EPA/ROD/R01-97/160
1997

EPA Superfund
Record of Decision:

FORT DEVENS-SUDBURY TRAINING ANNEX
EPA ID: MAD980520670
OU 01, 02, 03
SUDBURY, MA
09/30/1997

<IMG SRC 971600>
<IMG SRC 97160A>

RECORD OF DECISION
AREA OF CONTAMINATION A4
AND AREAS OF CONTAMINATION A7 AND A9
MANAGEMENT OF MIGRATION OPERABLE UNITS
U.S. ARMY SUDBURY ANNEX
MIDDLESEX COUNTY, MASSACHUSETTS

SEPTEMBER 1997

TABLE OF CONTENTS

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Areas of Contamination A4, A7, and A9
U.S. Army Sudbury Annex
Middlesex County, Massachusetts

STATEMENT OF PURPOSE AND BASIS

This decision document presents the U.S. Army's selected remedial action decision for Area of Contamination (AOC) A4 - Waste Dump and the Management of Migration Operable Units (OUs) at AOCs A7-Old Gravel Pit Landfill and A9-POL Burn Area, at the U.S. Army Sudbury Annex, Middlesex County, Massachusetts. It was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended, 42 USC °° 9601 et seq. and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as amended, 40 CFR Part 300, to the extent practicable. The Sudbury Annex Base Realignment and Closure (BRAC) Environmental Coordinator; the Devens Reserve Forces Training Area (RFTA) Installation Commander; and the Director of the Office of Site Remediation and Restoration, U.S. Environmental Protection Agency (USEPA) New England have been delegated the authority to approve this Record of Decision.

This decision document is based on the Administrative Record that has been developed in accordance with Section 113(k) of CERCLA. The Administrative Record is available for public review at the Devens BRAC Environmental Office, Building 666, Devens RFTA, Massachusetts, and at the Sudbury, Massachusetts Town Hall. The Administrative Record Index (Appendix D of this Record of Decision) identifies each of the items considered during selection of the remedial action.

DESCRIPTION OF THE SELECTED REMEDY

The U.S. Army and USEPA, with concurrence of the Massachusetts Department of Environmental Protection (MADEP), have determined that no action is necessary to ensure protection of human health and the environment at AOC A4 and the Management of Migration OUs at AOCs A7 and A9. Therefore, the Army's selected remedy is No Action Under CERCLA. At AOCs A7 and A9, previous removal and containment actions have eliminated underground storage tanks and removed or contained contaminated media which would otherwise be a continuing source of groundwater contamination.

DECLARATION

The U.S. Army and the USEPA, with concurrence of the MADEP, have determined that No Action Under CERCLA is necessary for protection of human health and the environment at AOC A4 and the Management of Migration OUs at AOCs A7 and A9. The selected remedy is consistent with CERCLA and to the extent practicable the NCP. Based on previous source area removal and containment actions and the results of the Site Investigation and Remedial Investigation, no action is necessary for AOC A4 and the Management of Migration OUs at AOCs A7 and A9 to ensure protection of human health and the environment.

Because this is a decision for No Action Under CERCLA, the statutory requirements of CERCLA Section 121 for remedial actions are not applicable, and no five-year review will be undertaken as part of this remedy. The Army will conduct long-term groundwater monitoring at AOC A7 as part of the remedy for the AOC A7 Source Control OU and will conduct five-year site reviews as part of that remedy.

The foregoing represents the decision for No Action Under CERCLA by the U.S. Department of the Army and the U.S. Environmental Protection Agency, with the concurrence of the Commonwealth of Massachusetts Department of Environmental Protection.

Concur and recommend for immediate implementation:

U.S. DEPARTMENT OF THE ARMY

<IMG SRC 97160B>

The foregoing represents the decision for No Action Under CERCLA by the U.S. Department of the Army and the U.S. Environmental Protection Agency, with the concurrence of the Commonwealth of Massachusetts Department of Environmental Protection.

Concur and recommend for immediate implementation:

<IMG SRC 97160C>

The foregoing represents the decision for No Action Under CERCLA by the U.S. Department of the Army and the U.S. Environmental Protection Agency, with the concurrence of the Commonwealth of Massachusetts Department of Environmental Protection.

Concur and recommend for immediate implementation:

<IMG SRC 97160D>

1.0 SITE NAME, LOCATION, AND DESCRIPTION

The U.S. Army Sudbury Annex (the Annex) is a National Priorities List (NPL) site under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). The Annex occupies approximately 4.3 square miles (2,750 acres) in the Massachusetts towns of Hudson, Marlborough, Maynard, Stow, and Sudbury. It is located approximately 20 miles west of Boston and 12 miles northwest of Natick, Massachusetts (Figure 1 in Appendix A). Hudson Road divides the installation into two sections: the larger, northern section, and the smaller, southern section. The Annex became part of Fort Devens, now the Devens Reserve Forces Training Area (RFTA), in 1982.

The Annex historically served as a munitions storage area, ordnance test area, research and development facility, and as a troop training ground. The Annex currently contains military family housing, guest housing, a geophysical radar station operated by the U.S. Air Force, and offices for the Federal Emergency Management Agency (FEMA).

This Record of Decision addresses past releases of contaminants to all media at Area of Contamination (AOC) A4-Waste Dump, and past releases to groundwater at AOC A7-Old Gravel Pit Landfill and AOC A9-Petroleum Oil, and Lubricant (POL) Burn Area. For the purposes of site remediation, a source control (soil) operable unit (OU) and a management of Migration (groundwater) OU was created for AOCs A7 and A9. Source control actions are documented in the Record of Decision for the source control OUs for AOCs A7 and A9. All three AOCs are located within the northern section of the Annex (Figure 2 in Appendix A).

In September 1995, the Annex was identified for cessation of operations and closure under the Defense Base Realignment and Closure (BRAC Act of September 1990, Closure is tentatively scheduled for November 1997. Except for a small area to be retained for Army housing within the southern section of the installation, the Annex will be transferred to three federal agencies. The majority of the land has been requested by the U.S. Fish and Wildlife Service (USFWS) and will become part of the Great Meadows National Wildlife Refuge. The U.S. Air Force and FEMA have also requested small parcels to continue their existing operations at the Annex.

A more complete description of the Annex can be found in the Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts, and the Addendum Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts, prepared by OHM Remediation Services, Inc. in 1994 and 1995, respectively). These reports, referred to as the SI/RI and SI/RI addendum reports in this Record of Decision, are both available for review at the BRAC Environmental Office at Devens RFTA, Devens Massachusetts, and the town libraries in Hudson, Maynard, and Stow.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 LAND USE AND RESPONSE HISTORY

The facility presently known as the Annex was established in the late 1930s as the Maynard Ammunition Sub-depot. The properly was acquired by the U.S. Government in 1942 and named the Maynard Ammunition Backup Storage Point. It was used for ammunition storage and as a loading point for ammunition being transported overseas. Following World War II, jurisdiction over the facility was transferred from the Chief of Transportation to the Chief of Ordnance. In 1950, control of the facility was transferred to the First Army, as a subinstallation of Fort Devens, for storage and training.

In 1952, the facility, under control of the Chief of Ordnance, became known as the Maynard Ordnance Test Station. From 1952 to 1957, the primary military activities at the facility involved classified research and development by the Universal Match Corporation and the Arthur D. Little Company that may have included rocket, pyrotechnics, and explosives testing. At the expiration of the Universal Match Corporation contract in 1957, the Ordnance Corps transferred control of the facility to the Quartermaster Corps to help relieve crowded conditions at the nearby Natick Laboratories. In December 1957, the facility was designated the Maynard Quartermaster Test Activity.

From 1957 to 1982, the Annex was used as a field resource by Natick Laboratories. The Natick Laboratories mission was research and development in the physical, behavioral, and biological sciences, and engineering to develop commodities such as clothing and protective equipment. Physical research and development activities included the development of air drop techniques, field shelters and equipment, field organization equipment, fuel delivery systems, and food and food service systems. Scientific research and development included determination of the stability of various fungicides in materials exposed to outdoor environments, foamed plastics field tests, flame testing of clothing and equipment, toxic fumigant effects on insects, and the study of climatic data in support of various test programs and air drop testing.

In 1982, operational control of the Annex was transferred to Fort Devens. From 1982 through 1994, the Annex was used by Fort Devens to support its mission to train active duty and reserve personnel, and to support the U.S. Army Security Agency Training Center and School, U.S. Army Reserves, National Guard, Reserve Officer Training Corps, and Air Defense sites in New England. By agreement with Fort Devens, Natick Laboratories retained certain use and occupancy rights after property transfer to Fort Devens. This agreement included conditional use of approximately 8 acres of land known as the POL Burn Area, use of a 30-acre area as an air drop zone, use of specific storage areas, and use of a field evaluation course.

Other agencies and organizations that have used or leased portions of the Annex include the U.S. Air Force and its contractors, Raytheon Corporation, Massachusetts Air National Guard, Massachusetts State Police Academy, Massachusetts Army National Guard, Massachusetts Fire Fighting Academy (MFFA), and FEMA.

2.1.1 AOC A4-Waste Dump

AOC A4 is located near the Eastern Gate and the intersection of Craven Lane and Patrol Road (Figure 3 in Appendix A). It occupies an area of approximately 1,000 by 200 feet along the northwestern side of Craven Lane, from Patrol Road to a wetland on the site's southwestern border. The center of the site consists of a grassy area, whereas trees and low bushes are present along the edges. The land surface slopes gradually from Craven Lane toward the southwest. Groundwater flow is toward the west and the wetland at the western site boundary. The site contains a surface dump near its southwest end and a building foundation dated to the late 1600's at the northeast end. At the time of the SI/RI, the ground surface was littered with plastic bags, empty food and beverage cans, empty paint cans, demolition debris, and glass. The site reportedly was used for the burial of unidentified chemical wastes and drums over a three to four year period from the late 1960s to early 1970s.

The following items summarize the history of AOC A4:

- Late 1960s to early 1970s. During this period, AOC A4 was reportedly used for the burial of unidentified chemical wastes and drums.

- 1980. AOC A4 (then designated Location 15) was identified as a suspected waste disposal site by the Army during a records search.

- 1983. The Army Environmental Health Agency (AEHA) performed an hydrogeologic and subsurface assessment which included installation of one groundwater monitoring well at AOC A4.

- 1984. A pre-CERCLA investigation was performed to characterize groundwater quality downgradient of reported dumping areas. Groundwater sampling indicated low concentrations of inorganics, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs). Of the detected analytes, iron, manganese and methylene chloride exceeded U.S. Environmental Protection Agency (USEPA) drinking water standards; however, iron and manganese concentrations were consistent with background concentrations and methylene chloride was concluded to be the result of laboratory contamination. It was concluded that the presence of other analytes not attributable to background conditions or laboratory procedures could be indicative of a low degree of groundwater contamination. Surface water and sediment samples collected from the bordering stream did not show significant contamination.

- 1991-1993. A two phase RI was performed to assess the nature and extent of contamination in surface soil, groundwater, sediment, and surface water at the site. Investigations included geophysical surveys to locate buried drums and other disposal debris, installation of additional groundwater monitoring wells and several test pits, collection of soil and groundwater samples, and a baseline risk assessment.

  Because of seasonal dry-weather conditions, surface water samples could not be collected, and shallow groundwater samples were substituted. This was subsequently identified as a data gap.

- 1996. Data gap investigations were performed to assess surface water contamination. The technical memorandum prepared to discuss the findings of the data gap activities concluded that chemicals of potential concern in surface water were present at or below background concentrations and did not pose unacceptable risk to human health or the environment. The technical memorandum recommended that no further action be taken concerning soil and groundwater at AOC A4.

A more detailed description of AOC A4 site history can be found in the Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts; the Addendum Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts; and the Final Technical Memorandum, Remedial (Data Gap) Investigation, Area of Contamination A4, US. Army Sudbury Annex. These three reports are available for review at the BRAC Environmental Office at Fort Devens, and the town libraries in Hudson, Maynard, and Stow.

2.1.2 AOC A7-Old Gravel Pit Landfill

AOC A7 is a 10-acre site located on the north side of Patrol Road along the northern installation boundary (Figure 4). The northern edge of the site is within approximately 100 feet of the Assabet River. The site is generally wooded, but does have a large sandy clearing near its center. The ground surface slopes toward the north and the Assabet River from Patrol Road.

Groundwater flow is also to the north. Aerial photographs indicate the area was first used as a source for gravel during the early 1940s.

Interviews with Natick Laboratories employees identified AOC A7 as the location of laboratory chemical dumping from the late 1950s through 1971. Chemicals were reportedly buried in a shallow trench as well as poured directly onto the ground. General refuse was reported buried at the site as early as 1941; a practice which continued into the 1980s. Refuse including metal pipes, abandoned fuel tanks, drums, and debris was observed during site investigations. Site P8, a reported transformer disposal site, is situated along the eastern edge of AOC A7. Site P8 was identified in 1990 as the possible location of transformer disposal within the A7 site. During the file search, no reference to transformer disposal at the site could be located.

The following items summarize the history of AOC A7:

- Early 1940s through early 1950's. Site used as a borrow pit.
- 1940's through 1980s. AOC A7 used for general refuse dumping, burning, and burial.
- Late 1950s through 1971. AOC A7 reportedly used for disposal of waste chemicals.
- 1980. AOC A7 (then designated Location 12) was identified as a dumping, chemical disposal, and burning ground by the Army during a records search.
- 1983. AEHA installed one groundwater monitoring well and performed groundwater sampling and analysis for drinking water parameters as part of an investigation to evaluate the hydrogeologic setting and groundwater quality. The only detections were low concentrations of fluoride and nitrate.
- 1984. A second monitoring well was installed and groundwater samples collected. In addition, surface water and sediment samples were collected from a small unnamed stream at the eastern edge of the site. Analytical results indicated potential groundwater contamination with phthalates and inorganics, including hexavalent chromium. Surface water samples contained low concentrations of iron and acetone, and sediment contained arsenic at concentrations consistent with background and low concentrations of several polynuclear aromatic hydrocarbons (PAHs).
- 1991-1993. A two phase RI was performed to assess the nature and extent of contamination in surface soil, subsurface soil, groundwater, sediment, and surface water at the site. Investigations included a geophysical study, test pit excavation with subsurface soil sampling, surface soil sampling, installation of soil borings with soil sampling, installation of additional groundwater monitoring wells with groundwater sampling, surface water and sediment sampling, an hydrogeologic assessment, an ecological assessment, and a baseline risk assessment.

  Although groundwater contamination was identified, the SI/RI addendum report was unable to conclude whether it had migrated beyond the installation boundary. This was identified as a data gap requiring additional investigation.
- 1993. A feasibility study was performed to evaluate potential remedial alternatives for source area (soil) and management of migration (groundwater) OUs at AOC A7.

- September 1995. The Record of Decision for the Source Control Operable Unit at AOC A7 was signed. The selected source area remedy included removal of chemical waste debris in the laboratory dump area, considered to be the primary source of groundwater contamination, construction of a double-barrier (RCRA Subtitle C) landfill cap to contain remaining site contaminants, operation and maintenance, institutional controls and land use restrictions to limit future use of the land at AOC A7, long-term groundwater monitoring, and five-year site reviews to assess whether the remedy remains protective of human health and the environment.

- July-November 1996. A part of the source area cleanup, chemical waste debris in the laboratory dump area, was excavated for off site disposal, and a double-barrier (RCRA Subtitle C) landfill cap was constructed to contain remaining site contaminants. The two-acre landfill cap was used to contain approximately 6,200 cubic yards of waste material from AOC A7 as well as 5,800 cubic yards of non-hazardous material from other Annex sites needed as fill to meet the design specifications for the cap.

- 1996. Data gap investigations were performed to assess whether groundwater contamination had migrated beyond the installation boundary. The technical memorandum prepared to discuss the findings of the data gap investigations concluded that although groundwater contamination was present beyond the installation boundary, it did not pose an unacceptable risk to human health or the environment. The technical memorandum recommended that no further action be taken concerning groundwater at AOC A7.

- February 1997. The Final Operations and Maintenance Plan For The Landfill At Area Of Concern A7 outlined the long-term monitoring program for AOC A7. The initial program includes semi-annual sampling of 13 monitoring wells located to enable assessment of contaminant migration from AOC A7. These monitoring wells include wells along the site perimeter and three wells located near the Assabet River to monitor potential contaminant migration toward the river. Samples will be analyzed, at a minimum for the following parameters: VOCs, pesticides, metals, phosphate, sulfate, chloride, nitrate, ammonia, total dissolved solids, chemical oxygen demand, dissolved oxygen, and cyanide.

A more detailed description of AOC A7 site history can be found in the Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts, the Addendum Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts; and the Final Technical Memorandum, Remedial (Data Gap) Investigation, Area of Contamination A7, U.S. Army Sudbury Annex. These three reports are available for review at the BRAC Environmental Office at Fort Devens, and the town libraries in Hudson, Maynard, and Stow.

2.1.3 AOC A9-POL Burn Area

AOC A9 is an eight acre site located on the north side of Patrol Road along the northern installation boundary, approximately 600 feet north of AOC A7 (Figure 5 in Appendix A). The northern edge of the site is within approximately 100 feet of the Assabet River. The site is level and predominately grassy with some pine and oak trees along the western and northern edge. Groundwater in the area flows toward the Assabet River.

AOC A9 was used for flame testing of fire regardant clothing, POL testing and/or storage, MFFA training, and destruction of confiscated fireworks. Testing of fire regardant clothing involved exposing clothing to a JP-4 jet fuel fire in an asphalt lined pit. A 1,000 gallon underground storage tank (UST) (Site P-12) was used to store JP-4 at the site, presumably to supply fuel for this testing. Testing reportedly occurred during a two week period each year from the late 1950s to the 1980s.

Starting around 1970, the MFFA used the area to conduct training on flammable liquid fires. This training reportedly involved extinguishing fires of No. 2 fuel oil and JP-4 tank bottoms floating on water in a shallow concrete pit. Other fire training was conducted in unlined pits and trenches. This training continued until at least 1994 and also included control of flames and smoke associated with the testing of fire regardant clothing by Natick Laboratories. Natick Laboratories also performed some POL testing at the site.

The Massachusetts State Police burned confiscated fireworks at AOC A9 from the early-to-mid 1970s until 1991.

During a 1986 site inspection by representatives by the Massachusetts Department of Environmental Quality Engineering (MADEQE), numerous drums of unidentified material were being stored at the site.

The following items summarize the history of AOC A9:

- Late 1950s-1986. Natick Laboratories conducted fire regardant clothing testing at the site.
- 1962. Natick laboratories began POL testing and continued for an unknown length of time.
- 1970-1984. MFFA conducted fire training exercises at the site.
- Mid 1970s-1991. Massachusetts State Police burned confiscated fireworks at the site.
- 1980. AOC A9 (then designated Location 4) was identified as a fire test facility by the Army during a records search.
- 1984. Investigation of the site begins. Samples collected between 1984 and 1987 indicate that surface soil is contaminated with PAHs, phthalates, and hydrocarbons. Groundwater is contaminated with chlorinated VOCs and fuel related hydrocarbons including ethylbenzene, toluene, and xylenes.
- March 1986. Representatives of the MADEQE observed standing oil in trenches, oil stained soils, and unmarked drums at the site.
- June 1986. All above ground tanks and drums are removed.
- 1987-1988. Approximately 1,100 cubic yards of contaminated soil are removed up to a depth of approximately 26 feet below ground surface (bgs) and disposed of under manifest.
- 1991-1993. A two phase RI was performed to assess the nature and extent of contamination in surface soil, subsurface soil, and groundwater at the site. Investigations included a geophysical study, soil-gas study, surface and subsurface soil sampling, installation of additional groundwater monitoring wells with groundwater sampling, an hydrogeologic assessment, an ecological assessment, and a baseline risk assessment.

  The SI/RI addendum report identified both petroleum-related and chlorinated solvent contamination in groundwater. Although free-phase chlorinated solvents were not encountered during SI/RI activities, the inability to rule out the presence of a dense non-aqueous phase liquid (DNAPL) plume was considered a data gap.
- 1992. The 1,000 gallon UST (Site P-12) and approximately 31 cubic yards of contaminated soil were removed.
- 1993. A feasibility study was performed to evaluate potential remedial alternatives for source area (soil) and management of Migration (groundwater) OUs at AOC A9.
- 1996. As part of the source area cleanup, approximately 11 cubic yards of contaminated soil from hot spot locations were excavated and transported to AOC A7 for containment under a landfill cap.
- 1996. Data gap investigations were performed to assess the presence or absence of DNAPL at AOC A9. The technical memorandum prepared to discuss the findings of the data gap investigations concluded that DNAPL plumes were not present and recommended that no further action be taken concerning groundwater at AOC A9.

A more detailed description of AOC A9 site history can be found in the Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts; the Addendum Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts; and the Final Technical Memorandum, Remedial (Data Gap) Investigation, Area of Contamination A9, U.S. Army Sudbury Annex. These three reports are available for review at the BRAC Environmental Office at Fort Devens, and the town libraries in Hudson, Maynard, and Stow.

2.2 ENFORCEMENT HISTORY

On January 29, 1987, the Annex was classified as a Federal Facility under the jurisdiction, custody, and control of the U.S. Department of Defense, within the meaning of Executive Order 12580, and within the meaning of the Defense Environmental Restoration Program (DERP), 10 U.S.C., Section 2701 et seq.

On February 21, 1990, the Annex was placed on the NPL under CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), to evaluate and implement response actions to cleanup past releases of hazardous substances, pollutants, and contaminants. A Federal Facility Agreement (FFA)

to establish a procedural framework for ensuring that appropriate response actions are implemented at the Annex was developed and signed by the U.S. Army and the USEPA Region I on May 13, 1991, and finalized on November 15, 1991. AOCs A4, A7, and A9 are considered subsites to the entire installation.

In 1991, the U.S. Department of Defense, through the U.S. Army Environmental Center (USAEC), initiated an SI/RI for AOCs A4, A7, and A9, and the final SI/RI report was issued in January 1994. An addendum to the report was issued in September 1995. The purpose of the SI/RI was to determine the nature and extent of contamination, assess human health and ecological risks, and assess whether additional response actions were necessary. A feasibility study to develop and evaluate candidate alternatives to protect human and ecological receptors from unacceptable risks associated with potential exposure to contaminated media at AOCs A7 and A9 was completed in 1995.

The Proposed Plan detailing the Army's plan of No Action Under CERCLA for AOC A4 and the Management of migration OUs at AOCs A7, and A9 was issued in June 1997 for public comment. Technical comments presented during the public comment period are included in the Administrative Record. The Responsiveness Summary, Appendix C to this Record of Decision, contains a summary of these comments and the Army's responses, and describes how these comments affected the No Action Under CERCLA decision.

3.0 COMMUNITY PARTICIPATION

The Army has held quarterly public Technical Review Committee (TRC) meetings, issued newsletters and press releases, and held a number of public meetings to keep the community and other interested parties informed of activities at the Annex.

In April 1992, the Army released, following public review, a community relations plan that outlined a program to address community concerns and keep citizens informed about and involved in remedial activities at the Annex. As part of this plan, the Army established a TRC, which first met May 13, 1991. The TRC, as required by SARA Section 211 and Army Regulation 200-1, included representatives from USEPA, USAEC, Fort Devens, Massachusetts Department of Environmental Protection (MADEP), U.S. Army Corps of Engineers (USACE), local officials, and the community. The TRC meets quarterly to review and provide technical comments on schedules, work plans, work products, and proposed activities for the study areas at Sudbury Annex. The SI/RI, SI/RI addendum, and feasibility study reports, technical memoranda, Proposed Plan, and other related support documents were submitted to the TRC for their review and comment.

During the week of June 9, 1997, the Army published a public notice announcing the Proposed Plan, public informational meeting, and public hearing in the Sudbury Town Crier, the Middlesex News, the Marlborough-Hudson Enterprise, the Stow Villager, and the Maynard Beacon. The Army also made the Proposed Plan available to the public at the information repositories at the libraries in Stow, Hudson, Sudbury, and Maynard, and at Devens RFTA.

From June 9 through July 8, 1997, the Army held a 30-day public comment period to accept public comments on the Proposed Plan. On June 10, 1997, the Army held an informal public hearing at the Stow Town Building, in Stow, Massachusetts to discuss the Proposed Plan and to accept verbal or written comments from the public. Verbal comments were received from the Four Town Focus and subsequently were elaborated upon in writing. Public comments and the Army's response to comments are included in the Responsiveness Summary (Appendix C of this Record of Decision).

All supporting documentation for the No Action Under CERCLA decision for AOC A4 and the Management of Migration OUs at AOCs A7 and A9 is contained in the Administrative Record The Administrative Record is a collection of all the documents considered by the Army in making the No Action Under CERCLA decision. On March 20, 1994, the Army made the Administrative Record available for public review at the Sudbury Annex BRAC Environmental Office, and at the Sudbury Town Hall, Sudbury, Massachusetts.

4.0 SCOPE AND ROLE OF RESPONSE ACTION

This No Action decision addresses all media at AOC A4 and the management of migration (i.e., groundwater) OUs at AOCs A7 and A9 at the U.S. Army Sudbury Annex. The risk assessments contained in the SI/RI and SI/RI addendum reports for these AOCs indicate that environmental media at AOC A4 and groundwater contamination at AOCs A7 and A9 does not pose an unacceptable risk to human health or the environment. Technical memoranda for AOCs A4, A7, and A9 completed subsequent to the SI/RI reports provide additional support for this conclusion. Based on this conclusion, the U.S. Army and the USEPA, with the concurrence of the MADEP, have determined that No Action Under CERCLA is required for AOC A4 and the Management of migration OUs at AOCs A7 and A9.

Potential risks to human health and the environment posed by AOC A4 have not previously been addressed by a Record of Decision. Potential risks to human health and the environment posed by source area OUs (i.e., contaminated soil and waste material) at AOCs A7 and A9 were addressed in the final Record of Decision for source control OUs for A7 and A9 signed in September 1995. No other OUs or known sources of contamination of concern exist at these AOCs.

USEPA has the authority to revisit the No Action Under CERCLA decision if future conditions indicate that an unacceptable risk to human health or the environment would result from exposure to contaminants at AOCs A4, A7, and A9. Such a review could occur even if the Annex is removed from the NPL.

5.0 SUMMARY OF SITE CHARACTERISTICS

The Army performed SI/RI activities in 1992 and 1993 and data gap activities in 1996 to characterize the nature and distribution of contaminants at AOCs A4, A7, and A9. Detailed descriptions of the investigations and available data are presented in the SI/RI and SI/RI addendum reports as well as technical memoranda. The following subsections summarize significant findings of the contamination assessments from those reports.

5.1 AOC A4

Soils. During the Phase I and Phase II RI sampling, eight surface soil and 23 subsurface soil samples were collected for analysis. In general, target analytes included Target Compound List (TCL) VOCs, SVOCs, pesticides, polychlorinated biphenyls (PCBs), chlorinated herbicides, explosives, and Target Analyte List (TAL) metals. Several samples were also analyzed for organophosphorus pesticides and total petroleum hydrocarbons (TPH).

VOCs were detected at low concentration in several Phase I samples; however, all were attributed to laboratory contamination or to naturally occurring turpenes. Only one SVOC, chrysene, was detected above soil screening concentrations. Because it was found in only one sample of 24, it was not considered a chemical of potential concern (COPC).

All pesticide detections were at concentrations less than Massachusetts Contingency Plan (MCP) S-1/GW-1 standards. TPH was detected at a maximum concentration of 35 Ig/g. PCBs and explosives were not detected. With the exception of lead and zinc, all metals were detected at concentrations less than screening criteria or at concentrations representative of background.

Groundwater. A total of 17 groundwater samples were collected from six monitoring wells during Phases I and II of the SI/RI. In general, target analytes included TCL VOCs, SVOCs, pesticides, PCBs, chlorinated herbicides, explosives, and TAL metals. Several samples were also analyzed for organophosphorus pesticides.

VOCs were not detected above screening criteria in any samples. Toluene was detected at a low concentration in the Phase I sample from one monitoring well; it was not detected in Phase II samples. Only one SVOC was detected; however, its presence was attributed to laboratory contamination. Pesticides were detected in samples from two monitoring wells at concentrations below federal drinking water Maximum Contaminant Levels (MCLs). PCBs and explosives were not detected.

Several inorganics were detected in groundwater. Of these, lead in one unfiltered Phase I sample showed the greatest potential to be a contaminant of concern. Analysis of unfiltered and filtered samples from the same monitoring well in Phase II showed unfiltered concentrations well below the federal drinking water action level of 15 micrograms per liter (Ig/L). Lead was not detected in the filtered sample. Aluminum, iron, and manganese were detected in several samples at concentrations greater than federal drinking water Secondary Maximum Contaminant Levels (SMCLs). No other metals were detected at concentrations above screening criteria.

Surface Water. Characterization of surface water during the Phase I and Phase II SI/RI included collection and analysis of seven surface water samples. Most of the samples were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, chlorinated herbicides, explosives, and TAL metals. Several samples were also analyzed for organophosphorus pesticides.

There were no positive identifications of VOCs and SVOCs or confirmations of explosives in the samples. The pesticides endrin aldehyde and 2,2-bis(para-chlorophenyl)-1,1,1-trichloroethane (DDT) and the herbicide dacthal were each reported once. No other pesticides or herbicides were reported.

Concentrations of metals, including lead, aluminum, chromium, copper, and zinc, exceeded aquatic life screening criteria at several locations. With the exception of zinc, exceedances were attributed to the

presence of high suspended particulate concentrations in the samples. Elevate concentrations of zinc were attributed to laboratory contamination. Concentrations of arsenic were below screening criteria for aquatic life, but exceeded human health screening criteria.

As part of data gap activities to assess surface water contamination, three surface water samples were collected in 1996 and, based on evaluation of previous data, analyzed for lead. Lead was not detected in two of the samples and was present at a concentration below background in the third.

Sediment. Sediment samples were collected from eleven locations during the Phase I and Phase II SI/RI. Most of the samples were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, chlorinated herbicides, explosives, and TAL metals. Phase II samples were also analyzed for organophosphorus pesticides.

Several VOCs and SVOCs were detected in sediment samples, but all were common laboratory contaminants and were not considered site-related. The pesticides 2,2-bis(para-chlorophenyl)-1,1-dichloroethane (DDD) and 2,2-bis(para-chlorophenyl)-1,1-dichloroethene (DDE) were both detected once at low concentrations. The explosive HMX was detected in one Phase I sample.

Concentrations of several metals, including arsenic, beryllium, barium, copper, lead, nickel, and selenium, were detected at concentrations exceeding screening criteria. However, the SI/RI addendum report concluded that detected concentrations were consistent with concentrations in the Assabet River and that distribution patterns did not suggest that AOC A4 was a significant contributor to sediment metal concentrations.

Summary. Surface and subsurface soil data are consistent with previous dumping of organic chemicals at the site. Elevated concentrations of lead were present at isolated locations. Groundwater data show concentrations of aluminum, iron, and manganese above SMCLs. Although concentrations of metals in SI/RI surface water samples appear high, this is likely the result of high concentrations of suspended matter in the samples. Surface water samples collected during data gap investigations had concentrations of lead which were less than background. AOC A4 does not show widespread contamination and does not appear to be a source of sediment or surface water contamination.

A complete discussion of AOC A4 site characteristics can be found in Section 2.0, of the SI/RI addendum report and the AOC A4 Technical Memorandum.

5.2 AOC A7

Soils. Characterization of soil during the SI/RI included collection of 14 surface soil samples, collection of 53 soil samples from 19 test pit locations, and collection of 27 soil boring and 2 hand-auger subsurface soil samples. In general, these samples were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, chlorinated herbicides, explosives, and TAL metals. A portion of Phase II samples were also analyzed for organophosphorus pesticides.

At the laboratory waste disposal area soil contaminants exceeding screening criteria were primarily pesticides and chlorinated VOCs. The organochlorine pesticides dieldrin, lindane, DDD, and DDT were detected at concentrations greater than screening criteria. Chlordane, heptachlor, heptachlor epoxide, DDE, and PCBs were also detected. The organophosphorus pesticides Demeton-0, Fenthion, and methyl parathion were also detected at concentrations greater than screening criteria. In the VOC analyses, 1,1,2-trichloroethane, 1,2-dichloroethane, chloroform, and tetrachloroethene were detected at concentrations greater than screening criteria. Acetone, chlorobenzene, ethylbenzene, trichloroethene, and xylenes were also detected. Lead was detected in all 10 subsurface soil samples from this area.

At the solid waste landfill, exceedances of screening criteria for were noted for DDT, DDD, and DDE only in the south-central portion of AOC A7. Within this small area, DDT, DDD, and DDE were detected at concentration above screening criteria. The only other compound detected above screening criteria in this area was the SVOC 2-methylnaphthalene.

In the southeastern portion of AOC A7, exceedances of screening criteria for the pesticides endrin, heptachlor epoxide, and total chlordane were noted in samples from test pit A7TPS. An exceedance of total chlordane was also noted in the sample from soil boring A7B12. Lead was detected in test pit A7TPS.

SVOCs were detected at concentrations greater than screening criteria at two closely spaced sampling locations in the north-central portion of AOC A7. Chrysene was detected at a depth of 2.0 to 4.0 feet bgs in test pit A7TPE. 2-Methynaphthalene, benzo(a)anthracene, and benzo(a)pyrene were detected at surface soil sampling location A7SO6.

Groundwater. Groundwater sampling during the SI/RI included collection of 30 samples from 10 monitoring wells. Target analytes generally consisted of TCL VOCs, SVOCs, pesticides, PCBs, chlorinated herbicides, explosives, phosphate, and TAL metals.

Groundwater quality in the vicinity of the laboratory waste disposal area was assessed with data from monitoring wells OHM-A7-8, OHM-A7-45, and OHM-A7-46. The groundwater quality downgradient (north) of this source area was assessed with data from monitoring wells OHM-A7-51 and OHM-A7-52. Exceedances of groundwater screening criteria were primarily noted in source area wells OHM-A7-8 and OHM-A7-46, and in downgradient monitoring well OHM-A7-51. The majority of the contaminants detected in the groundwater were also present at elevated concentrations in area soils.

The pesticides lindane, DDD, and dieldrin and the VOCs 1,1,2-trichloroethane, acetone, carbon tetrachloride, chloroform, and tetrachloroethene, all detected at elevated concentrations in area soils, were also detected in source area groundwater at concentrations exceeding screening criteria. Lead was not detected above screening criteria in any of the monitoring wells.

During the ground water sampling event performed in December 1993, both unfiltered and filtered groundwater samples were submitted for pesticide and PCB analysis for all monitoring wells in, and downgradient of, the laboratory waste disposal area. Pesticides were detected at similar concentrations in both the unfiltered and filtered samples from several monitoring wells.

Groundwater quality downgradient of the solid waste landfill area was assessed with data from ground water samples collected from monitoring wells OHM-A7-9, OHM-A7-10, OHM-A7-11, and OHM-A7-12. An exceedance of the drinking water action level for lead in one sampling round was not confirmed during two other sampling rounds. Lead is therefore not considered to be a contaminant of concern in groundwater in this area. Methylene chloride was detected a total of 5 times in these monitoring wells at concentrations slightly exceeding the MCL. Four of these detections occurred during the October 3, 1991 sampling event, while the fifth occurred during the June 25, 1992 sampling event. None of the methylene chloride detections were confirmed during other sampling events, and SI/RI report considered the positive detections laboratory artifacts. These analytical results indicate that buried solid waste in the central and eastern portions of AOC A7 is not significantly affecting groundwater quality at this time.

Data gap activities to assess contaminant migration in groundwater included installation of three new monitoring wells and collection and analysis of two rounds of groundwater samples from the three new and six existing monitoring wells. Target analytes consisted of VOCs and pesticides. The analytical results showed that contamination with VOCs and lindane did extend beyond the installation boundary, however, comparison of data from existing monitoring wells with previous data indicated that concentrations were generally lower than in earlier samples collected from those monitoring wells.

Surface Water. Characterization of surface water was based on seven surface water/sediment pair samples collected during the SI/RI and two surface water/sediment pair samples collected during earlier studies. In general, the surface water samples were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, chlorinated herbicides, explosives, and TAL metals. Phase II samples were also analyzed for phosphorus and organophosphorus pesticides.

VOCs and SVOCs were only detected in one sample collected in 1984. The reported organic compounds were all common laboratory contaminants, and the lack of confirmatory results from subsequent sampling led to the SI/RI conclusion that they are not contaminants of concern in the stream.

Arsenic was detected at A7SW2 and E3-BCK-DO3 at concentrations below the freshwater chronic Ambient Water Quality Criteria (AWQC), but above the human health AWQC. Although arsenic, lead, zinc and aluminum were detected in several surface water samples from AOC A7 and Study Area (SA) P9 at concentrations above USEPA Region I Environmental Services Assistance Team (ESAT) surface water and freshwater chronic AWQC criteria, all concentrations were below maximum background values. Elevated zinc concentrations were attributed to laboratory contamination, as the rinseate blank concentrations were comparable to the field sample concentrations. Aluminum exceeded ESAT criteria at A7SW2 and A7SW3. In general, there were no significant differences in metal concentrations between the upstream and downstream sample locations.

Sediment. Sediment characterization was based on seven surface water/sediment pair samples collected during the SI/RI and two surface water/sediment pair samples collected during earlier studies. Sediment samples were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, chlorinated herbicides, explosives, total organic carbon, and TAL metals. Phase II samples were also analyzed for phosphorus and organophosphorus pesticides.

VOCs were only detected in samples collected during the RI The three detected VOCs (acetone, methyl ethyl ketone, and methylene chloride) are common laboratory contaminants and were not considered site-related contaminants. Several PAHs were detected at one sampling location in 1984. PAHs were not detected in

the sediment sample which was collected immediately downstream of that location in 1993.

Pesticides and PCBs were not detected in the sediment samples from AOC A7. DDE and DDT were detected at concentrations above ESAT sediment criteria in one background sample. DDT, DDD, and DDE were also detected at concentrations above screening values in sediment samples collected from upstream locations at SA P9.

Arsenic, barium, nickel, and selenium were all detected at concentrations above ESAT sediment criteria.

Summary. Although several chemicals identified as soil contaminants of concern at AOC A7 were also detected in surface water or sediment samples, there was no significant difference in concentrations between samples collected upstream of the site and those collected downstream of the site. Therefore, the SI/RI concluded that site-related activities have not affected stream quality and that the stream is not acting as a pathway for contaminants to migrate from AOC A7 to the Assabet River. Groundwater data from data gap activities shows that concentrations of groundwater contaminants are decreasing.

A complete discussion of AOC A7 site characteristics can be found in Section 3.0, of the SI/RI addendum report. Supplemental information regarding 1996 groundwater sampling can be found in the AOC A7 Technical Memorandum.

5.3 AOC A9

Soils. A total of 11 surface soil and 46 subsurface soil samples were collected to characterize soil contamination during the SI/RI. In general, these samples were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, explosives, and TAL metals. Soil samples from Phase II borings were also analyzed for organophosphorus pesticides.

Chemicals detected above screening levels in AOC A9 soil samples were primarily metals. Arsenic was detected at concentrations above background at the upstream end of the culvert at the southwest corner of AOC A9; however, additional samples from the vicinity of the culvert indicate that it is not migrating downgradient. Its presence may have been related to past agricultural use. Lead was detected above background in one sample collected near the drum storage area, but not at several nearby locations, suggesting that lead contamination was not widespread. Thallium was also detected above background at one location.

Several VOCs and SVOCs were detected in surface and subsurface soil samples from AOC A9. Of these, acetone, methylene chloride, 2-methyl naphthalene, and di-n-butylphthalate exceeded screening criteria. Acetone and methylene chloride were attributed to laboratory contamination. Detected pesticide and PCB concentrations were less than local background upper confidence limits.

Data gap activities included the drilling of an additional soil boring along the interpreted migration pathway of a chlorinated VOC DNAPL plume and collecting split spoon samples at 5-foot intervals. Field screening of sample container headspace with a photoionization detector did not indicate the presence of any VOCs. In addition, no stains or odors suggesting the presence of DNAPLs were observed. Gas chromatograph screening of four samples and confirmatory analysis of two samples did not detect any VOCs.

Groundwater. Groundwater characterization during the SI/RI included review of data from 25 samples from a total of 15 monitoring wells. Target analytes generally consisted of TCL VOCs, SVOCs, pesticides, PCBs, explosives, phosphate, and TAL metals. The ten groundwater samples analyzed during Phase II investigations were also analyzed for organophosphorus pesticides.

Several chlorinated and petroleum related VOCs were detected in AOC A9 groundwater at concentrations above MCLs. Chlorinated VOCs (1,1,1-trichloroethane, 1,1-dichloroethene, methylene chloride, and trichloroethene) appear limited to an area downgradient of the fire-pit area. The petroleum-related compounds ethylbenzene and toluene were detected in monitoring wells downgradient of the former UST location. The SVOCs naphthalene and 2-methylnaphthalene and the explosives 3-nitrotoluene and 1,3,5-trinitrobenzene were also detected in monitoring wells in areas downgradient of the former UST location.

The only metal detected above drinking water standards was lead in a sample from downgradient of the former UST location. Its presence was considered consistent with the presence of petroleum compounds at the site.

Data gap activities included the collection and analysis of samples from four monitoring wells located within the area of historic chlorinated VOC groundwater contamination. Analysis was for VOCs only. Analytical results for three of the four wells showed VOC concentrations consistent with or less than previous results. Concentrations were somewhat higher than previously observed at the fourth monitoring

well, but provided no indication of a DNAPL plume.

Summary. Primary soil contaminants at AOC A9 include arsenic and lead at isolated locations, but do not appear widespread. Two groundwater plumes exist at the site: one containing chlorinated compounds downgradient of the fire-pit, and one containing petroleum-related compounds downgradient of the former UST location. Concentrations decrease with increasing downgradient distance, suggesting that degradation/attenuation is occurring. Data gap activities did not identify a DNAPL plume at AOC A9.

A complete discussion of AOC A9 site characteristics can be found in Section 4.0, of the SI/RI addendum report. Additional groundwater data can be found in the AOC A9 Technical Memorandum.

6.0 SUMMARY OF SITE RISKS

A Baseline Risk Assessment was completed for AOCs A4, A7, and A9 in 1994 during the Phase I SI/RI. A subsequent addendum to the risk assessment was prepared to evaluate whether data collected during the Phase II SI/RI modified the findings of the 1994 risk assessment. The risk assessments contained in the SI/RI and SI/RI addendum reports evaluate the probability and magnitude of potential adverse human health effects associated with exposure to contaminated media at AOCs A4, A7, and A9. The human health risk assessment followed a four step process: (1) contaminant identification, which identified those hazardous substances that, given the specifics of the site, were of significant concern, (2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure;(3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances, and (4) risk characterization, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the site, including carcinogenic and non-carcinogenic risks. A detailed discussion of the human health risk assessment approach and results is presented in Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts, and the Addendum Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts.

The human health risk assessments prepared in 1994 evaluated current and future exposure pathways which included, respectively, site trespassers and site residents. Since then, the reasonably foreseeable future use scenario of the majority of the Annex has changed from residential development to wildlife refuge, and the anticipated human exposure pathway for AOCs A4, A7, and A9 has changed from a residential pathway to a recreational pathway, however, the risk assessments were not revised and potential future risks under the new future use were qualitatively evaluated in the SI/RI addendum report. Under the base closure process, the Annex property will be transferred to three agencies, with the USFWS receiving approximately 2,000 acres of land. Therefore, the residential future use scenario evaluated in the risk assessments provides a conservative estimate of risk from exposure to site contaminants. Human exposure under a recreational use scenario would be much more limited than exposure under a residential use scenario.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying the exposure level by the chemical-specific cancer slope factor. Cancer slope factors have been developed by USEPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, the true risk is unlikely to be greater than the predicted risk. The resulting risk estimates are expressed in scientific notation as a probability (e.g., 1x10 -6 for 1/1,000,000) and indicate (using this example) that an individual has a one-in-a-million chance of developing cancer as a result of site-related exposure over 70 years to the particular compound at the stated concentration. Current USEPA practice considers cancer risks to be additive when assessing exposure to a mixture of hazardous substances.

The hazard index (HI) was also calculated for each exposure pathway as a measure of the potential for non-carcinogenic health effects. The HI is the sum of the hazard quotients (HQs) for individual chemicals with similar exposure pathways and toxic endpoints. A HQ is calculated by dividing the exposure level by the reference dose (RfD) or other suitable benchmark for non-carcinogenic health effects for each individual chemical. RfDs have been developed by USEPA to protect sensitive individuals over the course of a lifetime, and they reflect a daily exposure level that is likely to be without an appreciable risk of an adverse health effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. The HQ is often expressed as a single value (e.g., 0.3) indicating the ratio of the stated exposure to the RfD value (in this example, the exposure as characterized is approximately one third of an acceptable exposure level for the given chemical). The HQ is only considered additive for chemicals that have the same or similar toxic endpoint. (For example, the HQ for a chemical known to produce liver damage should not be added to a second whose toxic endpoint is kidney damage).

Under the current USEPA Superfund policy, acceptable exposures to carcinogens are those that represent an excess upper bound lifetime cancer risk of between 1 x 10 -4 and 1 x 10 -6. For noncarcinogenic effects, acceptable exposure levels are those with an HI of 1.0 or less.

A basewide ecological risk assessment that was not specific to individual AOCs was finalized in January 1994 as part of the SI/RI. The SI/RI addendum report supplemented the basewide assessment by including individual ecological risk assessments that focused on AOCs A4, A7, and A9.

The results of the human health risk assessments, followed by a discussion of the ecological risk assessment, are discussed below for AOCs A4, A7, and A9,.

6.1 SUMMARY OF RISKS AT AOC A4

The following subsections summarize the results of the baseline risk assessment and ecological risk assessment for AOC A4.

6.1.1 Human Health Risk Assessment Summary for AOC A4

The COPCs listed in Table 1 in Appendix B of this Record of Decision were selected for evaluation in the AOC A4 baseline human health risk assessment of the SI/RI report. These COPCs were selected to represent potential site-related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment.

Potential human health effects associated with exposure to the COPCs were estimated quantitatively or qualitatively through the development of hypothetical exposure pathways associated with current and anticipated future land use. These pathways, listed below, were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the site. A detailed discussion of the human health risk assessment approach and results is presented in the SI/RI report and the SI/RI addendum report.

Current Land Use

- Soil: Adolescent trespasser exposure to soil contaminants through direct contact and subsequent ingestion or dermal exposure.

Future Land Use

- Soil: Residential exposure through dermal exposure or ingestion
- Sediment: Residential exposure through dermal exposure or ingestion
- Groundwater: Residential exposure through ingestion

Table 2 in Appendix B of this Record of Decision summarizes the human health risks at AOC A4 identified in the baseline risk assessment of the SI/RI report. This table also shows which exposure pathways are most responsible for the estimated risks.

Review of Table 2 shows that for an adolescent under current land use conditions the estimated potential cancer risk for soil exposure is 2 x 10 -8 for Reasonable Maximum Exposure (RME) conditions and 1 x 10 -8 for central tendency or average exposure conditions. These values are below the USEPA 1 X 10 -4 to l x l0 -6 target risk range. The RME case assumes that all of a receptor's exposure is to the maximum contaminant concentrations observed at the site, and is therefore a conservative estimate. HIs for potential RME to noncarcinogenic COPCs in soil are well below USEPA's benchmark value of 1.0. There is no current use or exposure to groundwater.

Under the evaluated future residential scenario, the estimated potential cancer risks for soil are 3x10 -7 under RME conditions and 1x10 -7 under average conditions, both less than the USEPA target risk range of 1x10 -4 to lxl0 -6. Noncancer HIs associated with residential exposure to soil contaminants are 0.3 and 0.1 under RME and average conditions, respectively.

Under the evaluated future residential scenario, the estimated potential cancer risks for sediment are 3x10 -5 under RME conditions and 1x10 -5 under average conditions, both within the USEPA target risk range Of 1x10 -4 to 1x10 -6. Noncancer HIs associated with residential exposure to sediment contaminants are 0.1 and 0.07 under RME and average conditions, respectively.

The estimated potential cancer risks for groundwater under the evaluated future residential scenario are 6x10 -5 under RME conditions and 2x10 -5 under average conditions, both within the USEPA target risk

range Of 1x10 -4 to 1x10 -6. Noncancer HIs associated with residential exposure to groundwater contaminants are 0.5 and 0.1 under RME and average conditions, respectively.

The total estimated potential cancer risks for exposure to soil and groundwater under the evaluated future residential scenario are 6x10 -5 under RME conditions and 2x10 -5 under average conditions, both within the USEPA target risk range Of 1x10 -4 to 1x10 -6. Noncancer His associated with residential exposure to soil and groundwater contaminants are 0.8 and 0.2 under RME and average conditions, respectively.

Potential risks from exposure to lead were evaluated using the USEPA Uptake/Biokinetic (UBK) model. Assuming continuous consumption of groundwater with the maximum observed concentration of 190 Ig/L, the model predicts that blood lead levels in children would exceed the target level of 10 micrograms per deciliter after two years. Excluding this single value, lead concentrations at AOC A4 do not produce blood lead levels above the USEPA target value.

Chemicals with the greatest contribution to the baseline risk estimates were lead, bis(2-ethylhexyl)phthalate, and arsenic in groundwater and lead and arsenic in soil. Actual risks are likely to be substantially lower than indicated by the baseline risk assessment. Arsenic was present at background concentrations in soil and was detected only once in AOC A4 groundwater; the reported concentration, 3 Ig/L, was well below the MCL of 50 Ig/L. Lead concentrations were high in the October 1992 sampling round (190 Ig/L), but were not detected in other samples.

The SI/RI addendum report reviewed the data obtained during the Phase II SI/RI to evaluate whether modification of the baseline risk assessment was appropriate. The Phase II data were generally consistent with Phase I data. The data confirmed that high concentrations of lead do not appear widespread in soil or groundwater. Lead was not considered a concern in groundwater. Beryllium was detected at greater concentrations in soil, but still at concentrations considered indicative of background. Sediment concentrations of beryllium were also higher during Phase II sampling. Maximum detected concentrations beryllium resulted in a cancer risk of 1x10 -5, within the USEPA target range.

Using both Phase I and Phase II data, the Army concluded that contaminants at AOC A4, and groundwater contaminants in particular, do not pose an unacceptable risk to human health risk.

Surface water data collected during data gap activities showed that the data evaluated during the SI/RI were not representative of surface water conditions and that lead in surface water at and near AOC A4 poses no human health risk beyond background conditions.

6.1.2 Ecological Risk Assessment Summary for AOC A4

A number of chemicals were detected in samples from AOC A4 during the Phase I and II investigations. The ecological risk assessment of the SI/RI addendum report compared detected concentrations with background concentrations and with screening level toxicity criteria to assess whether the chemicals were COPCs. Tables 3-1 through 3-6 of the ecological risk assessment (Appendix C of the SI/RI addendum report) provide those comparisons. The tabulated chemicals include the following:

Soil

- metals, organochloride pesticides, herbicides, explosives, SVOCs, and chlorinated and non-chlorinated solvents

Groundwater

- chlorinated solvents, organochlonide pesticides, and acetone

Surface Water

- iron

Sediment

- metals, solvents, nitrosamine, and an insect repellent

The risk assessment concluded that there is no significant risk to ecological receptors.

Surface water data collected during data gap activities showed that the data evaluated during the SI/RI were not representative of surface water conditions and that lead in surface water at and near AOC A4 poses no ecological risk beyond background conditions.

6.2 SUMMARY OF RISKS AT AOC A7

The following subsections summarize the results of the baseline risk assessment and ecological risk assessment for AOC A7.

6.2.1 Human Health Risk Assessment Summary for AOC A7

The COPCs listed in Table 3 in Appendix B of this Record of Decision were selected for evaluation in the AOC A7 baseline human health risk assessment of the SI/RI report. These COPCs were selected to represent potential site-related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment.

Potential human health effects associated with exposure to the COPCs were estimated quantitatively or qualitatively through the development of hypothetical exposure pathways associated with current and anticipated future land use. These pathways, listed below, were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the site. A detailed discussion of the human health risk assessment approach and results is presented in the SI/RI report and the SI/RI addendum report.

Current Land Use

- Soil: Adolescent trespasser exposure to soil contaminants through direct contact and subsequent ingestion or dermal exposure.

Future Land Use

- Soil: Residential exposure through dermal exposure or ingestion
- Sediment: Residential exposure through dermal exposure or ingestion
- Groundwater: Residential exposure through ingestion

Table 4 in Appendix B of this Record of Decision summarizes the human health risks at AOC A4 identified in the baseline risk assessment of the SI/RI report. This table also shows which exposure pathways are most responsible for the estimated risks.

Review of Table 4 shows that for an adolescent under current land use conditions the estimated potential cancer risk for soil exposure is 3xl0 -5 for RME conditions and 3x10 -6 for central tendency or average exposure conditions. These values are within the USEPA 1x10 -4 to 1x10 -6 target risk range. The RME case assumes that all of a receptor's exposure is to the maximum contaminant concentrations observed at the site, and therefore a conservative estimate. HIs for potential RME to noncarcinogenic COPCs in soil are well below USEPA's benchmark value of 1.0. There is no current use or exposure to groundwater.

Under the evaluated future residential scenario, the estimated potential cancer risks for soil are 3x10 -4 under RME conditions, slightly greater than the USEPA target range of 1x10 -4 to 1x10 -6, and 4x10 -5 under average conditions, within the USEPA target risk range. Noncancer HIs associated with residential exposure to soil contaminants are 4 and 0.4 under RME and average conditions, respectively.

Under the evaluated future residential scenario, the estimated potential cancer risks for sediment are 2x10 -5 under RME conditions and 1x10 -5 under average conditions, both within the USEPA target risk range of 1x10 -4 to 1x10 -6. Noncancer HIs associated with residential exposure to sediment contaminants are 0.7 and 0.6 under RME and average conditions, respectively.

The estimated potential cancer risks for groundwater under the evaluated future residential scenario are 2x10 -4 under RME conditions, slightly greater than the USEPA target risk range of 1x10 -4 to 1x10 -6, and 3x10 -5 under average conditions, within the USEPA target risk range. Noncancer HIs associated with residential exposure to groundwater contaminants are 1 and 0.2 under RME and average conditions, respectively.

The total estimated potential cancer risks for exposure to soil and groundwater under the evaluated future residential scenario are 5xl0 -4 under RME conditions, slightly greater than the USEPA target risk range of 1x10 -4 to 1x10 -6, and 7x10 -5 under average conditions, within the USEPA target risk range of 1x10 -4 to 1x10 -6. Noncancer HIs associated with residential exposure to soil and groundwater contaminants are 5 and 0.6 under RME and average conditions, respectively.

Potential risks from exposure to lead were evaluated using the USEPA UBK model. Based on the UBK model, lead does not pose a health risk at AOC A7.

Much of the risk estimated for AOC A7 in the baseline risk assessment was associated with areas of localized contamination. As a result, for risks of the estimated magnitude to occur, frequent contact with these hotspots would be required. Such contact would be unlikely, even in the event of residential development. Consequently, actual risks would be lower, quite possibly substantially lower, than the estimated risks based on maximum concentrations.

The SI/RI addendum report reviewed the data obtained during the Phase II SI/RI to evaluate whether modification of the baseline risk assessment was appropriate. The Phase II data were generally consistent with Phase I data, although several chemicals were found at somewhat higher concentrations in Phase II samples. The SI/RI addendum report concluded that source area controls and incorporation of AOC A7 into the Great Meadows National Wildlife Refuge would lower potential exposure to levels within or below the USEPA target risk range. Source area controls consisting of removal of laboratory waste, construction of a RCRA Subtitle C multi-layer cap, institutional controls, and long-term groundwater monitoring were implemented in 1996. There is no current human health exposure pathway associated with groundwater at AOC A7. In addition, the property downgradient of AOC A7, between the site and the Assabet River, is zoned Recreation-Conservation and is classified as unbuildable by the Town of Stow. Following incorporation of AOC A7 into the Great Meadows National Wildlife Refuge, future residential exposure will not be a realistic exposure scenario.

6.2.2 Ecological Risk Assessment Summary for AOC A7

A number of chemicals were detected in samples from AOC A7 during the Phase I and II investigations. As a preliminary step, the ecological risk assessment of the SI/RI addendum report compared detected concentrations with background concentrations and with screening level toxicity criteria to assess whether the chemicals were COPCs. Only chemicals of potential ecological concern, as identified through screening, were carried through the ecological risk assessment. Tables 4-1 through 4-8 of the ecological risk assessment (Appendix C of the SI/RI addendum report) provide those comparisons. The tabulated chemicals include the following:

Soil

- metals, organochloride pesticides, VOCs, and SVOCs

Groundwater

- trace concentrations of solvents, pesticides, and an insect repellent (probably introduced during sampling)

Surface Water

- one pesticide

Sediment

- solvents and metals

As a result of the screening comparisons, the SI/RI addendum report identified the following chemicals of potential ecological concern at AOC A7:

Soil

- the pesticides DDT, dieldrin, endrin, and chlordane
- PCBs
- the PAHs benzo(a)anthracene, benzo(a)pyrene, and phenanthrene
- lead

Sediment

- the inorganics arsenic, barium, copper, and nickel

Groundwater

- the pesticides DDT, lindane, and heptachlor epoxide
- the chlorinated VOCs chloroform, tetrachloroethene, 1,1,2,2-tetrachloroethane, and trichloroethene

Potential risks to aquatic ecosystem were evaluated by comparing detected groundwater concentrations to Ambient Water Quality Criteria with consideration given to the dilution offered by surface water in the Assabet River and the ability of river sediments to bind contaminants and reduce their mobility. The SI/RI addendum report concluded that chemicals in site affected groundwater were likely to have an insignificant effect on aquatic life.

Potential risks to terrestrial ecosystems were evaluated by comparison of detected soil concentrations to dietary benchmark values for voles, shrews, and robins. With the exception of a very high HQ for exposure of the robin to DDT, all calculated HQs were less than 5. Although the HQ for the robin was high, the benchmark value was inconsistent with other data and considered suspect. The SI/RI addendum report concluded that chemicals in soil affected by the site do not pose a substantial risk to terrestrial receptors.

Although comparison of sediment data to available criteria suggested that potential adverse effects were possible, the results of a Rapid Bioassessment Protocol evaluation showed that conditions in the site's stream were typical of what would expected in the absence of contamination. Therefore, it was concluded that site conditions were not adversely affecting stream organisms.

In summary, the risk assessment concluded that there is no significant risk to ecological receptors at AOC A7.

6.3 SUMMARY OF RISKS AT AOC A9

The following subsections summarize the results of the baseline risk assessment and ecological risk assessment for AOC A9.

6.3.1 Human Health Risk Assessment Summary for AOC A9

The COPCs listed in Table 5 in Appendix B of this Record of Decision were selected for evaluation in the AOC A9 baseline human health risk assessment of the SI/RI report. These COPCs were selected to represent potential site-related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment.

Potential human health effects associated with exposure to the COPCs were estimated quantitatively or qualitatively through the development of hypothetical exposure pathways associated with current and anticipated future land use. These pathways, listed below, were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the site. A detailed discussion of the human health risk assessment approach and results is presented in the SI/RI report and the SI/RI addendum report.

Current Land Use

- Soil: Adolescent trespasser exposure to soil contaminants through direct contact and subsequent ingestion or dermal exposure.

Future Land Use

- Soil: Residential exposure through dermal exposure or ingestion
- Groundwater: Residential exposure through ingestion

Table 6 in Appendix B of this Record of Decision summarizes the human health risks at AOC A9 identified in the baseline risk assessment of the SI/RI report. This table also shows which exposure pathways are most responsible for the estimated risks.

Review of Table 6 shows that for an adolescent under current land use conditions the estimated potential cancer risk for soil exposure is 7x10 -6 for RME conditions and 2x10 -6 for central tendency or average exposure conditions. These values are within the USEPA 1x10 -4 to 1x10 -6 target risk range. The RME case assumes that all of a receptor's exposure is to the maximum contaminant concentrations observed at the site, and is therefore a conservative estimate. HIs for potential RME to noncarcinogenic COPCs in

soil are well below USEPA's benchmark value of 1.0. There is no current use or exposure to groundwater.

Under the evaluated future residential scenario, the estimated potential cancer risks for soil are 1x10 -4 under RME conditions, and 3x10 -5 under average conditions, both within the USEPA target risk range of 1x10 -4 to 1x10 -6. Noncancer HIs associated with residential exposure to soil contaminants are 0.6 and 0.2 under RME and average conditions, respectively.

The estimated potential cancer risks for groundwater under the evaluated future residential scenario are 2x10 -4 under RME conditions, slightly greater than the USEPA target risk range of 1x10 -4 to 1x10 -6, and 3x10 -5 under average conditions, within the USEPA target risk range of 1x10- 4 to lxl0 -6. Noncancer HIs associated with residential exposure to groundwater contaminants are 10 and 1 under RME and average conditions, respectively.

The total estimated potential cancer risks for exposure to soil and groundwater under the evaluated future residential scenario are 2x10 -4 under RME conditions, slightly greater than the USEPA target risk range of 1x10 -4 to 1x10 -6, and 6x10 -5 under average conditions, within the USEPA target risk range Of 1x10 -4 to 1x10 -6. Noncancer HIs associated with residential exposure to soil and groundwater contaminants are 10 and 1 under RME and average conditions, respectively.

Potential risks from exposure to lead were evaluated using the USEPA UBK Model. Based on the UBK model, lead does not pose a health risk at AOC A9.

It is likely that the baseline risk assessment provided a conservative estimate of the risks at AOC A9. Much of the baseline risk estimate was associated with sporadic detection of single chemicals and frequent repeated contact with these hotspots is unlikely. The chemical posing the greatest risk at AOC A9 was arsenic, which was detected in a single water sample at 4 Ig,/L, well below the MCL of 50 Ig/L. Several other chemicals which contributed to risk were also present in only a single sample.

The SI/RI addendum report reviewed the data obtained during the Phase II SI/RI to evaluate whether modification of the baseline risk assessment was appropriate. Because several VOCs were detected in Phase II groundwater data at concentrations greater than reported in the Phase I data, additional quantitative evaluation was performed under the residential exposure scenario. The re-estimate of cancer risks was somewhat greater (maximum risk of 1x10 -3) than reported in the baseline risk assessment, primarily as a result of higher 1,1-dichloroethene concentrations. However, the SI/RI addendum report stressed that AOC A9 groundwater does not meet MADEP criteria for a domestic water source and that its use as drinking water was unlikely. The potential for domestic use of groundwater is eliminated by incorporation of AOC A9 into the Great Meadows National Wildlife Refuge. The SI/RI addendum report concluded that natural attenuation processes would likely reduce contaminant concentrations and further reduce the evaluated exposure risks.

6.3.2 Ecological Risk Assessment Summary for AOC A9

A number of chemicals were detected in samples from AOC A9 during the Phase I and II investigations. As a preliminary step, the ecological risk assessment of the SI/RI addendum report compared detected concentrations with background concentrations and with screening level toxicity criteria to assess whether the chemicals were COPCs. Only chemicals of potential ecological concern, as identified through screening, were carried through the ecological risk assessment. Tables 5-1 through 5-6 of the ecological risk assessment (Appendix C of the SI/RI addendum report) provide those comparisons. The tabulated chemicals include the following:

Soil
- metals, organochloride pesticides, VOCs, and SVOCs

Groundwater
- explosives, pesticides, VOCs, SVOCs, chlorinated solvents, and an insect repellent (probably introduced during sampling)

As a result of the screening comparisons, the SI/RI addendum report identified the following chemicals of potential ecological concern at AOC A9:

Soil
- the inorganics arsenic, lead, and thallium

Groundwater
- the VOCs ethylbenzene, toluene, xylene, and 1,1,1-trichloroethane

Potential risks to aquatic ecosystems were evaluated by comparing detected groundwater concentrations to Ambient Water Quality Criteria. The only chemicals exceeding criteria (i.e., ethylbenzene, toluene, and lead) were in samples collected close to the center of the site and not in downgradient monitoring wells closer to the Assebet River; consequently, it appears that the chemicals are not migrating to the river and are not posing a risk to aquatic life. Furthermore, dilution provided by the river would reduce significantly any potential effect. The SI/RI addendum report concluded that chemicals in site-affected groundwater were likely to have an insignificant effect on aquatic life.

Potential risks to terrestrial ecosystems were evaluated by comparison of detected soil concentrations to dietary benchmark values for voles, shrews, and robins. Under the assumptions of the risk assessment, inorganics at AOC A9 may pose risks to small mammals and birds such as vole, shrews, and robins. However, based on the conservative nature of the screening level assessment; the SI/RI addendum report concluded that chemicals in soil affected by the site do not pose a substantial risk to terrestrial receptors.

In summary, the risk assessment concluded that there is no significant risk to ecological receptors at AOC A9.

7.0 DESCRIPTION OF THE NO ACTION ALTERNATIVE

Based on the results of the Baseline Risk Assessments and ecological risk assessments in the SI/RI and SI/RI addendum reports and the technical memoranda, No Action Under CERCLA is necessary to reduce contaminant concentrations or control human health or ecological exposure for AOC A4 and the Management of Migration OUs at AOCs A7 and A9. No five-year site reviews will be performed as part of this remedy.

Although there are no actions associated with the No Action Under CERCLA decision, the Army will continue to monitor groundwater at and conduct five-year site reviews for AOC A7 as part of the remedy for the AOC A7 Source Control OU. The Final Operations and Maintenance Plan for the Landfill Area of Concern A7 details the groundwater monitoring program. Land use restrictions associated with the source-area remedy will be described in the Environmental Condition of Property report and included in the property transfer documents.

8.0 DOCUMENTATION OF NO SIGNIFICANT CHANGES

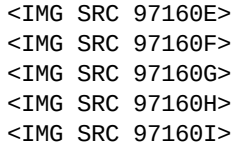
The U.S. Army presented a Proposed Plan for AOC A4 and the Management of Migration OUs at AOCs A7 and A9 on June 10, 1997. The Proposed Plan described the Army's plan to pursue No Action Under CERCLA at AOC A4 and the Management of Migration OUs for AOCs A7 and A9. There have been no significant changes made to the No Action Under CERCLA proposal stated in the Proposed Plan.

9.0 STATE ROLE

The Commonwealth of Massachusetts has reviewed the SI/RI, SI/RI addendum, and feasibility study reports, technical memoranda, and Proposed Plan and concurs with the No Action Under CERCLA decision. The Commonwealth has also reviewed these documents to determine if the decision complies with applicable or relevant and appropriate laws and regulations of the Commonwealth. A copy of the Declaration of State Concurrence is attached as Appendix E of this Record of Decision.

APPENDIX A

FIGURES



APPENDIX B
TABLES

TABLE 1
HUMAN HEALTH RISK ASSESSMENT CHEMICALS OF POTENTIAL CONCERN AT AOC A4

U.S. ARMY SUDBURY ANNEX
RECORD OF DECISION AOCs A4, A7, AND A9

	PHASEI			PHASEII		
CHEMICAL	SOIL	SEDIMENT	GROUND-WATER	SOIL	SEDIMENT	GROUND-WATER
VOLATILES						
Acetone	X	X	X		X	
Benzene					X	
Methylene chloride	X	X				
Methyl ethyl ketone					X	
Toluene			X			
alpha-Pinene	X					
SEMIVOLATILES						
Anthracene				X		
Benzo(a)anthracene				X		
Benzo(a)Pyrene				X		
Benzo(g,h,i)perylene				X		
bis(2-ethylhexyl)phthalate	X		X	X	X	
Chrysene				X		
Di-n-butylphthalate	X					
Fluoranthene	X			X		
Indeno(1,2,3-c,d)pyrene				X		
Phenanthrene	X			X		
PESTICIDES AND PCB						
DDE	X			X	X	
DDT	X			X		
Heptachlor epoxide			X			
DEET			X			
alpha-Endosulfan	X					
beta-Endosulfan			X			
EXPLOSIVES						
HMX		X				
INORGANICS						
Aluminum		X	X	X	X	X
Antimony	X					
Arsenic	X	X	X	X		
Barium	X	X		X	X	
Beryllium	X			X	X	
Cadmium	X			X		
Calcium	X	X	X	X	X	
Chromium	X	X		X		
Cobalt	X	X		X		
Copper	X	X		X	X	
Iron	X	X	X	X		X
Lead	X	X	X	X		X
Magnesium	X	X	X	X		X
Manganese	X	X	X			
Mercury	X		X	X		

TABLE 1
HUMAN HEALTH RISK ASSESSMENT CHEMICALS OF POTENTIAL CONCERN AT AOC A4

U.S. ARMY SUDBURY ANNEX
RECORD OF DECISION AOCs A4, A7, AND A9

	PHASE I			PHASE II		
CHEMICAL	SOIL	SEDIMENT	GROUND-WATER	SOIL	SEDIMENT	GROUND-WATER
Nickel	X	X	X	X		
Potassium	X	X	X	X	X	
Selenium					X	
Sodium			X	X	X	
Vanadium	X	X		X	X	
Zinc	X	X	X	X	X	
MISCELLANEOUS						
TOC	X	X		X	X	
TPH				X		

Notes:

TOC = total organic carbon
TPH = total petroleum hydrocarbons
DDE = 2,2-bis(para-chlorophenyl)-1,1-dichloroethene
DDT = 2,2-bis(para-chlorophenyl)-1,1,1-trichloroethene
DEET = N,N-Diethyl-3 methylbenzamide
HMX = Cyclotetramethylenetetranitramine

TABLE 2
SUMMARY OF HUMAN HEALTH BASELINE RISK ASSESSMENT FOR AOC A4

U.S. ARMY SUDBURY ANNEX
RECORD OF DECISION FOR AOCs A4, A7, AND A9

Exposure Pathway	Central Tendency		Reasonable Maximum Exposure	
	Cancer Risk	Hazard Index	Cancer Risk	Hazard Index
Current Land Use				
Soil				
Adolescent exposure to soil contaminants through ingestion and dermal adsorption	1E-08	0.02	2E-08	0.05
Future Land Use				
Soil				
Residential exposure to soil contaminants through ingestion and dermal adsorption	1E-07	0.1	3E-07	0.3
Sediment				
Residential exposure to soil contaminants through ingestion and dermal adsorption	1E-05	0.07	3E-05	0.1
Groundwater				
Residential exposure to contaminants through groundwater use	2E-05	0.1	6E-05	0.5
Total Future Risk: Soil and Groundwater	2E-05	0.2	6E-05	0.8

TABLE 3
HUMAN HEALTH RISK ASSESSMENT CHEMICALS OF POTENTIAL CONCERN AT AOC A7

U.S. ARMY SUDBURY ANNEX
RECORD OF DECISION AOCs A4, A7, AND A9

	PHASE I			PHASE II		
CHEMICAL	SOIL	SEDIMENT	GROUND-WATER	SOIL	SEDIMENT	GROUND-WATER
VOLATILES						
cis-1,2-Dichlorethylene						X
1,1,1-Trichlorethane						X
1,1,2-Trichloroethane	X					X
1,2-Dichlorethane	X					
Acetone	X	X	X		X	X
Carbon tetrachloride						X
Chlorobenzene	X		X	X		X
Chloroform	X		X	X		X
Chloromethane			X			
Ethylbenzene				X		
Methylene chloride	X	X	X	X		
Methyl ethyl ketone				X	X	
Nonane	X					
Octane	X					
Propylbenzene	X					
Tetrachloroethylene	X		X	X		X
Toluene	X		X			
Trichlorethylene	X					X
Trichlorfluoromethane	X					
Xylenes (total)	X			X		
alpha-Pinene	X					
SEMIVOLATILES						
1,2,3,4-Tetramethylbenzene	X					
1,3,5-Trimethylbenzene	X					
1-Ethyl-2-methylbenzene	X					
2-Methylnaphthalene	X			X		
Anthracene	X					
Benzo(a)anthracene	X					
Benzo(a)pyrene	X					
Benzo(b)fluoranthene	X					
Benzo(g,h,i)perylene	X					
bis(2-ethylhexyl)phthalate	X	X		X		
Chrysene	X					
Di-n-butylphthalate	X	X	X	X		
Fluoranthene	X					
Fluorene	X					
Hexadecanoic acid	X					
Indeno(1,2,3-c,d)pyrene	X					
N,N-bis(2-hydroxyethyl) dodecanamide		X				
N-Nitrosodi-N-propylamine		X				
Naphthalene	X		X			

TABLE 3
HUMAN HEALTH RISK ASSESSMENT CHEMICALS OF POTENTIAL CONCERN AT AOC A7

U.S. ARMY SUDBURY ANNEX
RECORD OF DECISION AOCs A4, A7, AND A9

	PHASE I			PHASE II		
CHEMICAL	SOIL	SEDIMENT	GROUND-WATER	SOIL	SEDIMENT	GROUND-WATER
Octadecanoic acid	X					
Phenanthrene	X			X		
Pyrene	X					
PESTICIDES AND PCB						
DDD	X		X	X		X
DDE	X			X		
DDT	X		X	X		
Dieldrin	X		X	X		
Endrin			X			
Endrin aldehyde			X			
Endosulfan sulfate	X					
Heptachlor	X					
Heptachlor epoxide	X		X	X		
Lindane	X		X	X		X
PCB 1242	X					
PCB 1248	X					
PCB 1254	X					
PCB 1260	X			X		
alpha-Benzenehexachloride			X			X
beta-Benzenehexachloride	X					
alpha-Chlordane	X		X	X		
gamma-Chlordane	X			X		
alpha-Endosulfan	X					
beta-Endosulfan	X		X	X		
Demeton-O				X		
Fenthion				X		
Methyl parathion				X		
EXPLOSIVES						
Cyclonite (RDX)	X					
INORGANICS						
Aluminum	X	X	X			
Arsenic	X	X	X	X	X	
Barium	X	X	X	X	X	
Beryllium	X	X		X		
Cadmium	X			X		
Calcium	X	X	X	X	X	
Chromium	X	X	X	X		
Cobalt	X	X		X		
Copper	X	X	X			
Iron	X	X	X	X	X	
Lead	X	X	X	X		
Magnesium	X	X	X	X		
Manganese	X	X	X	X		

TABLE 3
HUMAN HEALTH RISK ASSESSMENT CHEMICALS OF POTENTIAL CONCERN AT AOC A7

U.S. ARMY SUDBURY ANNEX
RECORD OF DECISION AOCs A4, A7, AND A9

	PHASE I			PHASE II		
CHEMICAL	SOIL	SEDIMENT	GROUND-WATER	SOIL	SEDIMENT	GROUND-WATER
Mercury	X			X		
Nickel	X	X		X		
Potassium	X	X	X	X		
Selenium					X	
Silver	X			X		
Sodium			X	X		
Vanadium	X	X	X	X		
Zinc	X	X	X	X	X	
MISCELLANEOUS						
Dacthal (DCPA)	X					
Silvex	X					
Phosphate			X	X	X	
Sulfur	X					
TOC	X	X		X	X	

Notes:

DDD = 2,2-bis(para-chlorophenyl)-1,1 -dichloroethane
DDE = 2,2-bis(para-chlorophenyl)-1,1 -dichloroethene
DDT = 2,2-bis(para-chlorophenyl)-1,1,1 -thrichloroethene
TOC = total organic carbon

TABLE 4
SUMMARY OF HUMAN HEALTH BASELINE RISK ASSESSMENT FOR AOC A7

U.S. ARMY SUDBURY ANNEX
RECORD OF DECISION FOR AOCs A4, A7, AND AS

Exposure Pathway	Central Tendency		Reasonable Maximum Exposure	
	Cancer Risk	Hazard Index	Cancer Risk	Hazard Index
Current Land Use				
Soil				
Adolescent exposure to soil contaminants through ingestion and dermal adsorption	3E-06	0.09	3E-05	0.9
Future Land Use				
Soil				
Residential exposure to soil contaminants through ingestion and dermal adsorption	4E-05	0.4	3E-04	4
Sediment				
Residential exposure to soil contaminants through ingestion and dermal adsorption	1E-05	0.6	2E-05	0.7
Groundwater				
Residential exposure to contaminants through groundwater use	3E-05	0.2	2E-04	1
Total Future Risk: Soil and Groundwater	7E-05	0.6	5E-04	5

TABLE 5

HUMAN HEALTH RISK ASSESSMENT CHEMICALS OF POTENTIAL CONCERN AT AOC A9

U.S. ARMY SUDBURY ANNEX
RECORD OF DECISION ACOCs A4, A7, AND A9

	PHASE I		PHASE II	
CHEMICAL	SOIL	GROUNDWATER	SOIL	GROUNDWATER
VOLATILES				
cis- 1,2-Dichlorethylene				
1,1,1-Trichlorethane	X	X	X	X
1,1,2-Trichloroethane				
1,1-Dichlorethylene		X		X
1,2-Dichlorethane				
1,1,3-Trimethylcyclohexane	X			
1,3-Dimethylclohexane	X			
1,4-Dimethycyclohexane	X			
Acetone	X	X		X
Carbon tetrachloride				
Chlorobenzene				
Chloroform				
Chloromethane				
Ethylbenzene	X	X	X	X
Ethylmethyl benzene		X		
Methylene chloride	X	X		
Methyl ethyl ketone	X			
Nonane				
Octane				
Tetrachloroethylene				
Toluene		X	X	X
Trichlorethylene		X		X
Trichlorfluoromethane				
Xylenes (total)	X	X	X	X
alpha-Pinene	X			
SEMIVOLATILES				
1,2,3,4-Tetramethyl benzene		X		
1,2,3-Trimethylbenzene		X		
1,3,5-Trimethylbenzene				
1-Ethyl-2-methylbenzene		X		
1-Methylnaphthalene		X		
2-Methylnaphthalene	X	X	X	X
Anthracene				
Benzo(a)anthracene				
Benzo(a)pyrene	X			
Benzo(b)fluoranthene				
Benzo(g,h,i)perylene				
bis(2-ethylhexyl)phthalate	X	X	X	
Chrysene	X			
Dibenzofuran	X		X	
Di-N-butylphthalate	X	X		

TABLE 5
HUMAN HEALTH RISK ASSESSMENT CHEMICALS OF POTENTIAL CONCERN AT AOC A9

U.S. ARMY SUDBURY ANNEX
RECORD OF DECISION AOCs A4, A7, AND A9

	PHASE I		PHASE II	
CHEMICAL	SOIL	GROUNDWATER	SOIL	GROUNDWATER
Di-N-octylphthalate	X			
Fluoranthene	X		X	
Fluorene	X			
Hexadecanoic acid				
Indeno(1,2,3-c,d)pyrene	X			
N,N-bis(2 hydroxyethyl)dodecanamide				
N-Nitrosodi-N-propylamine				
Naphthalene	X	X	X	X
Octadecanoic acid				
Phenanthrene	X		X	
Pyrene	X			
PESTICIDES AND PCB				
DEET		X		
DDD	X			
DDE	X			
DDT	X			
Endrin aldehyde		X		
Heptachlor epoxide	X	X		
PCB 1254		X		
alpha-Chlordane		X		
beta-Endosulfan		X	X	
EXPLOSIVES				
2,6-Dinitrotoluene	X			
1,3,5-Trinitrobenzene		X		
2,4,6-Trinitrotoluene		X		
3-Nitrotoluene		X		
INORGANICS				
Aluminum	X		X	X
Antimony				
Arsenic	X	X	X	X
Barium	X		X	
Beryllium	X		X	
Cadmium	X			
Calcium	X	X	X	X
Chromium	X	X	X	
Cobalt	X		X	
Copper	X	X	X	
Iron	X	X	X	X
Lead	X	X	X	X
Magnesium	X	X	X	X
Manganese	X	X		
Mercury	X			

TABLE 5
HUMAN HEALTH RISK ASSESSMENT CHEMICALS OF POTENTIAL CONCERN AT AOC A9

U.S. ARMY SUDBURY ANNEX
RECORD OF DECISION AOCs A4, A7, AND A9

	PHASE I		PHASE II	
CHEMICAL	SOIL	GROUNDWATER	SOIL	GROUNDWATER
Nickel	X		X	
Potassium	X	X	X	X
Selenium			X	
Sodium		X	X	X
Thallium			X	
Vanadium	X		X	
Zinc	X	X	X	X
MISCELLANEOUS				
Phosphate		X		
TOC	X		X	

Notes:

DDD = 2,2-bis(para-chlorophenyl)-1,1-dichloroethane
DDE = 2,2-bis(para-chlorophenyl)-l,1-dichloroethene
DDT = 2,2-bis(para-chlorophenyl)-1,1,1-thrichloroethene
DEET = N,N-Diethyl-3 methylbenzamide
TOC = total organic carbon

TABLE 6
SUMMARY OF HUMAN HEALTH BASELINE RISK ASSESSMENT FOR AOC A9

U.S. ARMY SUDBURY ANNEX
RECORD OF DECISION FOR AOCs A4, A7, AND A9

Exposure Pathway	Central Tendency		Reasonable Maximum Exposure	
	Cancer Risk	Hazard Index	Cancer Risk	Hazard Index
Current Land Use				
Soil				
Adolescent exposure to soil contaminants through ingestion and dermal adsorption	2E-06	0.03	7E-06	0.1
Future Land Use				
Soil				
Residential exposure to soil contaminants through ingestion and dermal adsorption	3E-05	0.2	1E-04	0.6
Groundwater				
Residential exposure to contaminants through groundwater use	3E-05	1	2E-04	10
Total Future Risk: Soil and Groundwater	6E-05	1	2E-04	10

APPENDIX C

RESPONSIVENESS SUMMARY

This Responsiveness Summary has been prepared to meet the requirements of Sections 113(k)(2)(B)(iv) and 117(b) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), which requires response to "significant comments, criticisms, and new data submitted in written or oral presentations" on a proposed plan for remedial action. The purpose of this Responsiveness Summary is to document Army responses to questions and comments expressed during the public comment period by the public, potentially responsible parties, and governmental bodies in written and oral comments regarding the Proposed Plan for Area of Contamination (AOC) A4 and the management of migration operable units (OUs) for AOCs A7 and A9 at the U.S. Army Sudbury Annex.

The Army held a 30-day public comment period from June 9 through July 8, 1997, to provide an opportunity for interested parties to comment on the site investigation/remedial investigation (SI/RI) reports, feasibility study, technical memoranda, Proposed Plan, and other documents developed to address contamination at AOCs A4, A7, and A9 at the U.S. Army Sudbury Annex A4, A7, and A9 and evaluated potential human health and ecological risks. In addition, data The SI/RI characterized soil, sediment, groundwater, and surface water contamination at AOCs gap activities were performed to fill in data gaps identified in the SI/RI and SI/RI addendum reports. Based on the results of the SI/RI, SI/RI addendum, and technical memoranda summarizing data gap activities, the Army concluded that AOC A4 and management of migration OUs at AOCs A7 and A9 did not pose unacceptable risks to human health or the environment. The Army identified its proposal for No Action Under CERCLA in the Proposed Plan issued on June 9, 1997.

All documents considered in arriving at the No Action Under CERCLA decision were placed in the Administrative Record for review. The Administrative Record contains all supporting documentation considered by the Army in choosing the remedy for AOCs A4, A7, and A9. The Administrative Record is available for public review at the U.S. Army Sudbury Annex BRAC Environmental Office, and at the Sudbury Town Hall, Sudbury, Massachusetts. An index to the Administrative Record is available at the U.S. Environmental Protection Agency (USEPA) Records Center, 90 Canal Street, Boston, Massachusetts and is provided as Appendix D to this Record of Decision.

This Responsiveness Summary is organized into the following sections:

I. Statement of Why the Army Recommended No Further Action-This section briefly states why the Army recommended No Action Under CERCLA.

II. Background on Community Involvement-This section provides a brief history of community involvement and Army initiatives in informing the community of site activities.

III. Summary of Comments Received During the Public Comment Period and Army Responses-This section provides Army responses to oral and written comments received from the public during the public comment period. A transcript of the public meeting consisting of all comments received during this meeting and copies of written comments are also provided in Attachment C of this Responsiveness Summary.

I. STATEMENT OF WHY THE ARMY RECOMMENDED NO ACTION UNDER CERCLA

The Army recommended No Action Under CERCLA because the risk assessments of the SI/RI indicate no unacceptable risks to human health under the evaluated exposure scenario of future residential development or to the environment. Actual future use of AOCs A4, A7, and A9 will be as part of the Great Meadows National Wildlife Refuge, and future residential exposure will not occur. Because of this potential risks would be lower than those estimated in the risk assessment.

II. BACKGROUND ON COMMUNITY INVOLVEMENT

The Army has held quarterly public Technical Review Committee (TRC) meetings, issued newsletters and press releases, and held a number of public meetings to keep the community and other interested parties informed of activities at the Annex.

In April 1992, the Army released, following public review, a community relations plan that outlined a program to address community concerns and keep citizens informed about and involved in remedial activities at the Annex. As part of this plan, the Army established a TRC, which first met May 13, 1991. The TRC, as required by SARA Section 211 and Army Regulation 200-1, included representatives from USEPA, U.S. Army Environmental Center (USAEC), Fort Devens, Massachusetts Department of Environmental Protection

(MADEP), U.S. Army Corps of Engineers (USACE), local officials, and the community. The TRC generally met quarterly to review and provide technical comments on schedules, work plans, work products, and proposed activities for the study areas at the Annex. The SI/RI, SI/RI addendum, and feasibility study reports, technical memoranda, Proposed Plan, and other related support documents were submitted to the TRC for their review and comment.

During the week of June 9, 1997, the Army published a public notice announcing the Proposed Plan, public informational meeting, and public hearing in the Sudbury Town Crier, the Middlesex News, the Marlborough-Hudson Enterprise, the Stow Villager, and the Maynard Beacon. The Army also made the Proposed Plan available to the public at the information repositories at the libraries in Stow, Hudson, Sudbury, and Maynard, and at Devens Reserve Forces Training Area (RFTA).

From June 9 through July 8, 1976, the Army held a 30-day public comment period to accept public comments on the Proposed Plan. On June 10, 1997, the Army held an informal public hearing at the Stow Town Building, in Stow, Massachusetts to discuss the Proposed Plan and to accept verbal or written comments from the public. Verbal comments were received and subsequently confirmed in writing. Attachment C contains a transcript of the public hearing.

All supporting documentation for the No Action Under CERCLA decision for AOC A4 and Management Of Migration OUs at AOCs A7 and A9 is contained in the Administrative Record. The Administrative Record is a collection of all the documents considered by the Army in making the No Action Under CERCLA decision. On March 20, 1994, the Army made the Administrative Record available for public review at the U.S. Army Sudbury Annex BRAC Environmental Office, and at the Sudbury Town Hall, Sudbury, Massachusetts.

III. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND ARMY RESPONSES

The Army received verbal comments from one citizen representative of the Four Town Focus during the public hearing (see Attachment C). These comments were subsequently confirmed in writing in a letter dated June 23, 1997 from Cambridge Environmental, Inc. (Attachment A). Because of the similarities of the verbal and written comments, the Army has prepared written responses for only the written comments. These responses are contained in Attachment B.

APPENDIX C

ATTACHMENT A - WRITTEN COMMENTS

<IMG SRC 97160J>

June 23, 1997

Thomas Strunk
Sudbury Annex BEC
43 Buena Vista Street
P12 Box 224
Devens, MA 01433

Dear Mr. Strunk:

In response to the public meeting held on June 10, 1997, Four Town Focus (Focus) would like to offer the following additional comments concerning the proposed determination of no further action for site A7. These comments are intended to augment (and not replace) the comments submitted on June 6, 1997. At this time, Focus is not convinced that all necessary steps have been taken to ensure that contamination from this landfill will not cause a threat to human health and/or the environment.

1. The potential risk to the environment from contaminated groundwater at site A7 has not been fully evaluated. The Ambient Water Quality Criteria (AWQC) and/or the Maximum Contaminant Levels (MCLs) for several VOCs, metals, and lindane have been exceeded by concentrations measured in groundwater. In the most recent sampling rounds, the pesticide lindane, for example, has been detected at concentrations 14 times the MCL on site and 1.6 times the MCL down-gradient of the site.

   The Remedial (Data-Gap) Investigation reports that adsorption of chemicals by sediments and dilution of contaminants by the river would reduce contaminant concentrations in the surface water and thus it is unlikely that site A7 may pose a significant ecological risk. As stated in our letter dated June 6, 1997, sampling in the Assabet River would confirm that contaminant migration is not posing a risk to environmental receptors. A quantitative justification of the adsorption and dilution of all contaminants that exceed AWQC should also be provided to further demonstrate your position of no significant risk. Further, if these contaminants are discharging to the Assabet, and have in the past, is there a possibility that these chemicals have accumulated in the sediments? Again, Focus would like a quantitative analysis of this matter.

2. The historical groundwater data presented in Table 1 shows that manganese exceeds the federal MCL in all analyzed samples. Other metals including lead, iron, and aluminum also exceeded the MCLs. Given these exceedences, why were the metals not sampled in subsequent groundwater testing? The potential risk to human health and the environment from metals in the groundwater have not been fully evaluated.

3. Groundwater was sampled between the Annex and the Assabet River. Who owns this property? What zoning exists on this property? Is residential development feasible? Since the groundwater sampled in this area has been shown to be unfit for human consumption, residential development should be restricted. Are any measures being taken to ensure that residential development will not occur in the future on this property?

4. Impacts to the bedrock aquifer have not been fully investigated. One bedrock well, OHM-A7-11, was sampled in earlier rounds only. Incidently, Figure 3 incorrectly depicts the screen elevation for this well. Dichloromethane and manganese concentrations exceeded the MCLs. Thus, potential off-site migration of these contaminants should be considered, especially if there are homes using private drinking water wells down-gradient of the site (see comment #5). Further, OHM-A7-11 is located northeast of the contaminant plume and would not capture contaminant migration from this disposal area.

Additional bedrock wells should be installed and sampled to determine if contaminated groundwater is reaching the bedrock aquifer that may then migrate off-site. The Data-Gap Investigation report states that a planned well to be screened at the top of bedrock was not installed because bedrock was encountered at 10 feet below ground surface. Please elaborate on this point. Where was this proposed well? Why could it not be installed? Why wasn't a well considered for the bedrock itself? Is there sufficient information to determine flow in the bedrock aquifer? During the public meeting, the ABB consultant noted that the bedrock aquifer could not be influenced by contamination located above this aquifer due to pressure pushing the groundwater up. What data were collected to support this claim?

5. Focus would like more information concerning the homes, if any, located down-gradient of site A7, across the Assabet River. Where does their water come from (groundwater wells or public water)? If private wells are being used, is public water available for these homes and were any of these wells sampled? Is the bedrock aquifer being used as the water source? If no homes currently exist across from A7, is the land zoned for residential development? If so, what measures are being taken to ensure that future private wells will be safe for human consumption? We note that Massachusetts regulations call for the protection of groundwater in areas where a public water supply line is not available (within 500 feet).

<IMG SRC 97160K>

Focus opposes the proposed no further action for site A7, the Old Gravel Pit Landfill. Additional sampling both in the bedrock aquifer and the Assabet River and suitable justifications to the questions posed concerning site A7 are requested at this time. Focus awaits your response to these and previously submitted comments either formally or informally, by June 27, 1997. This deadline is requested to provide Focus with ample time prior to the comment submission deadline of July 8, 1997 to elicit additional support if needed. We see no need to involve our Federal and State Senators and Representatives at this time if a reasonable solution can be agreed upon amongst the TRC members.

Thank you for your consideration.

Sincerely,

<IMG SRC 97160L>

APPENDIX C

ATTACHMENT B - RESPONSES TO PUBLIC COMMENTS

RESPONSE TO COMMENTS BY
CAMBRIDGE ENVIRONMENTAL, INC.
PREPARED ON BEHALF OF FOUR TOWN FOCUS
DATED JUNE 23, 1997
CONCERNING THE PROPOSED DETERMINATION OF NO FURTHER ACTION AT
AREA OF CONTAMINATION A7

Comment# Comment/Response

1. Comment: The potential Risk to the environment from contaminated groundwater at site A7 has not been fully evaluated. The Ambient Water Quality Criteria (AWQC) and/or the Maximum Contaminant Levels (MCLs) for several VOCs, metals, and lindane have been exceeded by concentrations measured in groundwater. In the most recent sampling rounds, the pesticide lindane, for example, has been detected at concentrations 14 times the MCL on site and 1.6 times the MCL down-gradient of the site.

The remedial (Data-Gap) Investigation reports that adsorption of chemicals by sediments and dilution of contaminants by the river would reduce contaminant concentrations in the surface water and thus it is unlikely that site A7 may pose a significant ecological risk. As stated in our letter dated June 6, 1997, sampling in the Assabet River would confirm that contaminant migration is not posing a risk to environmental receptors. A quantitative justification of the adsorption and dilution of all contaminants that exceed AWQC should also be provided to further demonstrate your position of no significant risk. Further, if these contaminants are discharging to the Assabet, and have in the past, is there a possibility that these chemicals have accumulated in the sediments? Again, Focus would like a quantitative analysis of this matter.

Response: The RI Data-Gap investigations were conducted in accordance with an approved Work Plan that was specifically intended and designed to address gaps in the RI data-base (ABB-ES, 1996c). The draft Work Plan for the Data-Gap investigations was prepared and distributed for public comment in March 1996 (ABB-ES, 1996b), and recommendations and comments on that document were considered prior to conducting that work.

Please note that MCLs are standards developed to protect human receptors, and AWQCs are surface-water guidelines for evaluating risks to ecological receptors.

In downgradient monitoring well JO-A7-M61, the pesticide lindane was detected at a maximum concentration of 0.326 Ig/L. However, in monitoring well JO-A7-M63, which is farther downgradient and is the well closest to the river (ABB-ES, 1997, Figures 5 and 6), the maximum detected concentration of lindane was 0.0979 Ig/L. Several rounds of sampling in these wells indicate that lindane concentrations are being attenuated significantly between the source area and the Assabet River. The downgradient decrease in lindane concentrations, as measured in groundwater samples collected in October 1996, is shown on Attachment 1-A. The relationship between lindane concentration and distance from the source area is calculated as y = 3.6014e -0.01x where "y" (Ig/L) = concentration of lindane at distance "x" (feet) from the source area.

At the Assabet River (410 feet from the source area), a lindane concentration of approximately 0.06 Ig/L would be expected. This is below the AWQC of 0.08 Ig/L.

Typically, a dilution/attenuation factor of 10 is conservatively assumed for groundwater discharging to surface water (i.e., the concentration of a contaminant in groundwater is assumed to be 10 times greater than in the surface-water body into which the groundwater discharges.) For example, a factor of 10 was applied to surface-water standards in deriving the GW-3 groundwater standards for the Massachusetts Contingency Plan (310 CMR 40) (refer to MADEP, 1994). The GW-3 groundwater standards are designed to be protective of ecological receptors in downgradient surface-water bodies. For AOC A7, a dilution factor of 10 from the groundwater concentration would represent a lindane concentration of 0.006 Ig/L in the Assabet River.

Actual dilution at AOC A7, where the plume of contaminated groundwater is discharging at a rate of 3.78 x 10 -3 cubic feet per second (ft 3/sec) (OHM, 1995b, Appendix C) into a river with an average annual flow at the Maynard gauging station, between 1941 and 1996, of 189 ft 3/sec (U.S. Geological Survey, 1996), would be substantially greater and would be expressed as:

where
D = Dilution factor
V 1 = Flow of groundwater plume
V 2 = Assabet River

<IMG SRC 97160M>
<IMG SRC 97160N>

standard (5,000 Ig/L). Even without allowing for the effects of dilution and volatilization in the river, these concentrations would not be considered a problem for aquatic organisms. No other VOCs were detected above AWQCs in groundwater near the river.

Concentrations of metals in groundwater are addressed in response to Comment #2.

In May 1992 the Army collected nine sediment samples from the Assabet River at locations upstream, downstream, and adjacent to AOC A7. Lindane and trichloroethylene were not detected in any of the samples. Tetrachloroethene was detected only at sampling location FWISD15, at a concentration of 0.016 Ig/g. Sediment sampling location FWISD15 was in the Assabet River near the mouth of the unnamed stream at the downstream boundary of AOC A7 (OHM, 1994). That concentration is substantially lower than the applicable apparent effects threshold (AET) for aquatic organisms of >8.1 Ig/g. (This specific AET is derived from Barrick and Beller's [1989] reported AET of >22 Ig per gram of organic carbon, corrected for the detected organic carbon content of 37% in the Assabet River sediment sample.) These results indicate that partitioning of the chemicals of concern from groundwater into sediments of the Assabet River does not present a potential risk to aquatic organisms.

In 1996, the Army implemented remedial measures at AOC A7 in accordance with the Record of Decision for the "Source-Control" Operable Unit. These measures included removal and off-site disposal of laboratory wastes excavated from the identified source area and design and construction of an extensive landfill cap. The principal objective of these measures has been to reduce the migration of contaminants, and it is expected that contaminant concentrations in groundwater will decline. As part of the operation and maintenance provisions of the Record of Decision, the Army is committed to conduct long-term monitoring of groundwater quality in wells installed at the landfill and between the landfill and the Assabet River.

2. Comment: The historical groundwater data presented in Table 1 shows that manganese exceeds the federal MCL in all analyzed samples. Other metals including lead, iron, and aluminum also exceeded the MCLs. Given these exceedances, why were the metals not sampled in subsequent groundwater testing? The potential risk to human health and the environment from metals in the groundwater have not been fully evaluated.

Response: The Army has developed an extensive analytical data-base for metals in groundwater at AOC A7 (ABB-ES, 1997).

The MCLs for aluminum (200 Ig/L), iron (300 Ig/L), and manganese (50 Ig/L) are actually secondary MCLs (USEPA, 1996). Secondary MCLs are unenforceable federal drinking-water guidelines that are based on factors such as taste, odor, and color. They are not health-related. Furthermore, because there are no current or potential future human groundwater receptors at AOC A7 or on the land located downgradient from the facility (refer to responses to Comments #3, #4, and #5), there are no human-health risks from ingestion of groundwater.

Concentrations of aluminum, iron, and manganese commonly exceed secondary MCLs in groundwater in New England. These metals were also detected above the secondary MCLs upgradient from the site, in well OHM-A7-13. The observed concentrations of these metals at AOC A7 do not represent site-related contamination.

The baseline risk assessment for AOC A7 was prepared before the decision was made to transfer Sudbury Annex to the Department of Interior and manage it as part of the Great Meadows National Wildlife Refuge. Consequently, the risk assessment was based on the earlier assumption that there would be future human ingestion of groundwater at the site. Even with that restrictive assumption, the baseline risk assessment concluded that lead in groundwater at AOC A7 does not pose a risk (OHM, 1994 and 1995a).

The maximum concentration of lead detected in groundwater in wells along the downgradient perimeter fence at AOC A7 was 4.57 Ig/L. This is below the MCL of 15 Ig/L for groundwater but is slightly greater than the AWQC for surface water (3.2 Ig/L, at 100 mg/L hardness as CaCO 3). Attenuation between the perimeter fence and the river, plus dilution in the river as calculated in response to Comment #1, would reduce the lead concentrations to levels far below the AWQC.

The maximum concentration of lead detected in the sediment samples collected in 1992 from the Assabet River was 8.2 Ig/g, at sampling location FWISD15 (adjacent to AOC A7). The low effects range for lead in sediment is 35 Ig/g (Long and Morgan, 1990). These data indicate that lead in groundwater at AOC A7 does not pose a risk to aquatic organisms in the Assabet River.

Based on the considerations summarized above, groundwater samples from the long-term groundwater monitoring program will not be analyzed for metals.

3. Comment: Groundwater was sampled between the Annex and the Assabet River. Who owns this property? What zoning exists on this property? Is residential development feasible? Since the groundwater sampled in this area has been shown to be unfit for human consumption, residential development should be restricted. Are any measures being taken to ensure that residential development will not occur in the future on this property?

Response: Records of land ownership are available at the Assessors' Office in Stow. The subject property is undevelopable for residential use because of its zoning classification (Conservation-Recreation), wetland restrictions, and proximity to the Assabet River. Further use restrictions are not necessary.

4. Comment: Impacts to the bedrock aquifer have not been fully investigated. One bedrock well, OHM-A7-11, was sampled in earlier rounds only. Incidentally, Figure 3 incorrectly depicts the screen elevation for this well. Dichloromethane and manganese concentrations exceeded the MCLs. Thus, potential off-site migration of these contaminants should be considered, especially if there are homes using private drinking water wells down-gradient of the site (see comment #5). Further, OHM-A7-11 is located northeast of the contaminant plume and would not capture contaminant migration from this disposal area.

Additional bedrock wells should be installed and sampled to determine if contaminated groundwater is reaching the bedrock aquifer that may then migrate off-site. The Data Gap Investigation report states that a planned well to be screened at the top of bedrock was not installed because bedrock was encountered at 10 feet below ground surface. Please elaborate on this point. Where was this proposed well? Why should it not be installed? Why wasn't a well considered for the bedrock itself? Is there sufficient information to determine flow in the bedrock aquifer? During the public meeting, the ABB consultant noted that the bedrock aquifer could not be influenced by contamination located above this aquifer due to pressure pushing the groundwater up. What data were collected to support this claim?

Response: The correct elevations of the well screen in monitoring well OHM-A7-11 are 160.7 feet msl (top of screen) and 150.7 feet msl (bottom of screen). Figure 3 of the AOC A7 Technical Memorandum (ABB-ES, 1997) has been revised to correctly depict the screen elevations for this well.

Sudbury Annex is scheduled to be transferred later this year to the U.S. Department of Interior and to become part of the Great Meadows National Wildlife Refuge. In addition, there are no homes located downgradient from AOC A7 (see response to Comment #5), and natural conditions and regulatory restrictions will prevent future residential development (see response to Comment #3). Therefore, there are no current or potential future human receptors of analytes in groundwater, there are no human-health risks from ingestion of groundwater, and groundwater standards designed to protect human health (MCLs) do not apply.

The potential for groundwater contaminant migration from AOC A7 has been considered for all contaminants. Analyte concentrations in groundwater are likely to attenuate between well OHM-A7-11 and the river. However, even if groundwater were to discharge to the Assabet River with dichloromethane at the same concentration as detected in monitoring well OHM-A7-11 (8.4 Ig/L), that concentration is far below the LOEL of 11,000 Ig/L for halomethanes (USEPA, 1986).

The maximum concentration of manganese detected in monitoring well OHM-A7-11 was 114 Ig/L, which is less than the maximum concentration detected in well OHM-A7-13 (270 Ig/L), upgradient of AOC A7. The presence of manganese in groundwater is not related to activities or conditions at the site.

Major source-control measures taken by the Army at AOC A7 in 1996, including source removal and capping of the landfill, were designed to further reduce analyte concentrations in groundwater.

The Army does not concur that additional bedrock wells are necessary at AOC A7. There is a strong upward groundwater flow potential (i.e., an upward vertical hydraulic gradient) near the river, because the Assabet River is a major regional groundwater discharge location. Hydrologically, this manifests itself as higher water levels (heads) in deep wells than in collocated shallow wells. In the downgradient area of AOC A7, the upward gradient is dramatically verified by the well pair OHM-A7-10 / OHM-A7-11. In the shallow well (OHM-A7-10), the head was measured at approximately 2.3 feet below ground surface (bgs),

whereas in the deep bedrock well (OHM-A7-11), groundwater flows out of the well under artesian conditions, with a head at least 2 feet above ground. The Army concurs that well OHM-A7-11 is not directly downgradient of the lab waste disposal area. Installation of the well pair JO-A7-M63 / JO-A7-M64 was proposed as a data-gap activity to address the concern that contaminants potentially being transported by groundwater flowing from bedrock into the surficial aquifer between the perimeter fence and the river had not been characterized. Monitoring well JO-A7-M64 was to be installed within the surficial aquifer, at the top of rock or at a depth of 50 feet bgs, whichever was found to be shallower. It was to be paired with (i.e., to be located within 10 feet of)water-table monitoring well JO-A7-M63. Together, these wells were designed to assess groundwater quality at the water table and deeper within the surficial aquifer. The requirements and rationale are presented in the approved Task Order Work Plan (ABB-ES, 1996c, Section 3.2.3.1, Figure 3-2, and Table 3-2).

In the boring for monitoring well JO-A7-M63, the water table was encountered at 1.5 feet bgs, and bedrock was encountered at 10 feet bgs. A standard 10-foot well-screen could not be used in well JO-A7-M63 under these conditions (ABB-ES, 1996c, p. 3-9; ABB-ES, 1995, pp. 4-18 - 4-21). ABB-ES installed a 5-foot screen from 2 feet bgs to 7 feet bgs and placed the filter pack from 1.5 feet bgs to the bottom of the borehole at 10 feet bgs. Hence, groundwater data obtained from monitoring well JO-A7-M63 are sufficient to represent the entire saturated thickness of the surficial aquifer, and well JO-A7-M64 was not needed.

Downward gradients beneath the landfill at AOC A7 may have introduced contaminants into the underlying bedrock, but as the groundwater flows toward the river it moves upward into the surficial aquifer. Several rounds of groundwater samples in water-table wells and stratigraphically deeper wells near the perimeter of the facility have adequately characterized the downgradient groundwater quality.

5. Comment: Focus would like more information concerning the homes, if any, located down-gradient of site A7, across the Assabet River. Where does their water come from (groundwater wells or public water)? If private wells are being used, is public water available for these homes and were any of these wells sampled? Is the bedrock aquifer being used as the water source? If no homes currently exist across from A7, is the land zoned for residential development? If so, what measures are being taken to ensure that future private wells will be safe for human consumption? We note that Massachusetts regulations call for the protection of groundwater in areas where a public water supply line is not available (within 500 feet).

Response: There are no homes located downgradient from AOC A7. Areas that are across the Assabet River from AOC A7 are not downgradient from AOC A7. The Assabet River is a regional hydraulic boundary, with surface water and groundwater discharging into it, from both sides, along its entire length. Natural hydraulic gradients prevent groundwater from flowing beneath the river, from one side of the river to the other. This well-known hydrogeologic principal is shown conceptually in the accompanying illustration (Attachment 5-A) and is discussed, for example, by Freeze and Cherry (1979, pp. 195-196). For discussions of general groundwater flow characteristics at Sudbury Annex, refer to HydroGeoLogic (1994), OHM (1995b, Appendix C, and ABB-ES (1996a, Section 2.2.6).

References:

ABB Environmental Services, Inc. (ABB-ES), 1995. Final Project Operations Plan, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts", Portland, ME; prepared for the U.S. Army Environmental Center, Aberdeen Proving Ground, MD; April.

ABB Environmental Services, Inc. (ABB-ES), 1996a. "Final Supplemental Site Investigation Report for Study Areas A3, A5, A10, A11, P5, P6, P9, P16, P23, P27, P28, P38, P41, P45, and P54, U.S. Army Sudbury Training Annex, Middlesex County, Massachusetts; Wakefield, MA; prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, MD; October.

BB Environmental Services, Inc. (ABB-ES), 1996b. "Draft Task Order Work Plan, Remedial (Data-Gap) Investigations of Area of Contamination A4 and Areas of Contamination A7/A9 (Management-of-Migration Operable Unit) and Supplemental Site Investigations of Selected Study Areas, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts"; Portland, ME; prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, MD; March.

ABB Environmental Services, Inc. (ABB-ES), 1996c. "Final Task Order Work Plan, Remedial (Data-Gap) Investigations of Area of Contamination A4 and Areas of Contamination A7/A9 (Management-of-Migration Operable Unit) and Supplemental Site Investigations of Selected Study Areas, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts"; Portland, ME; prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, MD; May.

ABB Environmental Services, Inc, (ABB-ES), 1997. "Technical Memorandum, Remedial (Data-Gap) Investigation, Area of Contamination A7, U.S. Army Sudbury Annex; Wakefield, MA; Wakefield, MA; prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, MD; March.

Barrick, R.C., and H.R. Beller, 1989. "Reliability of Sediment Quality Assessments in Puget Sound"; in Oceans '89, An International Conference Addressing Methods for Understanding The Global Ocean; Seattle, WA; pp. 421 - 426; September.

Freeze, R.A., and J.A. Cherry, 1979. Groundwater; Prentice-Hall, Inc.; Englewood Cliffs, NJ.

HydroGeoLogic, Inc., 1994. "Groundwater Flow Model for Sudbury Training Annex and Vicinity, Massachusetts"; in Final Phase I Site Investigation Report, Appendix H; Herndon, VA; prepared for Ecology & Environment, Inc., Arlington, VA; September.

Long, E.R., and L.G. Morgan, 1990. "The Potential for Biological Effects on Sediment-Sorbed Contaminants Tested in the National Status and Trends Program"; National Oceanic and Atmospheric Administration Technical Memorandum NOS OMA 52.

Massachusetts Department of Environmental (MADEP), 1994. "Background Documentation for the Development of the MCP Numerical Standards", Bureau of Waste Site Cleanup and Office of Research and Standards; April.

OHM Corporation (OHM), 1994. "Final Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts", Pittsburgh; PA; prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, MD; January.

OHM Corporation (OHM), 1995a. "Final Addendum Report, Site/Remedial Investigation, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts"; Pittsburgh, PA; prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, MD; September.

OHM Corporation (OHM), 1995b. "Final Feasibility Study Report for the Fort Devens Sudbury Training Annex, Areas of Contamination A7 and A9, Middlesex County, Massachusetts"; Pittsburgh, PA; prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, MD; May.

U.S. Environmental Protection Agency (USEPA), 1986. "Quality Criteria for Groundwater 1986"; EPA 440/5-86-001, Office of Water Regulations and Standards; Washington, D.C.; May.

U.S. Environmental Protection Agency (USEPA), 1991. "Water Quality Criteria Summary"; Office of Science and Technology; Washington, D.C.

U.S. Environmental Protection Agency (USEPA), 1996. "Drinking Water Regulations and Health Advisories", Office of Water; EPA 822-B-96-002; October.

U.S. Geological Survey, 1996. "Water Resources Data, Massachusetts and Rhode Island, Water Year 1996", Prepared in cooperation with the States of Massachusetts and Rhode Island and other agencies; MA-RI-96-1.

ATTACHMENT C - PUBLIC HEARING TRANSCRIPT

DORIS O. WONG ASSOCIATES, Inc.

50 FRANKLIN STREET, BOSTON, MASSACHUSETTS 02110 TELEPHONE (617) 426-2432

Volume I
Excerpt

U.S. ARMY

BASE REALIGNMENT AND CLOSURE

FT. DEVENS SUDBURY TRAINING ANNEX

PUBLIC HEARING ON PROPOSED PLAN
FOR AOC's A4, A7, and A9

BEFORE: Thomas Strunk, Environmental Coordinator

-held at-
Stow Town Building
380 Great Road
Stow, Massachusetts
Tuesday, June 10, 1997
7:25 p.m.

(Anne H. Bohan, Registered Diplomate Reporter)

* * * *

DORIS O. WONG ASSOCIATES

I N D E X

PRESENT: Thomas Strunk, Devens Sudbury BEC

Thomas R. Eschner, ABB Environmental Services Inc.

Jeff Waugh, Army Environmental Center

Robert LIM, U.S. EPA

Jim Murphy, U.S. EPA

Scott Greene, Massachusetts DEP

Beverely Lawrence, U.S. Army Corps of Engineers

Deborah Schumann, FOCUS

Lorna Nichols, FOCUS

* * * *

MR. STRUNK: But after listening to ABB's presentation of what the rationale was behind the record of decision that we're talking about, I can open this up for public comments. We'll record your comments, and then we won't answer them tonight, but they will be responded to in the appendix to the ROD, which we have a responsiveness summary section. And also feel free to mail in comments if you have those, and we'll get those out and have those responded to as well.

So if there's anything anyone would like to have addressed any more than we have tonight, this is your opportunity to do it.

MS. SCHUMANN: Well, I think FOCUS's letter pretty much covers the same identical territory that Lorna covered here, and maybe I caused a couple of diversions in possible ways to go after it, but it was the same issue. One way or another, determine what that drinking water risk to a residential housing development on the other side of that river is going to be. Now, I don't know, I'm torn at this point. On the one hand, I'd like you to come back and say, you know, it's horrendous, because it would

be absolutely ideal to stop a development. On the other hand, obviously I don't want to see any contaminants leaving that site at all. But I think we got to know either way, yeah?

MR. GREENE: Again, even if there's -- we're not supposed to respond today. Sorry.

MR. STRUNK: No comments tonight, Scott. Certainly everyone will have a chance to look at the comments as they come in and respond to them.

MS. NICHOLS: There actually are houses like right across the road from the golf course right next to the river. Why would you say there are no existing wells? Are they on some other system?

MR. GREENE: I don't know if there's existing wells or not. They were going to say the golf course was going to be developed.

MS. NICHOLS: Do you know if there are existing wells?

MR. LIM: No.

MS. NICHOLS: Do you know if there are existing wells?

MR. ESCHNER: I do not.

MS. LAWRENCE: I think he was saying the

water on the side. I think that they were just trying to say the wells that they installed were not used in that area.

MS. NICHOLS: Earlier he said to me, I'm not sure if he just repeated it then, that even if contamination was found on the other side of the river, since there are no existing residential wells, the State wouldn't consider that a protected aquifer.

MR. GREENE: I'm saying unless there's a private well there already in existence, and contamination is detected within 500 feet, we wouldn't predict that as a GW1 resource, within 500 feet of that well.

MS. NICHOLS: So whose job would it be to determine whether or not there are residential wells? No volunteers?

MR. WAUGH: The Town of Stow has been provided with all the documents, and they would have notified -- I would hope the Public Health would know of any wells there. I do know there are some wells on the Annex side of the river just east of A9.

MR. STRUNK: Off the record. We'll end the

public comment period now so we can take a break.

(Discussion off the record)

(Whereupon, at 8:40 p.m. the hearing was concluded)

C E R T I F I C A T E

I, Anne H. Bohan, Registered Diplomate Reporter, do hereby certify that the foregoing transcript, Volume I, is a true and accurate transcription of my stenographic notes taken on June 10, 1997.

9<IMG SRC 97160O

- - - -

DORIS O. WONG ASSOCIATES

APPENDIX D
ADMINISTRATIVE RECORD INDEX

Fort Devens - Sudbury Annex
Record of Decision
Area of Contamination A4 and
Areas of Contamination A7 and A9
Management of Migration Operable Units

Prepared for

New England Division
Corps of Engineers

Prepared by
ABB Environmental Services, Inc
Corporate Place 128, 107 Audubon Road, Wakefield, MA 01880 (617) 245-6606

Introduction

This document is the Index to the Administrative Record for the Record of Decision, Area of Contamination A4 and Areas of Contamination A7/A9, Management of Migration Operable Units, at the Fort Devens Sudbury Annex. Section I of the Index lists site-specific documents and Section II lists guidance documents used by U.S. Army in selecting response actions at the site. Some documents in this Administrative Record File Index have been cited but are not physically included in the Administrative Record for this Record Of Decision. If a document has been cross-referenced to another Administrative Record File Index, the available corresponding comments and responses have been cross-referenced as well. Efforts were made to include all appropriate comments and responses individually. In come cases, however, comments were only included as part of the response package.

The Administrative Record is available for public review at the office of the BRAC Environmental Coordinator, Fort Devens, Massachusetts, and at the Sudbury Town Hall, Sudbury, Massachusetts. Supplemental/Addendum volumes may be added to this Administrative Record File. Questions concerning the Administrative Record should be addressed to the BRAC Environmental Coordinator.

The Administrative Record is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendment and Reauthorization Act (SARA).

ADMINISTRATIVE RECORD INDEX

for

Record of Decision

Area of Contamination (AOC) A4 and AOCs A7 and 9

Management of Migration Operable Units

Fort Devens - Sudbury Annex Sites

Updated: September 25, 1997

1.0 Pre-Remedial

1.2 Preliminary Assessment

Reports

1. "Analysis of Existing Facilities/Environmental Assessment Report," Natick Research and Development Command (MARADCOM) (November, 1977).
2. "Analysis of Existing Facilities/Environmental Assessment Report," NARADCOM (1978).
3. "Installation Assessment of U.S. Army Natick Research and Development Command (NARADCOM), Report 170," United States Army Toxic and Hazardous Materials Agency (USATHAMA) (1980).
4. "Installation Assessment NARADCOM Research and Development Laboratory, Massachusetts," EPA Environmental Monitoring Systems Laboratory (March 1982).
5. "Burn Pit Remediation - Study Area A9," U.S. Army (November 21, 1986).

1.3 Site Inspection

Reports

1. "Final Site Inspection Report, Sudbury Annex, Sudbury, Massachusetts," NUS (1987).
2. "Draft Expanded Site Inspection (ESI) of Natick Research, Development, and Engineering Center," Dames & Moore (December 1990).
3. "Final Report - Site Investigation - Natick Lab Annex Property," GZA Associates (March 4, 1991).
4. "Final Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts, Vol I-VI," OHM Remediation Services Corp. (January 1994).
5. "Final Site Investigation/ Remedial Investigation Addendum Report for AOCs A4, A7, and A9 and SAs A3/P5, P4, P7, P17, P19, P20, P25, P35, P49, P51, P59, and P60, Ft. Devens Sudbury Training Annex" OHM Remediation Services Corp. (September 22, 1995).
6. "Ft. Devens, Sudbury Training Annex Remedial Investigations of AOC A4 and AOCs A7/A9 and Supplemental Site Investigation of Selected SAs Final Work Plan," ABB Environmental Services, Inc. (May 24, 1996).

1.7 Correspondence Related to Proposal of a Site to the NPL

1. Letter from Daniel J. Hannon, Commonwealth of Massachusetts, Department of Environmental Protection to Fort Devens Installation Commander (May 24, 1991), concerning notification that Fort Devens in considered a priority disposal site.

2.0 Removal Response

2.1 Correspondence

1. Memorandum from Timothy Prior, U.S. Army for the Record (August 16, 1991) concerning contaminated soil disposal.
2. Memorandum from Joseph Pierce, U.S. Army to Fort Devens Installation Commander (August 19, 1991) concerning Air Force noncompliance issues at the Sudbury Annex.
3. "Record of Environmental Consideration," (November 9, 1992).
4. Bills of Lading," (May 6, 1993).

2.2 Removal Response Reports

1. "Removal of Underground Storage Tanks," Environmental Application, Inc. (May 1989).

2.6 Work Plans and Progress Reports

Comments

1. Comments dated July 15, 1996 from Robert Lim, USEPA, on "Work Plan for Source Control Remediation SA A7 with Removal Actions at SAs A1, A2, A9, P2, P16, P23, P28, P29, and P41, Ft. Devens Sudbury Training Annex (WESTON).

2.9 Action Memoranda

Reports

1. "Final Technical Memorandum: Consolidation of Soils from SAs P16, P23, and P41 at AOC A7, Ft. Devens Sudbury Training Annex, MA," Stone & Webster (June 1996).

Comments

2. Comments dated March 26, 1996 from Robert Lim, USEPA, on the Draft Technical Memorandum, Consolidation of Soils from Areas P16, P23, and P41 as Subgrade at AOC A7, Ft. Devens Sudbury Training Annex, MA.

3.0 Remedial Investigation (RI)

3.1 Correspondence

1. Memorandum from NUS to Nancy Philigan, EPA (1985), concerning Dames & Moore Technical Plan for Sudbury Annex Site.
2. Meeting Notes, July 8, 1993 meeting at Environmental Office, Fort Devens. OHM Remediation Services Corp. (July 16, 1993).
3. Draft Notes of Site Walk on July 13, 1993, at Sudbury Training Annex. OHM Remediation Services Corp. (July 19, 1993).
4. Meeting Notes, Ecological Assessment Meeting on June 8, 1993, at EPA Region I, Boston, MA.

   OHM Remediation Services Corp. (July 28, 1993).
5. Meeting Notes, Pre-Drill Site Walk on August 10, 1993 at Sudbury Training Annex, Areas A4, A7, and A9. OHM Remediation Services Corp. (August 20, 1993).
6. Letter from D. Lynne Chappell, MADEP-CERO, to Ron Ostrowski, Fort Devens EMO (August 23, 1993). Concerning Pre-Drill Site Walk on August 10, 1993.
7. Meeting Notes, November 18, 1993 Meeting at Fort Devens to review/respond to comment on Initial Screening of Remedial Technologies and Process Options Report, and Comments on Site/Remedial Investigation Report. OHM Remediation Services Corp. (December 2, 1993).

3.4 Interim Deliverables

1. "Rationale for Not Installing Proposed Monitoring Well OHM-A4-51," OHM Remediation, Services Corp. (August 19, 1993).
2. "Initial Screening of Remedial Technologies and Process Options Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts," OHM Remediation Services Corp., (September 23, 1993).
3. "Development and Screening of Remedial Alternatives Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts," OHM Remediation Services Corp., (October 28, 1993).
4. "Technical Memorandum, Remedial (Data-Gap) Investigation, Area of Contamination A7, U.S. Army Sudbury Training Annex," ABB Environmental Services, Inc. (March 1997).
5. "Technical Memorandum, Remedial (Data-Gap) Investigation, Area of Contamination A9, U.S. Army Sudbury Training Annex," ABB Environmental Services, Inc. (March 1997).
6. "Final Technical Memorandum, Remedial (Data-Gap) Investigation, Area of Contamination A4, U.S. Army Sudbury Training Annex," ABB Environmental Services, Inc. (August 13, 1997).
7. "Final Technical Memorandum, Remedial (Data-Gap) Investigation, Area of Contamination A7, U.S. Army Sudbury Training Annex," ABB Environmental Services, Inc. (August 13, 1997).
8. "Final Technical Memorandum, Remedial (Data-Gap) Investigation, Area of Contamination A9, U.S. Army Sudbury Training Annex," ABB Environmental Services, Inc. (August 13, 1997).

Comments

9. Comments Dated October 25, 1993 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the Initial Screening of Remedial Technologies and Process Options, Fort Devens, Sudbury Training Annex, Middlesex County, Massachusetts, OHM Remediation Corp. (September 23, 1993).
10. Comments Dated October 26, 1993 from Robert Lim, USEPA, on the Initial Screening of Remedial Technologies and Process Options, OHM Remediation Corp. (September 23, 1993).
11. Comments Dated October 27, 1993 from Cindy Svec Ruzich, Four Town Focus on the "Draft Initial Screening of Remedial Technologies and Process Options".
12. Comments Dated December 10, 1993 from Robert Lim, USEPA, on the October 1993 "Draft Development and Screening of Remedial action Alternatives, Fort Devens Sudbury Training Annex," OHM Remediation Services Corp.
13. Comments Dated December 22, 1993 from Jay Naparstek, Commonwealth of Massachusetts Department of Environmental Protection on the October 1993 "Development and Screening of Remedial Alternatives: Fort Devens Sudbury Training Annex, Sudbury Massachusetts," OHM Remediation Services Corp.
14. Comments Dated January 9, 1997, from Robert Lim, USEPA Region I, on the "Draft Technical Memorandum, Remedial (Data-Gap) Investigation, Area of Contamination A4, U.S. Army Sudbury Annex," ABB Environmental Services, Inc.
15. Comments Dated April 17, 1997, from Robert Lim, USEPA Region I, on the March 1997 "Technical Memorandum, Remedial (Data-Gap) Investigation Area of Contamination A7, U.S. Army Sudbury Annex," ABB Environmental Services, Inc.

Responses to Comments

16. Responses Dated August 11, 1997, from ABB Environmental Services, Inc., to USEPA Region I Comments Dated January 9, 1997, on the December 1996 "Technical Memorandum, Remedial (Data-Gap) Investigation, Area of Contamination A4, U.S. Army Sudbury Annex," ABB Environmental Services, Inc.
17. Responses Dated August 11, 1997, from ABB Environmental Services, Inc., to Comments Dated April 17 and April 23, 1997, on the March 1997 "Technical Memorandum, Remedial (Data-Gap) Investigation, Area of Contamination A7, U.S. Army Sudbury Annex," ABB Environmental Services, Inc.
18. Responses Dated August 12, 1997, from ABB Environmental Services, Inc., to Comments Dated April 2, 1997, on the March 1997 "Technical Memorandum, Remedial (Data-Gap) Investigation, Area of Contamination A9, U.S. Army Sudbury Annex," ABB Environmental Services, Inc.

3.6 Remedial Investigation (RI) Reports

The records cited below as entries number 1 and 2 may be reviewed, by appointment only, at the Fort Devens Environmental Management Office.

1. "Final Remedial Investigations of the Sudbury Annex," Dames & Moore (November 1986).
2. "Final Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts, Vol I-VI," OHM Remediation Services Corp. (January 1994).
3. "Final Site Investigation/ Remedial Investigation Addendum Report for AOCs A4, A7, and A9 and SAs A3/P5, P4, P7, P17, P19, P20, P25, P35, P49, P51, P59, and P60, Ft. Devens Sudbury Training Annex" OHM Remediation Services Corp. (September 22, 1995).

Comments

4. Comments Dated April 12, 1993 from Cindy Svec Ruzich, Four Town FOCUS on the February 1993 "Draft Site/Remedial Investigation - Volumes I-IV," OHM Remediation Services Corp. with the attached Comments Dated March 19, 1993 from Cambridge Environmental, Inc. on the February 1993 "Draft Site/Remedial Investigation - Volumes I-IV," OHM Remediation Services Corp.
5. Comments Dated April 12, 1993 from James P. Byrne, EPA Region I on the February 1993 "Draft Site/Remedial Investigation - Volume I-IV," OHM Remediation Services Corp.
6. Comments Dated April 13, 1993 from Molly J. Elder for D. Lynne Chappell, Commonwealth of Massachusetts Department of Environmental Protection on the February 1993 "Draft Site/Remedial Investigation - Volume I-IV, OHM Remediation Services Corp.
7. Comments Dated May 18, 1993 from Kenneth C. Carr for Gordon E. Beckett, U.S. Department of the Interior Fish and Wildlife Services on the February 1993 "Draft Site/Remedial Investigation - Volume I-IV," OHM Remediation Services Corp.
8. Comments Dated August 6, 1993 from Cindy Svec Ruzich, Four Town Focus, on the Comment Time Extension on the "Draft Final RI/SI Report" and Army Response to FOCUS Comments on 'Draft RI/SI Investigation Report".

9. Comments Dated August 20, 1993 from James P. Byrne, USEPA, on the "Draft Final Site/Remedial Investigation Report," OHM Remediation Services Corp.
10. Comments Dated September 2, 1993 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the July 1993 "Draft Final Site/Remedial Investigation Report," OHM Remediation Services Corp.
11. Update of Comments Dated September 12, 1993 from Cindy Svec Ruzich of Four Town Focus on the Draft SI/RI Investigation Report.
12. Comments Dated September 14, 1993 from Robert Lim, USEPA on the Comment Time Extension on "Draft Final SI/RI Investigation Report and Army Response to Comments on "Draft SI/RI Investigation Report".
13. Comments Dated October 3, 1994 from Jay Naparstek, Commonwealth of Massachusetts Department of Environmental Protection on the August 1994 "Draft Addendum Final Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex," OHM Remediation Services Corp.
14. Comments Dated October 5, 1994 from Robert Lim, USEPA, on the Draft SI/RI Addendum Report, Fort Devens Sudbury Training Annex.
15. Comments Dated October 13, 1993 from Cindy Svec Ruzich of Four Town Focus on the Draft Final RI/SI Phase I Investigation Report, Volume I.
16. Comments Dated October 17, 1994 from Robert Lim, USEPA, on the August 1994 Draft SI/RI Addendum Report, Fort Devens Sudbury Training Annex (OHM Remediation Services Corp.).
17. Comments Dated November 1, 1994 from Jay Naparstek, Commonwealth of Massachusetts Department of Environmental Protection on the August 1994 Draft Addendum Final Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex.
18. Letter Dated November 7, 1994 from Robert Lim, USEPA, to the Ecological Risk Assessment Issues in the Remedial Investigation of Areas of Contamination A4, A7, and A9.
19. Follow-up Letter Dated November 21, 1994 from Robert Lim, USEPA, to the Ecological Risk Assessment Issues in the Remedial Investigation of Areas of Contamination A4, A7, and A9.
20. Comments Dated May 19, 1995 from Robert Lim, USEPA, on the Draft Final Site/Remedial Investigation Addendum Report, Fort Devens Sudbury Training Annex (OHM Remediation).

Responses to Comments

21. Responses Dated July 16, 1993, July 19, 1993 and July 28, 1993 from OHM Remediation Services Corp to the April 12, 1993 Four Town FOCUS, the April 12, 1993 EPA Region I, the April 13, 1993 Commonwealth of Massachusetts Department of Environmental Protection and the May 18, 1993 U.S. Department of Interior Fish and Wildlife Service Comments on the February 1993 "Draft Site/Remedial Investigation - Volumes I-IV," OHM Remediation Services Corp.
22. Responses Dated October 14, 1993 from U.S. Army Environmental Center on the Draft Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex (OHM Remediation Services Corp.).
23. Responses Dated October 28, 1993 from U.S. Army Environmental Center on the Draft Final Site/Remedial Investigation Report, Fort Devens Sudbury Training Annex (OHM Remediation Services Corp.).
24. Responses Dated November 4, 1994 from OHM Remediation Services Corp. on the USEPA Comments on the "Draft SI/RI Addendum Report.
25. Responses Dated June 21, 1995 from OHM Corporation to the U.S. Army Environmental Center on the Draft Final Addendum to the Final Site/Remedial Investigation Report, Fort Devens; Sudbury Training Annex.

Responses to Responses to Comments

26. Rebuttals Dated November 15, 1994 from Robert Lim, USEPA, on the Responses to the Army's Responses to Comments on the Draft SI/RI Addendum Report.
27. Correction Letter Dated November 22, 1994 from Robert Lim, USEPA, on November 15, 1994 letter.

3.7 Work Plans and Progress Reports

Reports

1. "Final Work Plan, Fort Devens Sudbury Training Annex," OHM Remediation Services Corp. (April 1992).
2. "Final Field Sampling Plan," OHM Remediation Services Corp. (April 1992).
3. "Final Health and Safety Plan," OHM Remediation Services Corp (April 1992).
4. "Final Quality Assurance Project Plan - Volume I-II," OHM Remediation Services Corp. (April 1992).

5. "Ft. Devens Sudbury Training Annex Remedial Investigations of AOC A4 and AOCs A7/A9 and Supplemental Site Investigation of Selected SAs Final Work Plan," ABB Environmental Services, Inc. (May 24, 1996).
6. Final Draft Project Closeout Report. (Five Vol.) Weston. February 1997.

Comments

7. Comments Dated August 21, 1991 from Todd S. Alving, Organization for the Assabet River on the June/July 1991 "Draft Work Plan, Draft Field Sampling Plan, Draft Health and Safety Plan, Draft Quality Assurance Plan, "OHM Remediation Services Corp.
8. Comments Dated August 21, 1991 from Anne D. Flood, Town of Maynard on the June/July 1991 "Draft Work Plan, Draft Field Sampling Plan, Draft Health and Safety Plan, Draft Quality Assurance Plan, " OHM Remediation Services Corp.
9. Comments Dated August 22, 1991 from Gregory M. Ciardi, Maynard Public Schools on the June/July 1991 "Draft Work Plan, Draft Filed Sampling Plan, Draft Health and Safety Plan, Draft Quality Assurance," OHM Remediation Services Corp.
10. Comments Dated February 12, 1992 from Todd S. Alving, Organization for the Assabet River on the December 1991 "Draft Final Work Plan, Draft Final Field Sampling Plan, Draft Final Health and Safety Plan, Draft Final Quality Assurance Plan," OHM Remediation Services Corp.
11. Comments Dated May 13, 1992 from James P. Byrne, EPA Region I on the April 1992 "Final Work Plan, Final Field Sampling Plan, Final Health and Safety Plan, Final Quality Assurance Project Plan," OHM Remediation Services Corp. and the April 1992 "Final Community Relations Plan," Dames & Moore.
12. Comments Dated May 18, 1992 from Ken Raina, Lake Boon Association on the April 1992 "Final Work Plan, Final Field Sampling Plan, Final Health and Safety Plan, Final Quality Assurance Project Plan," OHM Remediation Services Corp.
13. Comments Dated May 19, 1992 from Deborah Schumann and Cindy Svec Ruzich Four Town FOCUS on the April 192 " Final Work Plan, Final Field Sampling Plan, Final Health and Safety Plan, Final Quality Assurance Project Plan," OHM Remediation Services Corp.
14. Comments dated July 7, 1993 from Jack McKenna, Metcalf & Eddy on the June 1993 "Draft Technical Plan Addenda, Phase II Site Inspections, Remedial Investigations," Ecology and Environment, Inc. and the June 1993 "Draft Final
Addendum to the Final Technical Plans - Phase II Feasibility Study," OHM Remediation Services Corp.
15. Comments dated April 16, 1996 from Robert Lim, USEPA, on "Remedial (Data Gap) Investigations of AOC A4 and AOCs A7/A9 and Supplemental Site Investigations of Selected SAs, Draft Task Order Work Plan, Data Item A005."

Responses to Comments

16. Response Dated October 1991 from OHM Remediation Services Corp. to Regulatory Agency Comments on the June/July 1991 "Draft Work Plan, Draft Field Sampling Plan, Draft Health and Safety Plan, Draft Quality Assurance Project Plan," OHM Remediation Services Corp.
17. Response Dated November 19, 1991 from Joseph Pierce, U.S. Army to the August 21, 1991 Comments from Todd S. Alving, Organization for the Assabet River on the June/July 1991 "Draft Work Plan, Draft Field Sampling Plan, Draft Health and Safety Plan, Draft Quality Assurance Project Plan," OHM Remediation Services Corp.
18. Response Dated November 20, 1991 from Dennis R. Dowdy, U.S. Army to the August 22, 1991 Comments from Gregory M. Ciardi, Maynard Public Schools on the June/July 1991 "Draft Work Plan, Draft Field Sampling Plan, Draft Health and Safety Plan, Draft Quality Assurance Project Plan," OHM Remediation Services Corp.
19. Response Dated November 25, 1991 from Ronald J. Ostrowski, U. S. Army to the August 21, 1991 Comments from Anne D. Flood, Town of Maynard on the June/July 1991 "Draft Work Plan, Draft Field Sampling Plan, Draft Health and Safety Plan, Draft Quality Assurance Plan," OHM Remediation Services Corp.
20. Response Dated November 1991 from OHM Remediation Services Corp. to the Four Town FOCUS Comments on the June/July 1991 "Draft Work Plan, Draft Field Sampling Plan, Draft Health and Safety Plan, Draft Quality Assurance Plan," OHM Remediation Services Corp.
21. Responses from OHM Remediation Services Corp. to EPA Region I, Four Town FOCUS, and the U.S. Department of the Interior Fish and Wildlife Service Comments on the December 1991 "Draft Final Work Plan, Draft Final Field Sampling Plan, Draft Final Health and Safety Plan, Draft Final Quality Assurance Plan," OHM Remediation Services Corp.
22. Draft Responses to Four Town FOCUS Comments on the April 1992 "Final Work Plan," OHM Remediation Services Corp.

23. Response dated May 21, 1996 from ABB Environmental Services, Inc. to comments dated April 16 and 26, 1996 on Draft Work Plan for Remedial (Data-Gap) Investigations of AOC A4 and AOCs A7/A9 (Management of Migration Operable Unit) and Supplemental Site Investigations of Selected Study Areas, Ft. Devens Sudbury Training Annex, MA.

Responses to Responses to Comments

24. Response Dated October 21, 1991 from D. Lynne Chappell, Commonwealth of Massachusetts Department of Environmental Protection to the Response Dated October 1991 from OHM Remediation Services Corp. to Regulatory Agency Comments on the June/July 1991 "Draft Work Plan, Draft Field Sampling Plan, Draft Health and Safety Plan, Draft Quality Assurance Plan," OHM Remediation Services Corp.
25. Response Dated October 22, 1991 from James P. Byrne, EPA Region I to the Response Dated October 1991 from OHM Remediation Services Corp. to Regulatory Agency Comments on the June/July 1991 "Draft Work Plan, Draft Field Sampling Plan, Draft Health and Safety Plan, Draft Quality Assurance Pan," OHM Remediation Services Corp.
26. Response Dated October 22, 1991 from Steven E. Mierzykowski, U.S. Department of the Interior Fish and Wildlife Service to the Response Dated October 22, 1991 from OHM Remediation Services Corp. to Regulatory Agency Comments on the June/July 1991 "Draft Work Plan, Draft Field Sampling Plan, Draft Health and Safety Plan, Draft Quality Assurance Plan," OHM Remediation Services Corp.
27. Response Dated January 2, 1992 from Four Town FOCUS to the Response Dated November 1991 from OHM Remediation Services Corp. to the FOCUS Comments on the June/July 1991 "Draft Work Plan, Draft Field Sampling Plan, Draft Quality Assurance Plan," OHM Remediation Services Corp.

3.9 Health Assessments

1. "Final Site-Specific Risk Assessment for the Sudbury Training Annex Facility, Sudbury, Massachusetts," OHM Remediation Services Corp. (January 1994).

4.0 Feasibility Study (FS)

4.1 Correspondence

1. Meeting Notes, November 18, 1993 Meeting at Fort Devens to review/respond to comments on Initial Screening of Remedial Technologies and Process Options Report, and Site/Remedial Investigation Report. OHM Remediation Services Corp., December 2, 1993.
2. Memorandum from Robert Lim, USEPA Region I, to Tom Strunk, Fort Devens (July 27, 1994), regarding issues related to the Feasibility Study for Areas A4, A7, and A9.

4.4 Interim Deliverables

1. "Preliminary Draft Screening of Alternatives," OHM Remediation Services Corp.(May 25, 1993).

4.6 Feasibility Study (FS) Reports

1. "Final Feasibility Study at Fort Devens Sudbury Training Annex Areas A7 and A9, Middlesex County," OHM Remediation Services Corp. (May 1995).

Comments

2. Comments Dated January 30, 1995 from Robert Lim, USEPA, on the Source Control Record of Decision Proposal for Fort Devens Sudbury Training Annex Areas of Contamination - A7 and A9.
3. Comments Dated March 2, 1995 from Robert Lim, USEPA, on the Draft Final Feasibility Study Report at Fort Devens Sudbury Training Annex Area A7 and A9," (OHM Remediation Services Corp.).
4. Comments Dated April 3, 1995 from Robert Lim, USEPA, on the Fort Devens Sudbury Training Annex Feasibility Study for Area A7, 100-Floodplain Location Specific ARAR," (OHM Remediation Services Corp.).

Responses to Comments

5. Responses Dated September 20, 1994 from U.S. Army Environmental Center on the Draft Final Feasibility Study (OHM Remediation Services Corp.).

6. Responses Dated May 2, 1995 from U.S. Army Environmental Center on the Draft Final Feasibility Study Report, Sudbury Training Annex (OHM Remediation Services Corp.).

Responses to Responses to Comments

7. Rebuttals Dated October 4, 1994 from Robert Lim, USEPA, on the Army's Response to Comments on the Feasibility Study.

4.7 Work Plans and Progress Reports

Reports

1. "Final Addendum to the Final Technical Plans for the Phase II Feasibility Study at the Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts," OHM Remediation Services Corp. (November 10, 1993).

Comments

2. Cross Reference: Preliminary Comments Dated July 7, 1993 from Jack McKenna, Metcalf & Eddy on the June 1993 "Draft Technical Plan Addenda, Phase II Site Inspections, Remedial Investigations," Ecology & Environment, Inc on the June 1993 "Draft Final Addendum to the Final Technical Plans - Phase II Feasibility Study," OHM Remediation Services Corp. [Filed and listed in 3.7 Work Plans and Progress Reports in this Administrative Record Index.
3. Comments Dated July 22, 1993 from D. Lynne Chappell, Commonwealth of Massachusetts Department of Environmental Protection on the June 1993 "Draft Final Addendum to the Final Technical Plans - Phase II Feasibility Study," OHM Remediation Services Corp.
4. Comments Dated July 23, 1993 from D. Lynne Chappell, Commonwealth of Massachusetts Department of Environmental Protection on the "Addendum to the Final Technical Plans Phase II Feasibility Study, Fort Devens Sudbury Training Annex, Sudbury, Massachusetts," OHM Remediation Services Corp.
5. Comments Dated August 6, 1993 from James P. Byrne, USEPA, on the June 1993 "Addendum to the Final Technical Plans, Phase II Feasibility Study, Fort Devens Sudbury Training Annex, " OHM Remediation Services Corp.
6. Comments Dated August 6, 1993 from Cindy Svec Ruzich of Four Town Focus on the "Draft Addendum to the Final Technical Plans Phase II Feasibility," OHM Remediation Services Corp.

Responses to Comments

7. Responses Dated September 7, 1993 from OHM Remediation Services Corp. on USEPA Comments on the "Addendum to the Final Technical Plans, Phase II Feasibility Study, Fort Devens Sudbury Training Annex.

Responses to Responses to Comments

8. Rebuttal Dated October 1, 1993 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the June 1993 Army Responses to MADEP's Comments on the Draft Final Addendum to the Final Technical Plans Phase II Feasibility Study, Fort Devens Sudbury Training Annex, Sudbury, Massachusetts (OHM Remediation Corp).

4.8 Cost Reports and Invoices

1. Cost Estimates for Capping Alternatives at Area A7, OHM Remediation Services Corp. (October 18, 1994).

4.9 Proposed Plan for Selected Remedial Action

Reports

1. "Proposed Plan AOC A7, the Old Gravel Pit Landfill, AOC A9, the POL Burn Area, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts," OHM Remediation Services Corp. (June 1995).
2. "Proposed Plan, No Further CERCLA Action at Sites A4, A7, and A9, U.S. Army Sudbury Annex," Sudbury Annex BEC, Devens, MA (June 1997).

Comments

3. Comments Dated April 12, 1995 from Robert Lim, USEPA, on the March 1995 Draft Proposed Plan, Sudbury Training Annex (OHM Remediation Services Corp.).
4. Comments Dated May 18, 1995 from Robert Lim, USEPA on the April 1995 Draft Final Proposed Plan, Fort Devens Sudbury Training Annex (OHM Remediation Services Corp.).
5. Comments Dated April 17, 1997, from Robert Lim, USEPA Region I on the March 1997 "Draft Proposed Plan, No Further CERCLA Action at Sites A4, A7, and A9, U.S. Army Sudbury Annex," Sudbury Annex BEC.

5.0 Record of Decision (ROD)

5.2 Applicable or Relevant and Appropriate Requirements (ARARs)

1. Letter from D. Lynne Chappell, Commonwealth of Massachusetts Department of Environmental Protection to Jeff Waugh, U.S. Army (January 6, 1993). Concerning transmittal of the attached potential ARARs.
2. "Draft Preliminary Applicable or Relevant and Appropriate Requirements for the Fort Devens Sudbury Training Annex," OHM Remediation Services Corp. (January 21, 1993).

5.4 Record of Decision

1. "Final Record of Decision, Source Control Operable Unit AOC A7, the Old Gravel Pit Landfill, AOC A9, the POL Burn Area, Fort Devens, Sudbury Training Annex, Middlesex County, Massachusetts," OHM Remediation Services Corp. (September 1995).

Comments

2. Comments Dated July 21, 1995 from Robert Lim, USEPA Region I, on the June 1995 Draft Record of Decision, Source Control Operable Unit AOC A7, the Old Gravel Pit Landfill, AOC 9, the POL Burn Area, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts (OHM Remediation Services Corp.).
3. Comments Dated August 25, 1995 from Robert Lim, USEPA Region 1, on the August 1995 Draft Final Record of Decision, Source Control Operable Unit AOC A7, the Old Gravel Pit Landfill, and AOC A9, the POL Burn Area, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts (OHM Remediation Services Corp.).
4. Comments Dated September 8, 1997, from Robert Lim, USEPA Region I, on the August 1997 "Draft Record of Decision, Area of Contamination A4 and Areas of Contamination A7 and A9 Management of Migration Operable Unit, U.S. Army Sudbury Annex," ABB Environmental Services, Inc.

6.0 Remedial Design (RD)

6.1 Correspondence
1. Approval to Consolidate Soil Piles from Study Area P28 to Area Of Contamination A7, USEPA Region I (June 5, 1995).
2. Letter dated June 20, 1996 from Robert Lim, USEPA, on Ft. Devens Sudbury Training Annex Remedial Design.

6.4 Remedial Design Documents

Reports

1. "Site Safety and Health Plan for Source Control Remedial Design work to be performed at SA A7 and A9, Ft. Devens Sudbury Training Annex, MA," Stone & Webster (August 1995).
2. "Concept Design, Source Control Remediation SA A7 and A9 at Ft. Devens Sudbury Training Annex, MA," Stone & Webster (September 1995).
3. "Draft Final Basis of Design/Design Analysis (BD/DA) Volumes I and II for Source Control Remediation at SA A7 with Removal Actions at SAs A1, A2, A9, P2, P16, P23, P39, and P41 at Ft. Devens Sudbury Training Annex, MA," Stone & Webster (April 11, 1996).
4. "Draft Final Contract Specification and Design Drawings for Source Control Remediation at SA A7 with Removal Actions at SAs A1, A2, A9, P2, P16, P23, P39, and P41 at Ft. Devens Sudbury Training Annex, MA," Stone & Webster (April 11, 1996).
5. Inserts to "Draft Final BD/DA and Contract Specification, Source Control Remedial/Removal Actions, Ft. Devens Sudbury Training Annex, MA, SAs A1, A2, A7, A9, P2, P16, P23, P39, and P41," Stone & Webster (April 29, 1996).

6. Inserts for "Final Basis of Design/Design Analysis (BD/DA) Volumes I and II for Source Control Remedial Design at SAs A7 and A9 with Removal Actions at SAs A1, A2, P2, P16, P23, P39, and P41, Ft. Devens Sudbury Training Annex, MA," Stone & Webster (July 29, 1996).
7. Inserts for "Final Contract Specification and Design Drawings for Source Control Remedial Design at SAs A7 and A9 with Removal Actions at SAs A1, A2, P2, P16, P23, P39, and P41, Ft. Devens Sudbury Training Annex, MA," Stone & Webster (July 29, 1996).

Comments

8. Comments Dated December 20, 1995, from Robert Lim, USEPA Region I, on the November 1995 "65% Remedial Design," Stone & Webster Environmental Technology & Services.
9. Comments Dated March 18, 1996 by Robert Lim, USEPA, on the Pre 95% Remedial Design Package for the landfill design at A7, Ft. Devens Sudbury Training Annex, MA.
10. Comments Dated May 29, 1996 from Robert Lim, USEPA, on Draft Final Basis of Design/Design Analysis and Draft Final Contract Specification and Design Drawings, Sudbury Training Annex, Ft. Devens, MA.

Responses to Comments

11. Response dated January 17, 1996 from Stone & Webster to comments on the 65% Draft BD/DA and Specification for Source Control Remedial Design at SAs A7 and A9, Ft. Devens Sudbury Training Annex, MA.
12. Response dated June 14, 1996 from Stone & Webster to comments on 95% Draft BD/DA and Specification for Source Control Remedial Design, SAs A7/A9, Ft. Devens Sudbury Training Annex, MA.

7.0 Remedial Action (RA)

7.5 Remedial Action Documents

Reports

1. "Final Technical Memorandum: Consolidation of Soils from SAs P16, P23, and P41 at AOC A7, Ft. Devens Sudbury Training Annex, MA," Stone & Webster (June 1996).

Comments

2. Comments Dated March 26, 1996, from Robert Lim, USEPA Region I, on Draft Technical Memorandum, Consolidation of Soils from Areas P16, P23, P41 as Subgrade at AOC A7, Ft. Devens Sudbury Training Annex, MA.
3. Comments Dated March 20, 1997, from Robert Lim, USEPA Region 1, on the February 1997 "Draft Project Closure Report, Sudbury Training Annex," Roy F. Weston.

7.6 Work Plans and Progress Reports

Reports

1. "Final Technical Memorandum: Consolidation of Soils from SA A2, P2, and P39 as Subgrade at AOC A7, Ft. Devens Sudbury Training Annex, MA," Stone & Webster (December 1995).

Comments

2. Comments Dated July 15, 1996 from Robert Lim, USEPA, on "Work Plan for Source Control Remediation SA A7 with Removal Actions at SAs A1, A2, A9, P2, P16, P23, P28, P2 9, and P41, Ft. Devens Sudbury Training Annex, MA."
3. Comments Dated July 31, 1996, from Robert Lim, USEPA Region I on the following: Letter from Roy F. Weston (July 26, 1996) which summarizes Work Plan to address Lab Waste Staging, Decon Water, Geonet/Geotextile Comments, and Emergency Response Plan.
4. Comments Dated August 12, 1996, from Robert Lim, USEPA Region I, on the August 8, 1996 "Substitution Request for Replacement of the Sand Drainage Layer with a Geonet," Roy F. Weston, Inc.

8.0 Site Closeout

8.1 Correspondence

1. Acceptance Dated April 18, 1997, from Robert Lin, USEPA Region I, of the Responses to USEPA Comments on "Method Detection Limit Study" prepared as part of the "Final Operation and Maintenance Plan," Roy F. Weston, Inc.

8.3 Operations and Maintenance

1. Comments Dated December 23, 1996, from Robert Lim, USEPA Region I, on the November 1996 "Draft Operations and Maintenance Plan for the Landfill at Area of Contamination A7," Roy F. Weston, Inc.

10.0 Enforcement

10.16 Federal Facility Agreements

Reports

The document cited below as entry number 1 may be reviewed, by appointment only, at Fort Devens.

1. "Final Federal Facility Agreement Under CERCLA Section 120," EPA Region I and U.S. Department of the Army (November 15, 1991).

Comments

2. Comments Dated July 12, 1991 from Edmond G. Benoit, Commonwealth of Massachusetts Department of Environmental Protection on the March 1991 "Draft Federal Facility Agreement Under CERCLA Section 120," EPA Region I and U.S. Department of the Army.

Responses to Comments

3. Response Dated September 5, 1991 from James P. Byrne, EPA Region I to the Comments Dated July 12, 1991 from Edmond G. Benoit Commonwealth of Massachusetts Department of Environmental Protection on the March 1991 "Draft Federal Facility Agreement Under CERCLA Section 120," EPA Region I and U.S. Department of the Army.

13.0 Community Relations

13.2 Community Relations Plans

Reports

The document cited below as entries 1 and 2 may be reviewed, by appointment only, at Fort Devens.

1. "Final Community Relations Plan," Dames & Moore (April 1992).

Comments

2. Comments Dated September 30, 1991 from Cindy Svec Ruzich and Deborah Schumann, Four Town FOCUS on the August 1991 "Draft Community Relations Plan," Dames & Moore.
3. Comments Dated February 14, 1992 from Cindy Svec Ruzich and Deborah Schumann, Four Town FOCUS on the December 1991 "Draft Final Community Relations Plan," Dames & Moore.
4. Comments Dated March 17, 1992 from D. Lynne Chappell, Commonwealth of Massachusetts Department of Environmental Protection on the December 1991 "Draft Final Community Relations Plan," Dames & Moore.
5. Comments from James P. Byrne, EPA Region I on the December 1991 "Draft Final Community Relations Plan," Dames & Moore.
6. Cross Reference: Comments Dated May 13, 1992 from James P. Byrne, EPA Region I on the April 1992 "Final Work Plan, Final Field Sampling Plan, Final Heath and Safety Plan, Final Quality Assurance Project Plan," OHM Remediation Corp. and the April 1992 "Final Community Relations Plan," Dames & Moore. [Filed and listed in 3.7 Work Plans and Progress Reports in this Administrative Record Index.]

Responses to Comments

7. Response to the EPA Comments on the August 1991 "Draft Community Relations Plan," Dames & Moore.
8. Response to the Commonwealth of Massachusetts Department of Environmental Protection

Comments on the August 1991 "Draft Community Relations Plan," Dames & Moore.

13.5 Fact Sheets

1. "Installation Restoration Program Fact Sheet: Phase II Work Plan Addendums," U.S. Army, Fort Devens (June 1993).

13.11 Technical Review Committee Documents

1. Technical Review Committee Meeting Summary, List of Attendees, and Handouts (May 14, 1991).
2. Technical Review Committee Meeting Summary and List of Attendees (July 31, 1991).
3. Technical Review Committee Meeting Summary and List of Attendees (October 23, 1991).
4. Technical Review Committee Meeting Summary and List of Attendees (January 15, 1992).
5. Technical Review Committee Meeting Summary, Agenda, Handouts, Overheads, and List of Attendees (April 28, 1992).
6. Technical Review Committee Meeting Summary, Agenda, Handouts, Overheads, and List of Attendees (July 14, 1992).
7. Technical Review Committee Meeting Summary, Agenda, Handouts, Overheads, and List of Attendees (October 27, 1992).
8. Agenda and Attendance List for Sudbury Annex Working Meeting (November 23, 1992).
9. Technical Review Committee Meeting Summary, List of Attendees, and Handouts (February 2, 1993).
10. Letter from Richard D. Dotchin, U.S. Army to James P. Byrne, EPA Region I (March 3, 1993).
    Concerning follow-up to the February 2, 1993 Technical Review Committee Meeting.
11. Technical Review Committee Meeting Summary, List of Attendees, and Handouts (June 9, 1993).

17.0 Site Management Records

17.6 Site Management Plans

The document cited below as entries number 1 and 2 may be reviewed, by appointment only, at the Fort Devens Environmental Management Office.

Reports

1. "Final Master Environmental Plan," OHM Remediation Services Corp. (January 1992).
2. "Draft Master Environmental Plan, Fort Devens Sudbury Training Annex, Massachusetts," Ecology & Environment, Inc. (May 1994).
3. "Final Project Operations Plan, Fort Devens Sudbury Training Annex, Sudbury, Massachusetts, Volume I & II," ABB Environmental Services, Inc. (April 1995).
4. "Draft Master Environmental Plan, Ft. Devens Sudbury Training Annex, MA," ABB Environmental Services, Inc. (December 1995).

Comments

5. Comments Dated July 11, 1991 from James P. Byrne, EPA Region I on the May 1991 "Draft Master
   Environmental Plan, " OHM Remediation Services Corp.
6. Comments Dated July 15, 1991 from D. Lynne Chappell, Commonwealth of Massachusetts Department of Environmental Protection on the May 1991 "Draft Master Environmental Plan," OHM Remediation Services Corp.
7. Comments from James P. Byrne, EPA Region I on the January 1992 "Final Master Environmental Plan," OHM Remediation Services Corp.
8. Comments Dated June 27, 1994 from Robert Lim, USEPA, on the May 1994 "Master Environmental Plan, Update, Fort Devens Sudbury Training Annex, Massachusetts," Ecology and Environment, Inc.
9. Comments Dated January 3, 1997, from Mary Sanderson, USEPA Region I, on the "Draft Final Environmental Baseline Survey and CERFA Letter Reports, Sudbury Training Annex."

Responses to Comments

10. Response Dated August 28, 1991 from OHM Remediation Services Corp. to the Comments Dated July 11, 1991 from James P. Byrne, EPA Region I on the May 1991 "Draft Master Environmental

Plan," OHM Remediation Services Corp.

11. Response Dated August 28, 1991 from OHM Remediation Services Corp. to the Comments Dated July 15, 1991 from D. Lynne Chappell, Commonwealth of Massachusetts Department of Environmental Protection on the May 1991 "Draft Master Environmental Plan, " OHM Remediation Services Corp.

Responses to Responses to Comments

12. Response Dated September 12, 1991 from James P. Byrne, EPA Region I to the Response Dated August 28, 1991 from OHM Remediation Services Corp.

17.7 Reference Documents

1. "Criteria for Evaluating Sites for Hazardous Waste Management," Clark-McGlennon Associates (no date).
2. "Ground-Water Geology and Hydrology of the Maynard Area, Massachusetts," N. M. Perlmutter, U.S. Geological Survey Water-Supply Paper 1539-E (1962).
3. Real Estate File, Survey Inspection and Utilization of Government Property, List of Bunkers (1973).
4. "Report on Water Supply Investigation - Tuttle Hill Area," Dufresne-Henry, Inc.(April 1982).
5. "Element Concentrations in Soils and Other Surficial Materials of the Contemporaneous United States," H. T. Shacklett and J. G. Boergen (1984).
6. "Middlesex County Soil Survey, A Resource Planner's Guide," United States Department of Agriculture (June 1989).
7. "Endangered Species Survey, Phase I. An Environmental Inventory of Wildlife Species and Their Habitats," Anaptek Corporation (1991).
8. Compilation of information on Natick Laboratory and land management obtained through information search, including draft documents and document edits, notes correspondence, etc., OHM Remediation Services Corp. (1990-1991).
9. "Fort Devens Sudbury Annex Inventory Summary Report," Brian O. Butler (1992).

17.8 Federal and Local Technical and Historical Records

The document cited below as entry number 1 may be reviewed, by appointment only, at the office of the Fort Devens BRAC Environmental Coordinator, Fort Devens, Massachusetts.

1. "An Intensive Archeological Survey of the Sudbury Training Annex," The Public Archaeology Laboratory, Inc. (April 1985).
2. "Defense Base Closure and Realignment Commission, Archives Search Report for Ordnance and Explosives, Chemical Warfare Materials, Sudbury Annex," U.S. Army Corps of Engineers, St. Louis District (February 1997).

GUIDANCE DOCUMENTS

The following guidance documents were relied upon during the Fort Devens - Sudbury Annex cleanup. These documents may be reviewed, by appointment only, at the Environmental Management Office at Foil Devens, Massachusetts.

1. Occupational Safety and Health Administration (OSHA). Hazardous Waste Operation and Emergency Response (Final Rule, 29 CFR Part 1910, Federal Register. Volume 54, Number 42) March 6, 1989.
2. USATHAMA. Geotechnical Requirements for Drilling, Monitor Wells, Data Acquisition, and Reports, March 1987.
3. USATHAMA. IRDMIS User's Manual, Version 4.2, April 1991.
4. USATHAMA. USATHAMA Quality Assurance Program: PAM-41, January 1990.
5. USATHAMA. Draft Underground Storage Tank Removal Protocol - Fort Devens, Massachusetts, December 4, 1992.
6. U.S. Environmental Protection Agency. Guidance for Preparation of Combined Work/Quality Assurance Project Plans for Environmental Monitoring: OWRS QA-1, May 1984.
7. U.S. Environmental Protection Agency. Office of Research and Development. Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans: AMS-005/80, 1983.
8. U.S. Environmental Protection Agency. Test Methods for Evaluating Solid Waste: EPA SW-846 Third Edition, September 1986.
9. U.S. Environmental Protection Agency. Office of Emergency and Remedial Response. Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, (OSWER Directive 9355.5-01, EPA/540/3-89/004), 1986.
10. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation manual (Part A), EPA/1-89/002), 1989.
11. U.S. Environmental Protection Agency. Hazardous Waste Management System: Identification and Listing of Hazardous Waste: Toxicity Characteristic Revisions, (Final Rule, 40 CFR Part 261 et al, Federal Register Part V), June 29, 1990.
12. U.S. Army. Environmental Quality - Environmental Protection and Enhancement, (Army Regulation 200-1), April 23, 1990.
13. U.S. Environmental Protection Agency, 1991. Design and Construction of RCRA/CERCLA Final Covers; Office of Research and Development; Washington, DC; EPA/625/4-91/025; May.
14. U.S. Environmental Protection Agency, 1991. Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals) Interim; Office of Emergency and Remedial Response, Washington, DC; Publication 9285.7-01B, October.

APPENDIX F
GLOSSARY OF ACRONYMS AND ABBREVIATIONS

AEHA	Army Environmental Health Agency
AOC	area of contamination
AWQC	Ambient Water Quality Criteria
bgs	below ground surface
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	chemical of potential concern
DDD	2,2-bis(para-chlorophenyl)-1,1-dichloroethane
DDE	2,2-bis(para-chlorophenyl)-1,1-dichloroethene
DDT	2,2-bis(para-chlorophenyl)-1,1,1-trichloroethane
DERP	Defense Environmental Restoration Program
ESAT	USEPA Region I Environmental Services Assistance Team
FEMA	Federal Emergency Management Agency
FFA	Federal Facility Agreement
HI	Hazard Index
HQ	Hazard Quotient
MADEP	Massachusetts Department of Environmental Protection
NADEQE	Massachusetts Department of Environmental Quality Engineering
MCL	Maximum Contaminant Level
MCP	Massachusetts Contingency Plan
MFFA	Massachusetts Fire Fighting Academy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OU	operable unit
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyl
POL	petroleum, oil, and lubricants
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RFTA	Reserve Forces Training Area
RME	reasonable maximum exposure
RI	remedial investigation
SA	study area
SARA	Superfund Amendments and Reauthorization Act of 1986
SI	site investigation
SMCL	Secondary Maximum Contaminant Level
SVOC	semivolatile organic compound
TAL	Target Analyte List
TCL	Target Compound List
TPH	total petroleum hydrocarbons
TRC	Technical Review Committee
Ig/g	micrograms per gram
Ig/L	micrograms per liter
UBK	Uptake/Biokinetic
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