EPA/ROD/R01-95/113
1995

# EPA Superfund
# Record of Decision:

**FORT DEVENS**
**EPA ID: MA7210025154**
**OU 01**
**FORT DEVENS, MA**
**09/26/1995**

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**FORT DEVENS**
**FEASIBILITY STUDY**
**FOR GROUP 1A SITES**

# RECORD OF DECISION
# SHEPLEY'S HILL LANDFILL OPERABLE UNIT
# FORT DEVENS, MASSACHUSETTS

***IN ACCORDANCE WITH U.S. ARMY REGULATION 200-2, THIS DOCUMENT IS INTENDED BY THE U.S. ARMY TO COMPLY WITH THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969.***

**SEPTEMBER 1995**

***PRINTED ON RECYCLED PAPER***

AEC Form 45, 1 Feb 93 replaces THAMA Form 45 which is obsolete.

To: C. Keating and B. Brandon, EPA
From: C. Stein and D. McTigue, Gannett Fleming Inc.
Subject: Discussion of groundwater extraction at SHL

We understand that recent discussions at EPA have raised questions concerning the installation of a pump-and-treat (PAT) system at the toe of SHL as the interim remedy of choice (as mandated by the1995 ROD). Below, we have attempted to outline possible arguments for, and against, the implementation of this system, with particular emphasis on the technical (hydrologic and geochemical) issues, and some acknowledgment of various political, regulatory, and economic issues that have emerged, to date.

Benefits ("pros"):

1. There is a public perception that problems caused by SHL are Army's responsibility, so some remedy should be implemented as soon as possible to prevent further "off-site migration."

2. There is little doubt that the proposed contingency remedy would be effective, at least on a local scale. The PAT scheme would remove dissolved As, Fe, and low-ORP groundwater emerging from the toe of the landfill.

3. Emplacement of this system will satisfy the ROD (1995).

4. Emplacement of this system will prevent further northward migration of high-As water off-site. Note that cutting off the mass flux at the PAT system does not imply that there will be a reduction in arsenic concentrations downgradient (see related points below).

5. The PAT system *may* increase ORP in downgradient domains. It would remove low-ORP groundwater at the toe of the landfill, which is "replaced" from what is now "cross-gradient," and likely higher ORP. If these effects are sustained as the water moves downgradient, arsenic mobility may be decreased in certain subdomains (i.e., where ORP is >~100 mV). Note that the influence of upgradient changes in ORP on downgradient conditions are not known at this time, given current characterization. See corresponding "risk" developed below.

6. Doing something now (even though this is only an interim remedy) moves Army closer to the BRAC closure date of 2005, whereas calling a halt to installation of an interim remedy at SHL in favor of further exploratory work will cause significant delays.

Neutral (neither risk nor benefit):

1. The origin of the high As plume within the landfill has not been established. Evidence confirming that downgradient high-arsenic groundwater is closely linked to the landfill is still needed. The presence of low-ORP, high-As groundwater at Molumco Road and West Main Street may be the result of northward-flowing groundwater from within and beneath the landfill, but may also be naturally-occurring in those areas, due to preexisting conditions. Conditions favoring a natural origin for the elevated As in groundwater are known to be present (e.g., regional occurrence of high As in both bedrock minerals and in overburden hydrous ferric oxide (HFO) coatings, presence of peat deposits, low ORP, etc.). Thus, installation of a PAT system at the toe of the landfill may have no effect on groundwater to the north.

2. There seems to be general agreement that the ROD is no longer strictly applicable because new information (specifically, the discovery of high-As water at Molumco Rd. and W. Main St.) has come to light since it was signed. Therefore, the ROD requirements for any remedies should be revisited.

Risks ("cons"):

1. The costs of implementing a PAT system obviously should be weighed against the benefits of performing additional characterization, including development of a conceptual model consistent with data, that will help to identify the process(es) responsible for the observed arsenic distribution and concentrations, etc. The benefit of the PAT system has not been established (i.e., will it have positive, negative, or even no effects on the downgradient areas?).

2. Installation of the PAT system will perturb ambient conditions. Any subsequent investigative work to determine the processes controlling As mobilization (either in the subsurface or in Plow Shop Pond) may be compromised. It will not be possible to characterize ambient groundwater conditions near the toe of the landfill once perturbations have been introduced by the PAT system. Moreover, since any perturbations (e.g., of the flow field, pH, ORP, etc.) can be expected to propagate downstream, any sampling at points along flow lines to the north (such as Molumco Rd. and West Main Street) will have to be completed by the time the PAT effects arrive at those points. Otherwise, results will be compromised and possibly of limited usefulness. Note that the advective travel time from the toe of SHL to Molumco Road and West Main Street is estimated to be of the order of a few years, which is also the time scale over which the additional investigation is likely to take place. In addition, note that the proposed PAT scheme, with extraction of groundwater at ~30-50 gpm and discharge to a treatment plant offsite, will alter the regional hydrology in an undetermined way. Discharge of groundwater from the direction of SHL to Plow Shop Pond will likely decrease, and recharge of groundwater from the northwest portion of Plow Shop Pond will likely increase. Also, the total flux of groundwater

northward from the toe of the landfill will likely decrease, resulting in a lower hydraulic gradient, lower groundwater velocity, and undetermined geochemical consequences (e.g., lower ORP?).

3. All stakeholders should bear in mind that this is not a VOC plume, with an identifiable upgradient "source." Therefore, "source control" may not be an applicable concept. While there clearly is a "source" of arsenic beneath SHL, there is also likely additional "source" throughout the plume domain. The desire to cut off the flux of arsenic from the site is based, to some extent, on the more familiar experience with VOCs, where this action usually results in attenuation downgradient by "flushing," dilution by mixing, degradation, etc. Here, the distribution of arsenic in groundwater is controlled by complex hydrologic and geochemical processes that are not fully characterized or well understood at this time. It is entirely possible that the downgradient distribution of arsenic is relatively insensitive to upgradient conditions. A delay of a few years before installing a remedy at the toe of the landfill may not make any difference in the areal extent of high-As groundwater (e.g., it is possible that the system is well-buffered with respect to pH, ORP, etc., and As is ubiquitous).

4. Conducting the necessary investigation(s) before installing a remedy will optimize the selection and implementation of the appropriate technology for a long-term solution .

5. The PAT system may exacerbate the arsenic problem along the flow lines to the north. It has been noted previously that the extremely low ORP conditions (~ -300 to -400 mV and lower) and low arsenic concentrations (generally < ~50 μg/L) observed in HLA's drivepoint sampling at Molumco Rd. are consistent with the formation of solid-phase sulfides. The PAT system may cause the downstream propagation of more oxygenated water, as water from the edges of the landfill "fill in" around the groundwater "hole" created by the extraction well. If this higher-ORP water is in the range of about –150 to –200 mV by the time it reaches Molumco Rd., these sulfides will oxidize, thereby releasing additional arsenic, so the arsenic problem at least at that point may become considerably worse. Depending on the extent to which PAT-initiated oxidation occurs, it is also possible that the ORP may rise, at some downgradient location, to the point where ferric iron precipitates and dissolved arsenic is again lowered (by sorption).

6. In the event that the PAT is discontinued after a some finite period of operation, and the zone now containing hydrous ferric oxides (HFO) and sorbed As returns to ambient conditions that are more reducing, arsenic will be liberated. The installation and subsequent shutdown of a PAT system may induce arsenic remobilization and downgradient re-establishment of high-arsenic groundwater. Both startup and shutdown of a PAT system may effect a number of transient shifts in dissolved arsenic concentrations (both increases and decreases) in different portions of the domain. The current hydrogeochemical system includes domains that function as internal "sources" and "sinks" of arsenic, and any perturbation of the flow and controls on ORP may result in both spatial and temporal shifts of these domains.

7. No environmental receptors (e.g., ecological impacts due to accumulation of As in wetland sediment to the north) have been identified to date. It is not known whether or not any active remediation will be indicated in the long term.

- contingency remedy → prevent contaminant migration and potential exposure

principle threat: potential residential use of contam. gw

1995 - addresses gw contamination

- operated 1917 - 1992
- capped (10/86 - 5/93) to mitigate potential for off-site contamination

- RI - arsenic in downgradient wells (69-390 ppb) (unfiltered) gw at north end of landfill attained cleanup goals

ROs:

- protect potential residential receptors from exposure to contaminated gw emanating from the landfill having chemicals in excess of MCLs
- prevent contaminated gw from contributing to the contamination of PSP sediments in excess of hh & eco risk-based concs

"
- gw extraction systems used in Alts. SHL-5 & SHL-9 would be easily designed & constructed"

1/98 - 50% reduction in risk
1/03 - 75% " " " (addtl 25%)
1/08 - cleanup goals (MCLs) achieved

- will implement contingency remedy if above criteria not met for any chemicals for which cleanup levels were based on MCLs

# RECORD OF DECISION
# SHEPLEY'S HILL LANDFILL OPERABLE UNIT
# AREAS OF CONTAMINATION 4, 5, AND 18
# FORT DEVENS, MASSACHUSETTS

**SEPTEMBER 1995**

# RECORD OF DECISION
## SHEPLEY'S HILL LANDFILL OPERABLE UNIT
## FORT DEVENS, MASSACHUSETTS

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# DECLARATION FOR THE RECORD OF DECISION

## SITE NAME AND LOCATION

Shepley's Hill Landfill Operable Unit
Fort Devens, Massachusetts

## STATEMENT OF PURPOSE AND BASIS

This decision document presents the U.S. Army's selected remedial action for the Shepley's Hill Landfill Operable Unit, Fort Devens, 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 Fort Devens Base Realignment and Closure (BRAC) Environmental Coordinator; the Installation Commander; the U.S. Army Deputy Chief of Staff for Personnel and Installation Management; and the Director of the Waste Management Division, U.S. Environmental Protection Agency New England have been delegated the authority to approve this Record of Decision.

This decision 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 Fort Devens BRAC Environmental Office, Building P12, Fort Devens, Massachusetts, and at the Ayer Town Hall, Main Street, Ayer, Massachusetts. The Administrative Record Index (Appendix D of this Record of Decision) identifies each of the items considered during selection of the remedial action.

## ASSESSMENT OF THE SITE

Actual or potential releases of hazardous substances from the Shepley's Hill Landfill Operable Unit, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to the public health, welfare, or the environment.

## DESCRIPTION OF THE SELECTED REMEDY

This remedial action is a source control action that addresses long-term residential exposure to contaminated groundwater, the principal known threat at the Shepley's Hill Landfill Operable Unit. It consists of completing closure of Shepley's Hill Landfill in accordance with applicable Massachusetts requirements at 310 CMR 19.000, and monitoring and evaluating the effectiveness of the landfill cover system completed in 1993 at controlling groundwater contamination and site risk. The remedy controls the release of contaminants from wastes buried in Shepley's Hill Landfill and reduces the potential risk of future residential exposure to contaminated groundwater. The major components of the selected remedy include:

- landfill closure in accordance with applicable requirements of 310 CMR 19.000;
- survey of Shepley's Hill Landfill;
- evaluation/improvement of stormwater diversion and drainage;
- landfill cover maintenance;
- landfill gas collection system maintenance;
- long-term groundwater monitoring;
- long-term landfill gas monitoring;
- institutional controls;
- educational programs;
- 60 percent design of a groundwater extraction system;
- annual reporting to the Massachusetts Department of Environmental Protection and the U.S. Environmental Protection Agency; and
- five-year site reviews.

The selected remedy includes a contingency remedy if the selected remedy proves ineffective at controlling site risk. The contingency remedy is groundwater extraction and discharge to the Town of Ayer publicly owned treatment works.

## STATE CONCURRENCE

The Commonwealth of Massachusetts has concurred with the selected remedy. Appendix E of this Record of Decision contains a copy of the declaration of concurrence.

## DECLARATION

The selected remedy is consistent with CERCLA, and to the extent practicable, the NCP, is protective of human health and the environment, complies with federal and Commonwealth requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. The remedy utilizes permanent solutions and alternative treatment technologies, to the maximum extent practicable for the Shepley's Hill Landfill Operable Unit. However, because treatment of the principal source of contamination was found not to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element.

The contingency remedy, if implemented, would also be consistent with CERCLA, and to the extent practicable, the NCP, be protective of human health and the environment, comply with federal and Commonwealth requirements that are legally applicable or relevant and appropriate to the remedial action, and be cost effective. The remedy utilizes permanent solutions and alternative treatment technologies, to the maximum extent practicable for the Shepley's Hill Landfill Operable Unit. The contingency remedy, if implemented, would satisfy the statutory preference for treatment as a principal element.

Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

**DECLARATION FOR THE RECORD OF DECISION**
**Shepley's Hill Landfill Operable Unit**
**Fort Devens, Massachusetts**

The foregoing represents the selection of a remedial action 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**

James C. Chambers
Fort Devens BRAC Environmental Coordinator

19 Sep 95
Date

**DECLARATION FOR THE RECORD OF DECISION**
**Shepley's Hill Landfill Operable Unit**
**Fort Devens, Massachusetts**

The foregoing represents the selection of a remedial action 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**

Colonel Edward R. Nuttall
Installation Commander, Fort Devens

21 Sep 95
Date

**DECLARATION FOR THE RECORD OF DECISION**
**Shepley's Hill Landfill Operable Unit**
**Fort Devens, Massachusetts**

The foregoing represents the selection of a remedial action 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**

Arthur T. Dean — 28 Sep 95

ARTHUR T. DEAN
Major General, USA
Deputy Chief of Staff for
Personnel and Installation
Management

Date

**DECLARATION FOR THE RECORD OF DECISION**
**Shepley's Hill Landfill Operable Unit**
**Fort Devens, Massachusetts**

The foregoing represents the selection of a remedial action 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. ENVIRONMENTAL PROTECTION AGENCY**

Linda M. Murphy
Director, Waste Management Division
U.S. Environmental Protection Agency, New England

Sept. 26, 1995
Date

# DECISION SUMMARY

## I. SITE NAME, LOCATION, AND DESCRIPTION

Fort Devens is a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List (NPL) site located in the Towns of Ayer and Shirley (Middlesex County) and Harvard and Lancaster (Worcester County), approximately 35 miles northwest of Boston, Massachusetts. The installation occupies approximately 9,600 acres and is divided into the North Post, Main Post, and South Post (Figure 1 in Appendix A). Seventy-three Study Areas (SAs) and Areas of Contamination (AOCs) have been identified at Fort Devens.

This Record of Decision addresses groundwater contamination at the Shepley's Hill Landfill at Fort Devens. The Shepley's Hill Landfill includes three AOCs: AOC 4, the sanitary landfill incinerator; AOC 5, sanitary landfill No. 1 or Shepley's Hill Landfill; and AOC 18, the asbestos cell. AOCs 5 and 18 are located within the capped area at Shepley's Hill Landfill. The three AOCs are collectively referred to as Shepley's Hill Landfill.

Shepley's Hill Landfill encompasses approximately 84 acres in the northeast corner of the Main Post at Fort Devens. It is situated between the bedrock outcrop of Shepley's Hill on the west and Plow Shop Pond on the east (Figure 2 in Appendix A). Nonacoicus Brook, which drains Plow Shop Pond, flows through a wooded wetland at the north end of the landfill. The southern end of the landfill borders the Defense Reutilization and Marketing Office (DRMO) yard and a warehouse area. An area east of the landfill and south of Plow Shop Pond is the site of a former railroad roundhouse.

Review of the surficial geology map of the Ayer Quadrangle shows that in the early 1940s, the active portion of the landfill consisted of approximately 5 acres near the end of Cook Street, near where monitoring well SHL-1 is located. The fill was elongated north-south along a pre-existing small valley marked by at least two swamps (probably kettle holes) and lying between the bedrock outcrop of Shepley's Hill to the west and a flat-topped kame terrace with an elevation of approximately 250 feet to the east, next to Plow Shop Pond. During the landfilling operation, the valley was filled-in, and much of the kame terrace, which may have been used as cover material, disappeared. Background information indicates the landfill once operated as an open burning site.

Landfill operations at Shepley's Hill Landfill began at least as early as 1917, and stopped as of July 1, 1992. During its last few years of use, the landfill received about 6,500 tons per year of household refuse and construction debris, and operated using the modified trench method. There is evidence that trenches in the northwest portion cut into previously used areas containing glass and spent shell casings. The glass dated from the mid-nineteenth century to as late as the 1920s. The approximate elevation of the bottom of the waste is estimated to be 214 feet above sea level at the north end and in the central portion of the landfill, and 230 feet above sea level in the southeast portion of the landfill. The maximum depth of the refuse is about 30 feet. The average thickness of waste is not documented; however, if the average thickness were 10 feet, the landfill volume would be over 1,300,000 cubic yards. Reports of flammable fluid disposal in the southeastern portion of the landfill have not been substantiated by observations in test pits or other research. The Army has no evidence that hazardous wastes were disposed of in the landfill after November 19, 1980. No waste hot spots or hazardous waste disposal areas were identified during remedial investigation (RI) or supplemental RI activities.

In an effort to mitigate the potential for off-site contaminant migration, Fort Devens initiated the Fort Devens Sanitary Landfill Closure Plan in 1984 in accordance with Massachusetts regulations entitled "The Disposal of Solid Wastes by Sanitary Landfill" (310 CMR 19.00, April 21, 1971). The Massachusetts Department of Environmental Protection (MADEP) approved the plan in 1985. Closure plan approval was consistent with 310 CMR 19.00 and contained the following requirements:

- grading the landfill surface to a minimum 2 percent slope in non-operational areas of the landfill and 3 percent in operational areas;
- removing waste from selected areas within 100 feet of the 100-year floodplain;
- installing a gas venting system;
- installing a low permeability cap and covering the cap with sand, gravel, and loam, and seeding to provide cover vegetation and prevent erosion; and

- implementing a groundwater monitoring program based on sampling five existing monitoring wells every four months.

The capping was completed in four phases (see Figure 2 in Appendix A). In Phase I, 50 acres were capped in October 1986; in Phase II, 15 acres were capped in November 1987; and in Phase III, 9.2 acres were capped in March 1989. The Phase IV closure of the last 10 acres was accomplished in two steps: Phase IV-A was closed in 1991, and Phase IV-B was closed as of July 1, 1992, although the geomembrane cap was not installed over Phase IV-B until May 1993.

Because of the large area and shallow surface slope of the existing landfill, early phases of the landfill closure were completed with a 2 or 3 percent surface slope. Slopes were increased to 5 percent in Phase IV-B. Phases I through IV-A were capped with a 30-mil polyvinyl chloride (PVC) geomembrane overlain with a 12-inch drainage layer and 6-inch topsoil layer. At the request of MADEP, the Phase IV-B cap design was modified to include a 40-mil PVC geomembrane, a 6-inch drainage layer, and a 12-inch topsoil layer. A landfill gas collection system consisting of 3-inch diameter gas-collection pipes bedded in a minimum 6-inch thick gas-venting layer was installed beneath the PVC geomembrane in all closure phases. Gas vents were installed through the PVC geomembrane at 400-foot centers. A minimum 6-inch cushion/protection layer was maintained between the geomembrane and underlying waste. As requested by the U.S. Environmental Protection Agency (USEPA) and MADEP, four additional groundwater monitoring wells were installed in 1986 to supplement the five in the original groundwater program. The Army submitted a draft closure plan to MADEP on July 21, 1995 pursuant to 310 CMR 19.000 to document that Shepley's Hill Landfill was closed in accordance with plans and applicable MADEP requirements. Closure in accordance with applicable requirements of Commonwealth regulations is a component of the selected and contingent remedy.

AOC 4, the sanitary landfill incinerator was located in former Building 38 near the end of Cook Street within the area included in Phase I of the sanitary landfill closure. The incinerator was constructed in 1941, burned household refuse, and operated until the late 1940s. Ash from the incinerator was buried in the landfill. The incinerator was demolished and buried in the landfill in September 1967. The building foundation was removed and buried on-site in 1976.

AOC 18, the asbestos cell, is located in the section of the landfill closed during Phase IV. Between March 1982 and November 1985, an estimated 6.6 tons of asbestos construction debris were placed in the section of the landfill closed during Phase IV-A. In 1990, a new asbestos cell was opened in the section closed during Phase IV-B, and was used until July 1992 for disposal of small volumes of asbestos-containing material.

A more complete description of the Shepley's Hill Landfill Operable Unit can be found in the RI Addendum report, December 1993, Section 3, and the Feasibility Study (FS) report, February 1995, Subsection 1.2.

## II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

### A. Land Use and Response History

Fort Devens was established in 1917 as Camp Devens, a temporary training camp for soldiers from the New England area. In 1931, the camp became a permanent installation and was redesignated as Fort Devens. Throughout its history, Fort Devens has served as a training and induction center for military personnel, and as a unit mobilization and demobilization site. All or portions of this function occurred during World Wars I and II, the Korean and Vietnam conflicts, and operations Desert Shield and Desert Storm. During World War II, more than 614,000 inductees were processed and Fort Devens reached a peak population of 65,000.

The primary mission of Fort Devens is to command, train, and provide logistical support for non-divisional troop units and to support and execute Base Realignment and Closure (BRAC) activities. The installation also supports the Army Readiness Region and National Guard units in the New England area.

Fort Devens was selected for cessation of operations and closure under the Defense BRAC Act of 1990 (Public Law 101-510).

A more complete description of the Shepley's Hill Landfill Operable Unit can be found in the RI Addendum report, December 1993, Section 3, and the FS report, February 1995, Subsection 1.2.

B. Enforcement History

In conjunction with the Army's Installation Restoration Program (IRP), Fort Devens and the U.S. Army Environmental Center (USAEC; formerly the U.S. Army Toxic and Hazardous Materials Agency) initiated a Master Environmental Plan (MEP) in 1988. The MEP assessed the environmental status of SAs, discussed necessary investigations, and recommended potential responses to environmental contamination. Priorities for environmental restoration at Fort Devens were also assigned. The MEP identified Shepley's Hill Landfill as a source of groundwater contamination and recommended additional groundwater sampling and a full RI to determine the extent of contamination.

On December 21, 1989, Fort Devens was placed on the NPL under CERCLA as amended by the Superfund Amendments and Reauthorization Act (SARA) as a result of volatile organic compound (VOC) contamination in groundwater at Shepley's Hill Landfill, metal contamination in groundwater at the Cold Spring Brook Landfill (AOC 40), and the proximity of both locations to public drinking water supplies. A Federal Facilities Agreement (Interagency Agreement [IAG]) was developed and signed by the Army and USEPA Region I on May 13, 1991, and finalized on November 15, 1991. The IAG provides the framework for the implementation of the CERCLA/SARA process at Fort Devens.

In 1991, the U.S. Department of Defense, through USAEC, initiated an RI for the Group 1A sites (AOCs 4, 5, 18, and 40) at Fort Devens. The RI report was issued in April 1993, and an RI Addendum report was issued in December 1993. The purpose of the RI and RI Addendum was to determine the nature and extent of contamination at the AOCs, assess human health and ecological risks, and provide a basis for conducting an FS.

An FS that evaluates remedial action alternatives for cleanup of groundwater at Shepley's Hill Landfill was issued in February 1995. The FS identifies and screens 10 remedial alternatives and provides a detailed analysis of five of these remedial alternatives to allow decision-makers to select a remedy for cleanup of groundwater at the Shepley's Hill Landfill Operable Unit.

The proposed plan detailing the Army's preferred remedial alternative was issued in May 1995 for public comment. Technical comments presented during the public comment period are included in the Administrative Record. Appendix C, the Responsiveness

Summary, contains a summary of these comments and the Army's responses, and describes how these comments affected the remedy selection.

## III. COMMUNITY PARTICIPATION

The Army has held regular and frequent informational meetings, issued fact sheets and press releases, and held public meetings to keep the community and other interested parties informed of activities at Shepley's Hill Landfill.

In February 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 Fort Devens. As part of this plan, the Army established a Technical Review Committee (TRC) in early 1992. The TRC, as required by SARA Section 211 and Army Regulation 200-1, included representatives from USEPA, USAEC, Fort Devens, MADEP, local officials, and the community. Until January 1994, when it was replaced by the Restoration Advisory Board (RAB), the committee generally met quarterly to review and provide technical comments on schedules, work plans, work products, and proposed activities for the SAs at Fort Devens. The RI, RI Addendum, and FS reports, proposed plan, and other related support documents were all submitted to the TRC or RAB for their review and comment.

The Army, as part of its commitment to involve the affected communities, forms a RAB when an installation closure involves transfer of property to the community. The Fort Devens RAB was formed in February 1994 to add members of the Citizen's Advisory Committee (CAC) to the TRC. The CAC had been established previously to address Massachusetts Environmental Policy Act/Environmental Assessment issues concerning the reuse of property at Fort Devens. The RAB consists of 28 members (15 original TRC members plus 13 new members) who are representatives from the Army, USEPA Region I, MADEP, local governments and citizens of the local communities. It meets monthly and provides advice to the installation and regulatory agencies on Fort Devens cleanup programs. Specific responsibilities include: addressing cleanup issues such as land use and cleanup goals; reviewing plans and documents; identifying proposed requirements and priorities; and conducting regular meetings that are open to the public. The Army presented the proposed plan for the Shepley's Hill Landfill Operable Unit at the May 4, 1995 RAB meeting.

On May 31, 1995, the Army issued a fact sheet to citizens and organizations, to provide the public with a brief explanation of the Army's preferred remedy for cleanup of groundwater at the Shepley's Hill Landfill Operable Unit. The fact sheet also described the opportunities for public participation and provided details on the upcoming public comment period and public meetings.

During the week of May 22, 1995, the Army published a public notice announcing the proposed plan, public informational meeting, and public hearing in the Times Free Press and the Lowell Sun. A public notice announcing the public hearing was published the week of June 12, 1995 in the Times Free Press and the week of June 19, 1995 in the Lowell Sun. The Army also made the proposed plan available to the public at the information repositories at the libraries in Ayer, Shirley, Lancaster, and Harvard, and at Fort Devens.

From June 1 to June 30, 1995, the Army held a 30-day public comment period to accept public comments on the alternatives presented in the FS and the proposed plan and on other documents released to the public. On June 6, 1995, the Army held an informal informational meeting at Fort Devens to present the Army's proposed plan to the public and discuss the cleanup alternatives evaluated in the FS. This meeting also provided the opportunity for open discussion concerning the proposed cleanup. On June 27, 1995, the Army held an informal public hearing at Fort Devens to discuss the proposed plan and to accept verbal or written comments from the public. A transcript of this meeting, public comments, and the Army's response to comments are included in the attached Responsiveness Summary (Appendix C).

All supporting documentation for the decision regarding the Shepley's Hill Landfill Operable Unit is contained in the Administrative Record for review. The Administrative Record is a collection of all the documents considered by the Army in choosing the remedy for the Shepley's Hill Landfill Operable Unit. On June 2, 1995, the Army made the Administrative Record available for public review at the Fort Devens BRAC Environmental Office, and at the Ayer Town Hall, Ayer, Massachusetts. An index to the Administrative Record is available at the USEPA Records Center, 90 Canal Street, Boston, Massachusetts and is provided as Appendix D.

## IV. SCOPE AND ROLE OF THE RESPONSE ACTION

The Army developed the selected remedy by combining components of different source control and management of migration alternatives. The selected remedy for the Shepley's Hill Landfill Operable Unit controls the release of contaminants to groundwater and controls potential groundwater use. The selected remedy also provides environmental monitoring of groundwater for a period of thirty years. The implementation of the selected alternative will not adversely affect any future response actions at the Shepley's Hill Landfill Operable Unit should they be required.

This remedial action will address the principal threat to human health at the Shepley's Hill Landfill Operable Unit posed by long-term residential exposure to contaminated groundwater. Potential threats to human and ecological receptors resulting from exposure to contaminated sediments and surface water in Plow Shop Pond will be addressed as part of the Plow Shop Pond Operable Unit. Potential remedial actions for Plow Shop Pond sediment contamination will be evaluated in a separate engineering report anticipated to be issued September 1, 1996. Environmental monitoring to assess any continuing affect of the landfill on the pond will take place as part of the Plow Shop Pond Operable Unit.

## V. SUMMARY OF SITE CHARACTERISTICS

Section 1 of the FS report contains an overview of RI and supplemental RI investigations at Shepley's Hill Landfill. A complete discussion of site characteristics can be found in Sections 3, 5, and 6 of the RI report, April 1993, and Sections 3, 4, and 5 of the RI Addendum report, December 1993. Significant findings of the RI and supplemental RI are summarized in the following subsections.

### A. Soils

The RI at Shepley's Hill Landfill included collecting three surface soil samples from suspected seep areas and analyzing them for Target Compound List (TCL) organic compounds, Target Analyte List (TAL) metals, and total organic carbon (TOC). Low concentrations of acetone and methylene chloride were reported in the samples; however, they were attributed to laboratory contamination. No other organics were

detected. Concentrations of TAL metals were within the estimated background range, except for calcium, which was elevated slightly. This was not considered significant. Because soil contamination was not identified during the RI, soils were not sampled during the supplemental RI.

B. Groundwater

Assessment of groundwater quality included two rounds of sampling at 22 monitoring wells during the RI, and one confirming round of sampling at 27 monitoring wells plus a second round at five monitoring wells during the supplemental RI. Target analyte groups for the RI and supplemental RI field programs included VOCs, semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), explosives, and inorganics.

The RI report concluded that groundwater downgradient of the landfill was contaminated with VOCs and inorganics as well as low concentrations of explosives, pesticides, and PCBs in scattered monitoring wells. The presence of pesticides was not certain, however, because of apparent laboratory contamination of several method blanks. The PCB Aroclor-1260 was reported at a low concentration in only one of 22 samples in one sampling round. The SVOC di-ethylphthalate was reported at 12 and 32 parts per billion (ppb) in samples from two separate monitoring wells, and was considered a sampling artifact.

The RI Addendum report also concluded that downgradient monitoring wells were contaminated with several VOCs and inorganics. A total of nine VOCs was reported at low concentrations in seven of the monitoring wells. Organic compounds were reported most frequently and at the highest concentrations in the downgradient monitoring wells SHL-11, SHL-19, SHL-20, and SHM-93-10C along the eastern edge of the landfill. In two instances, concentrations exceeded federal Maximum Contaminant Levels (MCLs) or Massachusetts Maximum Contaminant Levels (MMCLs) for drinking water: total dichlorobenzenes were reported at 11 ppb (the MMCL for 1,4-dichlorobenzene = 5 ppb) in monitoring well SHL-20, and the VOC 1,2-dichloroethane was reported at 9.9 ppb (MCL = 5 ppb) in monitoring well SHM-93-10C.

Inorganics were also reported at their highest concentrations in downgradient monitoring wells, especially SHL-10, SHL-11, SHL-19, SHL-20, and SHM-93-22C. Unfiltered

groundwater samples from downgradient monitoring wells typically exceeded background concentrations for arsenic, calcium, iron, magnesium, manganese, and potassium. In addition, there were scattered exceedances of background concentrations for barium, lead, vanadium, and zinc. The concentrations of arsenic ranged from 69 to 390 ppb (MCL = 50 ppb) in unfiltered samples from these monitoring wells. A significant portion of the total concentration of the inorganics was often associated with suspended material in the samples. An exception to this was the presence of dissolved arsenic in monitoring wells SHL-11, SHL-19, and SHL-20, all of which had high concentrations of arsenic in both filtered and unfiltered samples. Low oxidation potential in the samples with high dissolved arsenic concentrations was consistent with expected conditions downgradient of the landfill.

No pesticides or PCBs were reported in the supplemental RI groundwater samples. This led the RI Addendum report to reinterpret groundwater data presented in the RI report. Although pesticides were reported at low concentrations in several RI samples, no monitoring well had pesticides detected in both RI sampling rounds. In addition, the RI report states that several pesticides including heptachlor, endrin, alpha- and beta-benzenehexachloride, 2,2-bis(para-chlorophenyl)-1,1,1-trichloroethane (DDT), and endosulfan sulfate were detected in method blank samples, and that low concentrations of those compounds should be considered laboratory contamination. The RI report also noted difficulties with the pesticide and PCB analyses. These considerations and the supplemental RI data support the conclusion that the landfill is not a source of pesticides or PCBs in groundwater.

Supplemental RI data included the reported presence of the explosive nitroglycerine in one monitoring well, the water table monitoring well SHM-93-24A, at 80.8 ppb. This monitoring well is considered cross-gradient of the landfill and the source of the nitroglycerine is not known. The landfill is not considered a source of nitroglycerine. Although the explosives 1,3,5-trinitrobenzene, 1,3-dinitrobenzene and tetryl were reported inconsistently and at low concentrations in RI samples, they were not detected in the supplemental RI samples. SVOCs were not identified as groundwater contaminants in the RI report or targeted as analytes during the supplemental RI field program. They are not considered groundwater contaminants at Shepley's Hill Landfill.

C. Plow Shop Pond Surface Water

During the RI, samples were collected from 13 locations along the Plow Shop Pond shoreline to characterize surface water quality. Target analytes included TCL organics and TAL metals. The VOCs chloroform and methylene chloride were reported in several samples, and the pesticide endrin was reported at a low concentration in one sample. Methylene chloride was considered a laboratory contaminant and the detection of endrin was not considered significant in the RI report. The presence of chloroform, considered an improbable surface water contaminant in the RI report, could not be explained. The inorganics copper, silver, and zinc exceeded Ambient Water Quality Criteria (AWQC) for the protection of aquatic life throughout the pond, and iron and zinc exceeded AWQC in the wetlands area north of the pond.

D. Plow Shop Pond Sediments

Plow Shop Pond is believed to have been a historical discharge area for groundwater passing beneath Shepley's Hill Landfill and to have received contamination from the landfill. Areas of iron staining have been observed in Plow Shop Pond adjacent to the landfill. The characterization of Plow Shop Pond sediments was accomplished during both the RI and supplemental RI. The RI report concluded that pond sediments were contaminated with high concentrations of TAL metals and low concentrations of several polynuclear aromatic hydrocarbons. The VOCs acetone, methylene chloride, and 2-butanone were reported in several samples, as were low concentrations of 2,2-bis(para-chlorophenyl)-1,1-dichloroethene (DDE) and heptachlor. The presence of acetone, methylene chloride, and heptachlor is attributed to laboratory contamination.

Additional sediment samples were collected during the supplemental RI. The RI Addendum report concluded that sediments were contaminated with arsenic, barium, copper, chromium, iron, lead, manganese, mercury, nickel, and zinc. Based on available data, manufacturing process chemicals, waste disposal practices, and chemical distribution patterns in Plow Shop and Grove ponds, the RI Addendum report identified a former tannery located on Grove Pond as the major source of arsenic, chromium, lead, and mercury. Shepley's Hill Landfill was identified as a primary source of barium, iron, manganese, and nickel and a secondary source of arsenic, chromium, and lead. Data available at the time of the RI Addendum report were insufficient to define the source of copper. Subsequently available data from the Grove Pond and Railroad Roundhouse investigations suggest that activities at the tannery may have been a source of barium and copper and activities at the roundhouse may have been a source of copper and lead.

The supplemental RI sampling confirmed the presence of 2,2-bis(para-chlorophenyl)-1,1-dichloroethane (DDD), DDE, and DDT at low concentrations in Plow Shop Pond sediments. Several chemicals exceeded sediment quality guidelines. The RI Addendum report did not identify the landfill as a source of the pesticides.

## VI. SUMMARY OF SITE RISKS

The risk assessment contained in the RI Addendum report evaluates the probability and magnitude of potential human health and environmental effects associated with exposure to contaminated media at the site and updates the risk assessment of the RI report. 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 Section 6 of the RI Addendum report and summarized in Subsection 1.4 of the FS report.

Forty contaminants of potential concern, listed in Tables 1 through 7 in Appendix B of this Record of Decision were selected for evaluation in the human health risk assessment of the RI Addendum report. These contaminants of concern were selected to represent potential site-related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment. A summary of the health effects of each of the contaminants of concern can be found in the risk assessment detailed in Section 6 of the RI Addendum Report and associated appendices.

Potential human health effects associated with exposure to the contaminants of concern were estimated quantitatively or qualitatively through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the site. The following is a brief summary of the exposure pathways

evaluated; a more thorough description can be found in Subsection 6.1.2.2 of the risk assessment:

- incidental ingestion of Plow Shop Pond surface water, and long-term consumption of Plow Shop Pond fish by recreational fishermen and their families;
- contact (dermal contact and incidental ingestion) with Plow Shop Pond sediment by site visitors;
- contact (dermal contact and incidental ingestion) with surface water by swimmers in Plow Shop Pond; and
- future residential use of groundwater (there is no current identified use).

Because the RI report did not identify human health or ecological risks for soils exceeding the target risk values, soils were not re-evaluated in the RI Addendum report.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying the exposure level with 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 risk predicted. 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 average individual is not likely to have greater that a one in a million chance of developing cancer over 70 years as a result of site-related exposure to the compound at the stated concentration. Current USEPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

The hazard index was also calculated for each pathway as a measure of the potential for non-carcinogenic health effects. A hazard quotient is calculated by dividing the exposure level by the reference dose (RfD) or other suitable benchmark for non-carcinogenic health effects for an individual compound. 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 hazard quotient is often expressed as a single value (e.g., 0.3) indicating the ratio of the stated exposure as defined to the RfD value (in this example, the exposure as characterized is approximately one third of an acceptable exposure level for the given compound). The hazard quotient is only considered additive for compounds that have the same or similar toxic endpoint and the sum is referred to as the hazard index (HI). (For example: the hazard quotient for a compound known to produce liver damage should not be added to a second whose toxic endpoint is kidney damage).

The human health risk assessment of the RI Addendum report identifies the following potential human health risks:

- Future residential use of unfiltered groundwater interpreted to be under the influence of the landfill and contaminated with several inorganics (arsenic, manganese, chromium, lead, nickel, and sodium) and 1,2-dichloroethane and dichlorobenzenes was estimated to present potential cancer risks of $4x10^{-4}$ to $8x10^{-3}$. Most of the risk was due to the presence of arsenic. If a downward modifying factor of 10 is applied to this estimate to account for the uncertainty associated with arsenic risks, the modified risk estimate is $4x10^{-5}$ to $8x10^{-4}$, still within or exceeding the Superfund target risk range. Manganese presented average and maximum noncancer HI values of 12 to 55.

  It should be noted that when present at the federal MCL for drinking water, arsenic presents an estimated cancer risk of $1x10^{-3}$, which exceeds the target risk range, and an HI of 5.

- Long-term consumption of fish from Plow Shop Pond presented cancer risks that ranged from $3x10^{-6}$ to $4x10^{-4}$, within or exceeding the Superfund target risk range. Arsenic accounted for approximately 96 to 99 percent of the risk, while DDE contributed approximately 4 to 0.4 percent. Mercury presented noncancer risks that exceeded the target value of 1 (HIs ranged from 2 to 7). If a downward modifying factor of 10 is applied to the cancer risk estimate to account for the uncertainty associated with arsenic risks, the modified risk estimate is $3x10^{-7}$ to $4x10^{-5}$, which is within or below the Superfund target risk range. Thus it appears that the major human health risk associated with Plow Shop Pond fish is due to mercury contamination.

- Long-term contact with Plow Shop Pond sediment presented cancer risks of $2x10^{-5}$ to $2x10^{-4}$ and $9x10^{-5}$ to $6x10^{-4}$ under current and future exposure scenarios, respectively. Only under the maximum exposure assumptions did the estimates exceed the target risk range. Arsenic was responsible for essentially 100 percent of the risk. If a downward modifying factor of 10 is applied to the cancer risk estimate to account for the uncertainty associated with arsenic risks, the modified risk estimates are $2x10^{-6}$ to $2x10^{5}$ (current exposure scenario) and $9x10^{-6}$ to $6x10^{-5}$ (future exposure scenario), which are within or below the Superfund target risk range.

The ecological risk assessment evaluates risks to aquatic and semi-aquatic receptors from exposure to Plow Shop Pond surface water and sediments. Because the RI report did not identify ecological risks for soils exceeding the target risk values, soils were not re-evaluated in the RI Addendum report. Exposure of ecological receptors to groundwater was not evaluated because this was not considered a likely or significant exposure pathway.

The ecological risk assessment predicted, based on comparison to reference criteria, that Plow Shop Pond surface water and sediments present potential adverse risks to aquatic receptors. Average and maximum HI values for aquatic receptor exposure to surface water were 7.7 and 12.8, respectively. Primary contributors to potential risk were copper, silver, and zinc. For aquatic receptor exposure to sediments, average and maximum HI values were 182 and 1,300, respectively. Primary contributors to estimated risk were arsenic, chromium, manganese, and mercury. Other data, including fish and macroinvertebrate community studies, suggest that adverse effects may be less severe than predicted by the risk assessment.

For semi-aquatic wildlife, in both the average and maximum exposure scenarios, HIs were greater than 1 for five of the eight receptor species evaluated, including the mallard duck, painted turtle, green frog, mink, and muskrat. For the great blue heron, the HI for the maximum exposure scenario but not the average exposure scenario exceeded 1. HIs for the osprey and raccoon were well below 1. Sediments were predicted most likely to present potential risks to species with small home ranges and direct contact with sediment, such as the green frog or painted turtle. Primary contributors to predicted risk were arsenic, chromium, manganese, and mercury.

A detailed discussion of the ecological risk assessment approach and results is presented in Section 7 of the RI Addendum report and summarized in Subsection 1.5 of the FS report.

Actual or potential releases of hazardous substances to groundwater from Shepley's Hill Landfill, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, and the environment.

## VII. DEVELOPMENT AND SCREENING OF ALTERNATIVES

### A. Statutory Requirements/Response Objectives

Under its legal authorities, the Army's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that the remedial action, when complete, must comply with all federal and more stringent state environmental standards, requirements, criteria, or limitations, unless a waiver is invoked; a requirement that a remedial action be cost-effective and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment permanently and significantly reduces the toxicity, mobility, or volume of hazardous substances as a principal element. Response alternatives were developed to be consistent with these Congressional mandates.

Based on preliminary information relating to types of contaminants, environmental media of concern, and potential exposure pathways, remedial response objectives were developed to aid in the development and screening of alternatives. These remedial response objectives were developed to mitigate existing and future potential threats to public health and the environment. The response objectives are:

- Protect potential residential receptors from exposure to contaminated groundwater migrating from the landfill having chemicals in excess of MCLs.

- Prevent contaminated groundwater from contributing to the contamination of Plow Shop Pond sediments in excess of human health and ecological risk-based concentrations.

Response objectives were not identified for surface soil, landfill gas, or leachate. The risk assessments did not identify potential risks from exposure to surface soil, and ambient air monitoring during the RI did not identify airborne contaminants. Liquid leachate was not identified during either RI or supplemental RI activities. Additional actions to manage risk from exposure to Plow Shop Pond surface water and sediment will be evaluated separately for the Plow Shop Pond Operable Unit.

## B. Technology and Alternative Development and Screening

CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives was developed for the Shepley's Hill Landfill Operable Unit. The NCP reaffirms CERCLA's preference for permanent solutions that use treatment technologies to reduce the toxicity, mobility, and volume of hazardous substances to the maximum extent practical. With respect to source control, the in-situ treatment, or alternately the excavation and treatment, of such a large, heterogeneous landfill as Shepley's Hill Landfill is considered impractical and not cost effective. Therefore, the FS for the Shepley's Hill Landfill Operable Unit developed a range of alternatives in which containment of wastes was the principal element. This approach is consistent with guidance contained in the USEPA document *Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites*, which states that the most practical remedial alternative for landfills is generally containment by capping. All of the alternatives (including the no action alternative) considered in the FS included containment of landfill waste by the existing cover system. One alternative was based on installing a Resource Conservation and Recovery Act (RCRA) composite cover system on top of the existing geomembrane cover system.

With respect to groundwater, the FS developed several remedial alternatives that attain site-specific cleanup levels using different technologies and a no action alternative. Three candidate alternatives included slurry wall containment of groundwater, two included in-situ treatment of groundwater, five included groundwater extraction and on-site treatment, and one included groundwater extraction and discharge to the local

publicly owned treatment works (POTW). Except for the no action alternative, all the alternatives also included institutional controls, long-term maintenance, and environmental monitoring programs.

Section 3 of the FS identified, assessed, and screened technologies and process options based on implementability, effectiveness, and cost. In Section 4 of the FS, these technologies and process options were combined into the ten candidate alternatives listed below.

Alternative SHL-1: No Action
Alternative SHL-2: Limited Action
Alternative SHL-3: Containment/Collection/Short-term Ex Situ Treatment/Surface Water Discharge
Alternative SHL-4: Containment/In Situ Treatment
Alternative SHL-5: Collection/Ion Exchange Treatment/Surface Water Discharge
Alternative SHL-6: Collection/Chemical Precipitation Treatment/Surface Water Discharge
Alternative SHL-7: Collection/Constructed Wetland Treatment/Surface Water Discharge
Alternative SHL-8: Groundwater Barrier/In Situ Oxidation
Alternative SHL-9: Collection/Discharge to POTW
Alternative SHL-10: Installation of RCRA Cap

Each alternative was then evaluated and screened in Section 4 of the FS based on implementability, effectiveness, and cost, as described in Section 300.430(e)(4) of the NCP, to narrow the number of potential remedial alternatives for detailed analysis. From this screening process, five remedial alternatives were retained for detailed analysis.

## VIII. DESCRIPTION OF ALTERNATIVES

Of the 10 alternatives identified in the FS, five were discarded during the FS screening step, and the remaining five were evaluated in detail. A detailed assessment of each alternative can be found in Section 5 of the FS report. This section provides a narrative summary of each of the following five alternatives evaluated in detail in the FS:

Alternative SHL-1: No Action
Alternative SHL-2: Limited Action
Alternative SHL-5: Collection/Ion Exchange Treatment/Surface Water Discharge
Alternative SHL-9: Collection/Discharge to POTW
Alternative SHL-10: Installation of RCRA Cap

A. Alternative SHL-1: No-Action

The No Action alternative does not contain any remedial action components beyond the existing landfill cover system to reduce or control potential risks. No institutional controls would be implemented to prevent future human exposure, and existing activities to maintain existing systems and monitor for potential future releases would be stopped. Alternative SHL-1 is developed to provide a baseline for comparison with the other remedial alternatives.

| | |
|---|---|
| Estimated Time for Restoration: not applicable | |
| Estimated Capital Cost: | $0 |
| Estimated Operation and Maintenance Cost: (net present worth) | $0 |
| Estimated Total Cost: (net present worth, assuming 5% discount rate) | $0 |

B. Alternative SHL-2: Limited Action

Alternative SHL-2 contains components to maintain and potentially improve the effectiveness of the existing landfill cover system and to satisfy the Landfill Post-Closure Requirements of 310 CMR 19.142 to reduce potential future exposure to contaminated groundwater. Key components of this alternative include:

- landfill closure in accordance with applicable requirements of 310 CMR 19.000;
- survey of Shepley's Hill Landfill;
- evaluation/improvement of stormwater diversion and drainage;
- landfill cover maintenance;
- landfill gas collection system maintenance;

- long-term groundwater monitoring;
- long-term landfill gas monitoring;
- institutional controls;
- educational programs;
- 60 percent design of a groundwater extraction system;
- annual reporting to MADEP and USEPA; and
- five-year site reviews.

Estimated Time for Restoration: Approximately 12 months for engineering evaluations, design, and construction.

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|---|---|
| Estimated Capital Cost: | $ 928,000 |
| Estimated Operation and Maintenance Cost: (net present worth) | $1,291,000 |
| Estimated Total Cost: (net present worth, assuming 5% discount rate) | $2,219,000 |

C. Alternative SHL-5: Collection/Ion Exchange Treatment/Surface Water Discharge

Alternative SHL-5 consists of components that, together with the components of Alternative SHL-2, would provide additional controls to prevent off-site migration of contaminated groundwater. Key components of Alternative SHL-5 include:

- landfill closure in accordance with applicable requirements of 310 CMR 19.000;
- design, construction, operation, and maintenance of groundwater extraction, treatment, and discharge facilities;
- survey of Shepley's Hill Landfill;
- evaluation/improvement of stormwater diversion and drainage;
- landfill cover maintenance;
- landfill gas collection system maintenance;
- long-term groundwater monitoring;
- long-term landfill gas monitoring;
- institutional controls;
- educational programs;
- annual reporting to MADEP and USEPA; and
- five-year site reviews.

The major difference between Alternative SHL-5 and Alternative SHL-2 is the construction and operation of groundwater extraction, treatment, and discharge facilities. Data collected during predesign studies would be used to optimize the size and location of groundwater extraction wells at Shepley's Hill Landfill. Contaminated groundwater would be treated in an on-site groundwater treatment facility that (subject to treatability studies) includes carbon adsorption, sand filtration, and ion exchange treatment units and discharges through an effluent pipeline to Nonacoicus Brook.

Estimated Time for Restoration: Approximately 18 months for predesign studies, design, and construction. Groundwater extraction and treatment assumed to continue for a minimum of 30-years.

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|---|---|
| Estimated Capital Cost: | $2,577,000 |
| Estimated Operation and Maintenance Cost: (net present worth) | $6,549,000 |
| Estimated Total Costs: (net present worth, assuming 5% discount rate) | $9,126,000 |

D. Alternative SHL-9: Collection/Discharge to POTW

Alternative SHL-9 adds the components of groundwater extraction and discharge to the Town of Ayer POTW to Alternative SHL-2 to provide additional control to prevent off-site migration of contaminated groundwater. Key components of Alternative SHL-9 include:

- landfill closure in accordance with applicable requirements of 310 CMR 19.000;
- design, construction, operation, and maintenance of groundwater extraction and discharge facilities;
- survey of Shepley's Hill Landfill;
- evaluation/improvement of stormwater diversion and drainage;
- landfill cover maintenance;
- landfill gas collection system maintenance;
- long-term groundwater monitoring;
- long-term landfill gas monitoring;
- institutional controls;
- educational programs;

- annual reporting to MADEP and USEPA; and
- five-year site reviews.

The major difference between Alternative SHL-9 and Alternative SHL-2 is the construction and operation of groundwater extraction and discharge facilities. Data collected during predesign studies would be used to optimize the size and location of groundwater extraction wells at Shepley's Hill Landfill. Following construction of the groundwater extraction facilities, contaminated groundwater would be pumped to a discharge manhole anticipated to be located on Scully Road near the north end of the landfill. There, the groundwater would combine with domestic wastewater and flow to the Town of Ayer POTW for treatment and subsequent discharge. The Ayer POTW, with a capacity of 1.79 million gallons per day (MGD), would be able to handle the additional anticipated volume of 20 to 30 gallons per minute (0.029 to 0.043 MGD).

Review of available groundwater monitoring data suggests that pretreatment of the groundwater will not be needed to meet existing pretreatment standards established by the Town of Ayer. The Army would monitor the groundwater discharge to the POTW, however, and if necessary install pretreatment facilities to meet pretreatment standards. The Army would pay a sewer user fee to the town based on the volume of water discharged to the POTW.

Estimated Time for Restoration: Approximately 15 months for predesign studies, design, and construction. Groundwater extraction and discharge to POTW assumed to continue for a minimum of 30-years.

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|---|---|
| Estimated Capital Cost: | $1,184,000 |
| Estimated Operation and Maintenance Cost: (net present worth) | $2,690,000 |
| Estimated Total Cost: (net present worth, assuming 5% discount rate) | $3,874,000 |

E. Alternative SHL-10: Installation of RCRA Cap

Alternative SHL-10 consists of building a new landfill cover system on top of the existing cover system at Shepley's Hill Landfill. The new cover system would be designed to meet RCRA performance criteria and design guidance for hazardous waste landfills. The principal component of the new cover system would be a 24-inch layer of low

permeability soil in intimate contact with a geomembrane. Maintenance activities, monitoring and reporting requirements, and institutional controls would be similar to those of Alternative SHL-2.

| | |
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| Estimated Time for Restoration: Approximately three years required for design and construction. | |
| Estimated Capital Cost: | $19,645,000 |
| Estimated Operation and Maintenance Cost: (net present worth) | $ 1,291,000 |
| Estimated Total Cost: (net present worth, assuming 5% discount rate) | $20,936,000 |

## IX. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that at a minimum the Army is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives. The nine criteria are used to select a remedy that meets the goals of protecting human health and the environment, maintaining protection over time, and minimizing untreated waste.
A detailed analysis was performed on the alternatives using the nine evaluation criteria to select a site remedy. Specific discussion regarding this analysis is provided in Section 5 of the FS report. Definitions of the nine criteria are provided below:

**Threshold Criteria**

The two threshold criteria described below must be met in order for an alternative to be eligible for selection in accordance with the NCP.

- Overall Protection of Human Health and the Environment - Assesses how well an alternative, as a whole, achieves and maintains protection of human health and the environment.

- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) - Assesses how the alternative complies with location-, chemical-, and action-specific ARARs, and whether a waiver is required or justified.

**Primary Balancing Criteria**

The following five criteria are used to compare and evaluate the elements of alternatives that meet the threshold criteria.

- Long-Term Effectiveness and Permanence - Evaluates the effectiveness of the alternative in protecting human health and the environment after response objectives have been met. This criterion includes consideration of the magnitude of residual risks and the adequacy and reliability of controls.

- Reduction of Toxicity, Mobility, and Volume Through Treatment - Evaluates the effectiveness of treatment processes used to reduce toxicity, mobility, and volume of hazardous substances. This criterion considers the degree to which treatment is irreversible, and the type and quantity of residuals remaining after treatment.

- Short-Term Effectiveness - Examines the effectiveness of the alternative in protecting human health and the environment during the construction and implementation of a remedy until response objectives have been met. Considers the protection of the community, workers, and the environment during implementation of remedial actions.

- Implementability - Assesses the technical and administrative feasibility of an alternative and availability of required goods and services. Technical feasibility considers the ability to construct and operate a technology and its reliability, the ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of a remedy. Administrative feasibility considers the ability to obtain approvals from other parties or agencies and extent of required coordination with other parties or agencies.

- Cost - Evaluates the capital, and operation and maintenance costs of each alternative.

**Modifying Criteria**

The modifying criteria are used on the final evaluation of remedial alternatives generally after the Army has received public comments on the FS and proposed plan.

- State Acceptance - This criterion considers the state's preferences among or concerns about the alternatives, including comments on ARARs or the proposed use of waivers.

- Community Acceptance - This criterion considers the communities preferences among or concerns about the alternatives.

Following the detailed analysis of each individual alternative, the Army conducted a comparative analysis, focusing on the relative performance of each alternative against the nine criteria. This comparative analysis of the five alternatives is presented in Table 6-1 of the FS report and summarized below.

A. Overall Protection of Human Health and the Environment

This criterion addresses how an alternative as a whole will protect human health and the environment. This includes an assessment of how public health and environmental risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls. According to CERCLA, this criterion must be met for a remedial alternative to be chosen as a final site remedy.

At Shepley's Hill Landfill, the existing cover system isolates landfill materials from the environment, blocks infiltration, and based on computer modeling, diverts groundwater that would otherwise discharge to Plow Shop Pond. Historical groundwater monitoring between the landfill and Plow Shop Pond has shown analyte concentrations in excess of cleanup levels; however, no current residential exposure to groundwater has been identified, and the existing cap prevents infiltration of contaminants into groundwater downgradient of the landfill. Alternatives SHL-1, SHL-2, SHL-5, and SHL-9, all of which rely on the existing cover to isolate waste, prevent infiltration, and reduce groundwater discharge to the pond, are considered equally protective of human health under current exposure scenarios. Alternative SHL-10, which proposes to replace the existing geomembrane cover with a composite cover, would not afford significantly greater protection under current conditions.

Differences in protectiveness may exist under future exposure conditions. Alternative SHL-1 proposes no action to prevent future residential exposure to groundwater or to maintain and monitor the long-term performance of the existing cover. The remaining alternatives all propose to implement zoning and deed restrictions to prevent future residential exposure to groundwater and to maintain and monitor long-term cover performance. Once installed, the composite cover system proposed for Alternative SHL-10 would be newer and therefore potentially provide protection longer than the existing cover. However, its protectiveness at any given time would not be significantly greater than the anticipated performance of the existing cover. In addition, the five-year site reviews proposed for all alternatives provide the opportunity to implement additional remedial actions if they are needed. The installation of a composite cover system could be considered in the future if the existing cover system does not perform as anticipated. Alternatives SHL-5 and SHL-9, in addition to their reliance on the existing cover system, propose to extract contaminated groundwater for subsequent treatment and discharge. They therefore provide some redundancy or backup to achieve cleanup levels if the existing cover system does not perform as anticipated.

There is no ecological exposure to groundwater. Reductions in infiltration and leaching coupled with the diversion of groundwater that would otherwise discharge to Plow Shop Pond will provide protection of the environment. The potential differences in effectiveness of the evaluated alternatives at protecting the environment are similar to the differences discussed for future protection of human health.

B. Compliance with Applicable or Relevant and Appropriate Requirements

This criterion addresses whether a remedy complies with all state and federal environmental and public health laws and requirements that apply or are relevant and appropriate to the conditions and cleanup options at a specific site. If an alternative cannot meet an ARAR, the analysis of the alternative must provide the rationale for invoking a statutory waiver.

Location-specific ARARs identified for the Shepley's Hill Landfill Operable Unit include regulations that protect wetlands, floodplains, and endangered species (i.e., the Grasshopper Sparrow, a state listed species of special concern). Alternatives SHL-1, SHL-2, and SHL-9 would not involve any activities anticipated to trigger wetlands or floodplain ARARs. Alternative SHL-5 would require construction of a discharge

pipeline to Nonacoicus Brook and may trigger wetland and floodplain ARARs. Activities for all alternatives would be conducted or altered to comply with wetlands and floodplain ARARs. All of the alternatives would be subject to ARARs protecting endangered species. Activities performed for any of the alternatives would be planned to prevent or minimize adverse effects on the Grasshopper Sparrow and its habitat. In spite of this, implementation of Alternative SHL-10 would result in destruction of any nesting areas of the Grasshopper Sparrow that might exist at the landfill.

Alternatives SHL-1, SHL-2, and SHL-10 rely on cover system performance to comply with chemical-specific ARARs and cleanup levels. Currently groundwater at the northern end of the landfill meets cleanup levels, and landfill capping is expected to reduce leaching of landfill materials and the resulting groundwater contamination, thereby achieving cleanup levels along the eastern edge of the landfill. Alternatives SHL-5 and SHL-9 would comply with chemical-specific ARARs and cleanup levels with a combination of landfill capping and groundwater extraction. Groundwater exceeding cleanup levels would be extracted and treated or disposed of before exiting the site.

Several action-specific ARARs have been identified for the Shepley's Hill Landfill Operable Unit; the most important are the ones relating to landfill cover systems and landfill closure. The Massachusetts Solid Waste Management Regulations at 310 CMR 19.000 have been identified as applicable. USEPA Regulations for Owners and Operators of Permitted Hazardous Waste Facilities at 40 CFR 264 (RCRA Subtitle C), and USEPA Criteria for Municipal Solid Waste Landfills at 40 CFR 258 (RCRA Subtitle D), and Massachusetts Hazardous Waste Management Rules at 310 CMR 30.000 have all been identified as relevant and appropriate.

The design of the existing cover system at Shepley's Hill Landfill was approved by MADEP in 1985 pursuant to the Massachusetts Sanitary Landfill regulations of 1971 (310 CMR 19.00). Provisions in the Massachusetts Solid Waste Management Regulations of 1990 (310 CMR 19.000) indicate that the conditions of the 1985 approval satisfy 310 CMR 19.000; therefore the existing cover is considered to comply with the applicable cover system requirements of 310 CMR 19.000. In addition, the existing cover meets the general performance standards of 310 CMR 19.000. The existing cover system also meets the performance standards of RCRA Subtitle C at 40 CFR 264.310, RCRA Subtitle D at 40 CFR 258, and Massachusetts Hazardous Waste Regulations at 310 CMR 30.000. The existing cover varies from USEPA guidance for RCRA final covers primarily in that it has a geomembrane hydraulic barrier rather than a composite

hydraulic barrier. Table 8 in Appendix B describes how the existing cover complies with these performance standards. Alternatives SHL-1, SHL-2, SHL-5, and SHL-9, which rely on the existing cover, will therefore comply with ARARs for cover systems. The cover system of Alternative SHL-10 would be designed to meet ARARs for cover systems as well as RCRA design guidance. The long-term monitoring and maintenance programs of all alternatives except Alternative SHL-1 would be designed to comply with the applicable requirements of 310 CMR 19.000.

Action-specific ARARs for landfill post-closure requirements would be met by all of the alternatives except Alternative SHL-1. Alternative SHL-5 would be required to meet the substantive requirements of a federal National Pollutant Discharge Elimination System (NPDES) permit to discharge treated groundwater to Nonacoicus Brook. These alternatives would also be required to meet ARARs for disposal of filter cake and resin regeneration concentrate from groundwater treatment and to meet substantive requirements of a U.S. Army Corps of Engineers permit, a MADEP license, and a Massachusetts water quality certification to construct a discharge pipeline to Nonacoicus Brook. Alternative SHL-9 would be required to meet the federal Clean Water Act General Pretreatment Requirements to discharge to the Town of Ayer POTW. Federal and state air quality regulations would be met by all the alternatives. Dust suppression techniques would be used, when necessary, for Alternatives SHL-5, SHL-9, and SHL-10 intrusive activities to meet air quality regulations.

C. Long-term Effectiveness and Permanence

This refers to the ability of an alternative to maintain reliable protection of human health and the environment over time once the cleanup levels have been met.

Alternative SHL-1 provides no controls or treatment beyond the existing cover system to protect human health and the environment. Alternatives SHL-2 and SHL-10 rely on the effectiveness of a landfill cover system to achieve the remedial action objectives. The other alternatives use groundwater extraction and treatment in addition to the cover system to achieve remedial action objectives. All of the alternatives except SHL-1 include landfill post-closure and long-term groundwater monitoring to evaluate their long-term effectiveness. All the alternatives except SHL-1 include institutional controls. Institutional controls require cooperation by private parties and government agencies to be reliable and effective.

Alternatives SHL-5 and SHL-9 would use data obtained from the pre-design hydrogeological investigation to design a groundwater extraction system. This would allow design of an extraction system that is effective in capturing contaminated groundwater. However, groundwater extraction would not prevent landfill waste and/or its leachate from potentially contaminating the underlying aquifer; these alternatives rely on the cover system as discussed earlier.

D. Reduction of Toxicity, Mobility, and Volume through Treatment

This criterion is a principal measure of the overall performance of an alternative. The 1986 amendments to the Superfund statute emphasize that, whenever possible, a remedy should be selected that uses a treatment process to reduce permanently the toxicity of contaminants at the site, the spread of contaminants away from the source of contamination, and the volume or amount of contamination at the site.

Alternatives SHL-1, SHL-2, and SHL-10 do not meet the statutory preference for treatment under CERCLA since these alternatives do not treat contaminants contained in groundwater or wastes at the site. Landfill capping which is a part of each of all the alternatives will reduce infiltration and the resulting leaching of contaminants, thus reducing contaminant mobility.

Alternatives SHL-5 and SHL-9 meet the CERCLA statutory preference for treatment. These alternatives would reduce the mobility of contaminants by extracting the groundwater for treatment or disposal. The removal of contaminants from groundwater in Alternative SHL-5 would generate concentrated waste streams that would require disposal. Alternative SHL-9 would discharge extracted groundwater to the Town of Ayer POTW. The POTW generates sludge from treating influent water which would require disposal.

E. Short-term Effectiveness

This refers to the likelihood of adverse effects on human health or the environment that may be posed during the construction and implementation of an alternative until cleanup goals are achieved.

Alternatives SHL-1 and SHL-2 would have the least likelihood for adverse effects during implementation because no intrusive activities would be required. Alternative SHL-1 would have the least effect during implementation because it would not involve construction or operation. Alternatives SHL-5 and SHL-9 involve installation of extraction wells and underground piping. A Health and Safety Plan would be followed during performance of these activities and during environmental monitoring to minimize the risk of site hazards to workers. Alternative SHL-5 would require transportation of treatment residuals and adherence to RCRA and U.S. Department of Transportation regulations to minimize potential risks to workers.

Site activities would be performed to minimize effects on the Grasshopper Sparrow and its habitat. Maintenance schedules for Alternatives SHL-2, SHL-5, and SHL-9 would be prepared to limit activities during the nesting season. Construction schedules for Alternatives SHL-5 and SHL-9 would be prepared to limit activities during nesting season to avoid direct effects on the bird. Alternative SHL-10 would destroy any nesting areas of the Grasshopper Sparrow that might exist at the landfill.

F. Implementability

Implementability refers to the technical and administrative feasibility of an alternative, including the ease of construction and operation; administrative feasibility; and availability of services, equipment, and materials to construct and operate the technology. Also evaluated is the ease of undertaking additional remedial actions.

Post-closure requirements included in all of the alternatives present no implementation problems. Equipment and services required for monitoring and maintenance are readily available. Zoning and deed restriction (i.e., institutional controls) included in all alternatives, except SHL-1, could be easily implemented by the Army. Enforcement by the Town of Ayer would be required.

Groundwater extraction systems used in Alternatives SHL-5 and SHL-9 would be easily designed and constructed. Many engineering companies are qualified to design and install extraction systems. The treatment system proposed for Alternative SHL-5 uses sand filtration, carbon adsorption, and ion exchange, all of which are proven technologies with vendors available. Alternative SHL-9 would require a long-term discharge agreement between the Army and the Town of Ayer POTW as part of its

implementation. Initial discussions with representatives from the Town of Ayer POTW indicate a willingness to consider accepting the discharge. Many engineering and construction companies are qualified to design and install the cover system of Alternative SHL-10.

Alternative SHL-1 would be the easiest alternative to implement at the site, and would have the least effect on future remedial actions.

G. Cost

Cost includes the capital (up-front) cost of implementing an alternative and the cost of operating and maintaining the alternative over the long term, and net present worth of both capital and operation and maintenance costs.

A comparison of the estimated total present worth costs (based on a 5 percent discount rate) for each alternative evaluated in detail is presented in the following table:

| Alternative | Total Capital | Total O&M (net present worth) | Total Costs (net present worth) |
|---|---|---|---|
| SHL-1 | $ 0 | $ 0 | $ 0 |
| SHL-2 | $ 928,000 | $ 1,291,000 | $ 2,219,000 |
| SHL-5 | $ 2,577,000 | $ 6,549,000 | $ 9,126,000 |
| SHL-9 | $ 1,184,000 | $ 2,690,000 | $ 3,874,000 |
| SHL-10 | $ 19,645,000 | $ 1,291,000 | $ 20,936,000 |

Capital, operation and maintenance, and present worth costs for each alternative were calculated with an estimated accuracy of -30 percent to +50 percent. The alternatives with the lowest capital costs are those that include the least amount of construction, such as Alternatives SHL-1, SHL-2, and SHL-9. Alternatives SHL-5 and SHL-10, which involve greater amounts of construction, require larger capital investment.

Operation and maintenance costs are estimated on an annual basis, and are lowest for Alternative SHL-1, which does not provide any long-term maintenance or monitoring. Operation and maintenance costs for Alternatives SHL-2, SHL-5, SHL-9, and SHL-10 include environmental monitoring for 30 years. Alternative SHL-5 includes operation of the groundwater extraction, treatment and discharge systems, while Alternative SHL-9 includes operation of groundwater extraction and discharge systems and groundwater monitoring for the estimated duration of treatment.

H. State Acceptance

This criterion addresses whether, based on its review of the RI, RI Addendum, FS, and proposed plan, the state concurs with, opposes, or has no comment on the alternative the Army is proposing as the remedy for the AOCs. The Commonwealth of Massachusetts has reviewed the RI, RI Addendum, FS, proposed plan, and this Record of Decision and concurs with the selected remedy.

I. Community Acceptance

This criterion addresses whether the public concurs with the Army's proposed plan. No comments were received from the community during the public comment period. The Army believes this shows community acceptance of the proposed plan and selected remedy.

## X. THE SELECTED REMEDY

The selected remedy to address groundwater contamination at the Shepley's Hill Landfill Operable Unit is Alternative SHL-2: Limited Action, with Alternative SHL-9 as the contingency remedy if Alternative SHL-2 proves not to be protective. Each of these alternatives includes components for the containment of landfill wastes and management of contaminant migration. The remedial components of the selected remedy are described in detail below.

A. Groundwater Cleanup Levels

Groundwater cleanup levels for the Shepley's Hill Landfill Operable Unit were developed following the USEPA guidance documents entitled, *Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual (Part B, Development of Risk Based Preliminary Remediation Goals)*, Interim, December 1991, and OSWER Directive 9355.0-30, *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions*. The first step in developing cleanup levels for protection of human health was to identify those environmental media that in the baseline risk assessment presented either a cumulative current or future cancer risk greater than $1x10^{-4}$ or a cumulative noncarcinogenic HI greater than 1, based on reasonable maximum exposure assumptions. The next step was to identify chemicals of concern within the media presenting cancer risks greater than $1x10^{-6}$ or a hazard quotient greater than 1. This approach identified dichlorobenzenes, 1,2-dichloroethane, arsenic, and manganese as chemicals of concern in groundwater. In addition, the baseline risk assessment identified the following chemicals of concern as exceeding MCLs or MMCLs: dichlorobenzenes, 1,2-dichloroethane, arsenic, chromium, and nickel. Concentrations of lead in groundwater exceeded the federal drinking water action level. Concentrations of aluminum and iron exceeded non-risk based federal and Massachusetts Secondary MCLs, while sodium exceeded the federal and Massachusetts guidelines for individuals on a sodium restricted diet.

With the exception of manganese, groundwater cleanup levels for chemicals of concern were established based on MCLs and MMCLs. No MCL or MMCL has been established for manganese. The cleanup level for manganese was based on background concentrations because background concentrations exceed the risk-based concentration derived from the available RfD value ($5x10^{-3}$ milligrams/kilograms/day). Because background concentrations for aluminum and iron exceed their respective guideline value, cleanup levels for them were set at the background value. The cleanup level for sodium was set equal to the federal health advisory. The following table summarizes cleanup levels for Shepley's Hill Landfill Operable Unit groundwater.

| Chemical of Concern | Cleanup Level, $\mu$g/L | Selection Basis |
|---|---|---|
| Arsenic | 50 | MCL |
| Chromium | 100 | MCL |
| 1,2-Dichlorobenzene | 600 | MCL |
| 1,4-Dichlorobenzene | 5 | MMCL |
| 1,2-Dichloroethane | 5 | MCL |
| Lead | 15 | Action Level |
| Manganese | 291 | Background |
| Nickel | 100 | MCL |
| Sodium | 20,000 | Health Advisory |
| Aluminum | 6,870 | Background |
| Iron | 9,100 | Background |

Attainment of cleanup levels in groundwater will result in an approximate eight-fold reduction in potential human health risk, reflecting the approximate eight-fold reduction in arsenic concentrations needed to attain the arsenic cleanup level. Recent studies indicate that many skin tumors arising from oral exposure to arsenic are non-lethal and that the dose-response curve for the skin cancers may be sublinear (in which case the cancer slope factor used to generate risk estimates may be overestimated). It has been USEPA policy to manage these risks downward by as much as a factor of ten. As a result, the carcinogenic risk for arsenic at Shepley's Hill Landfill Operable Unit has been managed as if it were one order or magnitude lower than the calculated risk. The residual human health risk from residential exposure to groundwater after attainment of cleanup levels is estimated to be approximately $1x10^{-3}$ (unmodified to account for the uncertainty associated with arsenic) and $1x10^{-4}$ if modified to account for the uncertainty associated with exposure to arsenic.

B. Description of Remedial Components

Alternative SHL-2 contains components to maintain and potentially improve the effectiveness of the existing landfill cover system and to satisfy the Landfill Post-Closure Requirements of 310 CMR 19.142 to reduce potential future exposure to contaminated groundwater. Key components of this alternative include:

- landfill closure in accordance with applicable requirements of 310 CMR 19.000;
- survey of Shepley's Hill Landfill;
- evaluation/improvement of stormwater diversion and drainage;
- landfill cover maintenance;
- landfill gas collection system maintenance;
- long-term groundwater monitoring;
- long-term landfill gas monitoring;
- institutional controls;
- educational programs;
- 60 percent design of a groundwater extraction system;
- annual reporting to MADEP and USEPA; and
- five-year site reviews.

Each of these components is described in the following paragraphs.

Landfill Closure in Accordance with Applicable Requirements of 310 CMR 19.000. Commonwealth of Massachusetts regulations at 310 CMR 19.000 contain requirements for the submittal to, and approval by, MADEP of plans and supporting materials to document that landfill closure occurs according to approved plans and applicable MADEP requirements. The Army submitted a draft closure plan for Shepley's Hill Landfill to MADEP on July 21, 1995 pursuant to 310 CMR 19.000; however, the landfill will not be officially closed until MADEP approves the documents. Review of the plan and official closure of the landfill by MADEP was anticipated prior to signature of this Record of Decision. The Army will coordinate the finalization and submittal of plans and support materials to MADEP to achieve official landfill closure.

Survey of Shepley's Hill Landfill. Prior to design and implementation of remedial actions at Shepley's Hill Landfill, an accurate topographic survey of the landfill surface is required. No survey has been done since completion of the last phase of landfill capping. The estimated cost of this alternative includes an aerial survey of Shepley's Hill Landfill. It also includes the costs to survey the elevation and horizontal location of

monitoring wells or piezometers installed as part of remedial alternative implementation, and to prepare record drawings.

Evaluation/Improvement of Stormwater Diversion and Drainage. Stormwater diversion and drainage systems at and adjacent to Shepley's Hill Landfill will be evaluated as part of this alternative. Modifications for improvement will be implemented if the evaluation shows they would be practical and cost-effective. The evaluation will focus on the following items of concern:

- landfill cap runoff patterns and drainage ditch flow capacities;
- potential run-under along the western edge of the landfill, particularly where the existing geomembrane cap may not have a good seal with the underlying bedrock; and
- the effectiveness of stormwater drainage systems upgradient of the landfill (i.e., at the transfer station, tire recycling station, DRMO yards, and along Market Street) at diverting run-off from potential infiltration areas upgradient of the landfill.

Detailed plans for evaluating stormwater diversion and drainage would be developed during the alternative's design phase and submitted for regulatory agency review and concurrence.

Landfill Cover Maintenance. A small area of ponded water in the northwestern section of the landfill would be drained and regraded to minimize stress on the cover system and prevent future ponding and potential for leakage through the PVC geomembrane. The area is approximately 100 feet in diameter and is estimated to be about 1 foot deep. The water would be pumped out and the ponded area backfilled with common borrow to bring the area up to the desired grade. A new section of PVC geomembrane would be installed on top of the fill and seamed to the existing geomembrane cap to provide a low permeability surface in this area.

At the northern end of the landfill, erosion of cover soil in sections of the drainage swales has occurred in the past, exposing PVC geomembrane. This erosion has been repaired, but may require additional repair in the future.

Annual inspections are proposed to monitor the condition of the landfill cover at Shepley's Hill Landfill, including monitoring wells, cover surface, and drainage swales to decide if maintenance is needed. Grass will be mowed annually and the cover repaired as required. Landfill maintenance and mowing would be scheduled to minimize potential adverse effects to the Grasshopper Sparrow, a state-listed species of special concern that may nest on the cover.

Detailed plans for landfill cover maintenance would be developed during the alternative's design phase and submitted for regulatory agency review and concurrence.

Landfill Gas Collection System Maintenance. Annual inspections are proposed to monitor the Shepley's Hill Landfill gas collection system and provide any necessary repairs.

Long-term Groundwater Monitoring. Groundwater monitoring is proposed to monitor groundwater quality at Shepley's Hill Landfill and to assess future environmental effects. Based on the hydrogeologic interpretation and analytical data presented in the RI Addendum report, the FS report presents proposed monitoring locations and analytical parameters for a conceptual long-term groundwater monitoring program. The conceptual plan includes installation of three new monitoring wells at the north end of the landfill to create nested triplets of shallow/water table, mid-depth, and deep overburden monitoring wells at SHL-9/SHL-22 and SHL-5. The monitoring wells that are included in the conceptual program would be sampled semi-annually for a minimum of 30 years, consistent with 310 CMR 19.142. Table 5-3 of the FS report presents proposed monitoring locations and analytical parameters for a conceptual long-term groundwater monitoring program.

Detailed plans for long-term groundwater monitoring would be developed during the alternative's design phase and submitted for regulatory agency review and concurrence.

Long-term Landfill Gas Monitoring. As part of post-closure monitoring activities, landfill gas will be monitored quarterly at landfill gas vents and analyzed in the field by direct-reading instruments for lower explosive limit and total organic gases. Semiannual samples will be collected from the two vents with the highest field measurements and analyzed for TCL VOCs. These samples will be collected and analyzed in accordance with USEPA Method TO 14. Detailed plans for landfill gas monitoring would be

developed during the alternative's design phase and submitted for regulatory agency review and concurrence.

Institutional Controls. Institutional controls are proposed in the form of zoning and deed restrictions for any property released by the Army at Shepley's Hill Landfill during Fort Devens base-closure activities. The Fort Devens Preliminary Reuse Plan, Main and North Posts has proposed that Army land bordering Plow Shop Pond be zoned for open space and rail-related uses. By pre-empting residential use, these controls would help limit human exposure. In addition, the Army would place deed restrictions on landfill area property to prohibit installation of drinking water wells. This, in combination with landfill capping and long-term groundwater monitoring, would protect potential human receptors from risks resulting from exposure to contaminated groundwater. There are no current human receptors for groundwater exposure. Institutional controls would be drafted, implemented, and enforced in cooperation with state and local governments.

Educational Programs. Periodic public meetings and presentations would be conducted to increase public awareness. This would help keep the public informed of the site status, including both its general condition and remaining contaminant levels. This could be accomplished by conducting public meetings every five years coincident with the five-year site reviews for Shepley's Hill Landfill. The presentation would summarize site activities and the results of monitoring programs.

60 Percent Design of a Groundwater Extraction System. The Army will conduct predesign hydrogeologic studies and prepare a 60 percent complete engineering design for groundwater extraction and discharge to the Town of Ayer POTW. Predesign studies may include installation of several additional piezometers in and around the landfill, collection of additional groundwater elevation data, and updating/refining the groundwater model. Detailed plans for monitoring the piezometers will be developed as part of the long-term groundwater monitoring plan. The 60 percent complete engineering design will begin in 1996 and be completed before the first five-year site review, scheduled for 1998.

Annual Reporting to MADEP and USEPA. Reports which would include a description of site activities and a summary of results of environmental monitoring would be submitted annually to MADEP and USEPA. This reporting would satisfy the requirements of 310 CMR 19.132 and 19.142.

Five-year Site Reviews. Under CERCLA 121c, any remedial action (or lack thereof) that results in contaminants remaining on-site must be reviewed at least every five years. During five-year reviews, an assessment is made of whether the implemented remedy is protective of human health and the environment and whether the implementation of additional remedial action is appropriate.

The five-year site reviews for Alternative SHL-2 will evaluate the alternative's effectiveness at reducing potential human health risk from exposure to groundwater and at preventing groundwater from contributing to Plow Shop Pond sediment contamination in excess of human health and ecological risk-based values. These evaluations will be based on how successful the alternative is at attaining cleanup levels at individual wells in two distinct monitoring well groups. Well Group 1 consists of wells, primarily at the north end of the landfill, where cleanup levels have been attained historically. Well Group 2 consists of wells where historically cleanup levels have not been attained.

The goal of Alternative SHL-2 is to maintain groundwater quality below cleanup levels at Group 1 wells, and to attain cleanup levels at Group 2 wells. Since groundwater quality historically attains cleanup levels in Group 1 wells, Alternative SHL-2 will be considered effective with regard to these wells if five-year site reviews show that this condition is maintained.

Evaluating effectiveness at Group 2 wells is less straightforward. Installation of the geomembrane cap over the most upgradient areas at Shepley's Hill Landfill (i.e., areas in the Phase IV-B closure) was not completed until May 1993. Based on groundwater modeling, it is estimated that the average time needed for groundwater to travel from these upgradient areas to downgradient wells SHL-11 and SHL-20 may be 10 to 14 years or longer. An equal or greater number of years may be needed for downgradient groundwater quality at these wells to attain cleanup levels. Overall groundwater quality is expected to improve and potential risk is expected to decrease during this period, although at some wells, certain chemicals may show small short-term increases in concentration while other chemicals show decreases in concentrations and overall risk is reduced.

The Army proposes to use reduction of risk rather than reduction of concentration as a measure of progress toward attainment of cleanup levels because this approach focuses on the cleanup of arsenic, which is the primary contributor to risk in the Group 2 wells. This approach prevents a situation in which failure to attain a concentration reduction

goal for a minor contributor to risk (e.g., 1,2-dichloroethane where a reduction of 2.5 ppb represents a 50 percent reduction in concentration exceeding the cleanup level) overshadows the achievement of 50 percent or greater reduction in the concentration of arsenic. In the Group 2 wells, a 50 percent reduction in the concentration of arsenic approximates a 50 percent reduction in groundwater risk, while a 50 percent reduction in the concentration of 1,2-dichloroethane represents less than a 1 percent reduction in groundwater risk. Alternative SHL-2 will be considered effective with regard to these wells if five-year reviews show an ongoing reduction of potential human health risk at Group 2 wells and the ultimate attainment of cleanup levels by January 2008.

The specific criteria for evaluating the effectiveness of Alternative SHL-2 are stated below. The criteria for both groups of wells must be met for the alternative to be considered effective.

> Group 1 Wells. For Group 1 wells where analyte concentrations have historically attained cleanup levels, Alternative SHL-2 will be considered effective if concentrations of individual chemicals within individual wells do not show statistically significant cleanup level exceedances. To determine statistical significance, the Army will apply methods consistent with the regulations at 40 CFR 264.97, 40 CFR 258.53, and 310 CMR 30.663.
>
> Group 2 Wells. For Group 2 wells where chemical concentrations have exceeded cleanup levels in the past, Alternative SHL-2 will be considered effective if a 50 percent reduction in the increment of risk between cleanup levels and baseline concentrations for chemicals of concern within individual wells is achieved by January 1998, if an additional 25 percent (75 percent cumulative) is achieved by January 2003, and if cleanup levels are attained by January 2008.

The Army will apply methods consistent with the regulations at 40 CFR 264.97, 40 CFR 258.53, and 310 CMR 30.663 to estimate chemical concentrations at baseline conditions. Analytical data collected during RI (August and December 1991) and supplemental RI (March and June 1993) activities will be used to estimate the baseline conditions. The detailed approach would be developed during the design phase and submitted for regulatory agency review and concurrence.

A major consideration in assessing the protectiveness of Alternative SHL-2 and whether additional remedial actions may be appropriate will be the basis on which individual

cleanup levels were set. The Army will implement the contingency remedy if the above criteria are not met for any chemicals for which cleanup levels were based on MCLs (40 CFR 141) and for manganese. No MCL has been established for manganese. The cleanup level for manganese was based on background concentrations because background concentrations exceed the risk-based concentration derived from the available RfD value ($5x10^{-3}$ milligrams/kilograms/day). This approach for setting cleanup levels and for evaluating the effectiveness of landfill closure is consistent with USEPA guidance contained in *Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals), Interim*, December 1991, and with 40 CFR 258.55.

The Army will not implement additional remedial actions under CERCLA if cleanup levels are not attained for aluminum and iron. The cleanup levels for aluminum and iron were based on background concentrations because dose/response values were not available.

Similarly, the Army will not implement additional remedial actions if the cleanup level is not attained for sodium. The cleanup level for sodium was based on the health advisory for individuals on a reduced sodium diet.

| | |
|---|---|
| Estimated Time for Restoration: Approximately 12 months for engineering evaluations, design, and construction. | |
| Estimated Capital Cost: | $ 928,000 |
| Estimated Operation and Maintenance Cost: (net present worth) | $1,291,000 |
| Estimated Total Cost: (net present worth, assuming 5% discount rate) | $2,219,000 |

## XI. STATUTORY DETERMINATIONS

The selected remedy for the Shepley's Hill Landfill Operable Unit, Alternative SHL-2, is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, attains ARARs, and is cost-effective. The remedy utilizes permanent solutions and alternative treatment technologies, to the maximum extent practicable for this site. However, because treatment of the principal

source of contamination at the site was found not to be practicable, Alternative SHL-2 does not satisfy the statutory preference for treatment as a principal element.

A. The Selected Remedy is Protective of Human Health and the Environment.

Alternative SHL-2 will permanently reduce the risks to human health and environment by eliminating, reducing, or controlling exposures to human and environmental receptors through engineering and institutional controls. The principal threat at the Shepley's Hill Landfill Operable Unit is potential residential use of contaminated groundwater. The landfill closure plan, approved in 1985 and implemented in 1986 through 1993, relies on landfill capping and stormwater controls to reduce leaching of landfill materials and contamination of groundwater, thereby reducing potential risk associated with groundwater use. Institutional controls included in this alternative would prevent the use of groundwater from the contaminated aquifer, resulting in reduced potential for human exposure to contaminated groundwater. The landfill cover maintenance activities will help ensure protection of human health and the environment by maintaining the integrity and effectiveness of the cover.

The effectiveness of the selected alternative will be evaluated by comparing groundwater monitoring data to cleanup levels tabulated in Subsection X.A. Attainment of cleanup levels along the eastern edge of the landfill will result in potential human health risk levels within the Superfund target risk range of $1x10^{-4}$ to $1x10^{-6}$ for carcinogenic chemicals. Groundwater at the north end of the landfill currently meets cleanup levels.

Groundwater modeling done during the FS suggests that capping of the landfill has significantly reduced the amount of water in the landfill area, resulting in a more northerly groundwater flow and reducing potential adverse effects on Plow Shop Pond. Groundwater at the north end of the landfill currently meets cleanup levels. No ecological receptor exposure to contaminated groundwater was identified.

Alternative SHL-9, the contingency remedy for the Shepley's Hill Landfill Operable Unit, is also protective of human health and the environment. Alternative SHL-9 will permanently reduce the risks to human health and environment by eliminating, reducing, or controlling exposures to human and environmental receptors through engineering and institutional controls. The principal threat at the Shepley's Hill Landfill Operable Unit is potential residential use of contaminated groundwater. The landfill closure plan,

approved in 1985 and implemented in 1986 through 1993, relies on landfill capping and stormwater controls to reduce leaching of landfill materials and contamination of groundwater, thereby reducing potential risk associated with groundwater use. In addition, as part of Alternative SHL-9 groundwater would be pumped from the contaminated aquifer and discharged to the Town of Ayer POTW for treatment and discharge, preventing contaminant migration and potential exposure. Institutional controls included in this alternative would further prevent the use of groundwater from the contaminated aquifer, resulting in reduced potential for human exposure to contaminated groundwater. The landfill cover maintenance activities will help ensure protection of human health and the environment by maintaining the integrity and effectiveness of the cover.

The effectiveness of the contingency alternative will be evaluated by comparing groundwater monitoring data to cleanup levels tabulated in Subsection X.A. Attainment of cleanup levels along the eastern edge of the landfill will result in potential human health risk levels within the Superfund target risk range of $1x10^{-4}$ to $1x10^{-6}$ for carcinogenic chemicals. Groundwater at the north end of the landfill currently meets cleanup levels.

Groundwater modeling done during the FS suggests that capping of the landfill has significantly reduced the amount of water in the landfill area, resulting in a more northerly groundwater flow and reducing potential adverse effects on Plow Shop Pond. Groundwater at the north end of the landfill currently meets cleanup levels. No ecological receptor exposure to contaminated groundwater was identified.

B. The Selected Remedy Attains ARARs.

The selected remedy will attain all applicable or relevant and appropriate federal and State requirements. No waivers are required. ARARs for the Shepley's Hill Landfill Operable Unit were identified and discussed in the FS (Sections 2 and 5). Table 9 in Appendix B summarizes the ARARs for the selected remedy, including the regulatory citation, a brief summary of the requirement, and how it will be attained. Environmental laws from which ARARs for the selected remedial action are derived, and specific ARARs include:

Location-specific Federal Requirements

Floodplain Management Executive Order No. 11988, (40 CFR Part 6, App. A)(Applicable)

Protection of Wetlands Executive Order No. 11990 (Applicable)

Fish and Wildlife Coordination Act, (16 USC 661 et seq.; 40 CFR Part 302)(Applicable)

Endangered Species Act, (16 USC 1531 et seq.; 50 CFR Part 402)(Applicable)

Location-specific State Requirements

Massachusetts Wetland Protection Act and Regulations, (MGL c. 131 s. 40; 310 CMR 10.00)(Applicable)

Massachusetts Endangered Species Act and implementing regulations, (MGL c. 131A, s. 1 et seq.; 321 CMR 8.00)(Applicable)

Areas of Critical Environmental Concern, (301 CMR 12.00)(Relevant and Appropriate)

Chemical-specific Federal Requirements

Safe Drinking Water Act, National Primary Drinking Water Standards, MCLs, (40 CFR Parts 141.11-141.16 and 141.50-191.51)(Relevant and Appropriate)

Chemical-specific State Requirements

Massachusetts Surface Water Quality Standards, (314 CMR 4.00)(Applicable)

Massachusetts Groundwater Quality Standards, (314 CMR 6.00)(Applicable)

Massachusetts Drinking Water Standards and Guidelines, (310 CMR 22.00)(Relevant and Appropriate)

Massachusetts Ambient Air Quality Standards, (310 CMR 6.00)(Relevant and Appropriate)

Massachusetts Air Pollution Control Regulations, (310 CMR 7.00)(Relevant and Appropriate)

Action-specific Federal Requirements

Resource Conservation and Recovery Act (RCRA), (Subtitle D, 40 CFR 258)(Relevant and Appropriate)

Resource Conservation and Recovery Act (RCRA), (Subtitle C, 40 CFR 260, 264)(Relevant and Appropriate)

Action-specific State Requirements

Massachusetts Solid Waste Management Regulations, (310 CMR 19.100)(Applicable)

Massachusetts Hazardous Waste Regulations, (310 CMR 30.00)(Relevant and Appropriate)

The contingency remedy, Alternative SHL-9, will also attain all applicable or relevant and appropriate federal and State requirements. No waivers are required. ARARs for the Shepley's Hill Landfill Operable Unit were identified and discussed in the FS (Sections 2 and 5). ARARs for the Alternative SHL-9 are the same as for Alternative SHL-2 with the addition of the General Pretreatment Program regulations (40 CFR 403) promulgated pursuant to the Clean Water Act. These regulations require that nondomestic wastewater discharges to a POTW must comply with the general prohibitions of the regulation, any categorical pretreatment standards, and local pretreatment standards. The discharge of groundwater to the POTW would be sampled to evaluate compliance with the regulation.

C. The Selected Remedial Action is Cost-Effective.

In the Army's judgment, the selected remedy is cost effective (i.e., the remedy affords overall effectiveness proportional to its costs). In selecting this remedy, once the Army identified alternatives that are protective of human health and the environment and attain, or, as appropriate, waive ARARs, the Army evaluated the overall effectiveness of each alternative according to the relevant three criteria -- long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness, in combination. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs.

Review of the discussion of "Overall Protection of Human Health and the Environment" in Subsection IX.A. and of "Cost" in Subsection IX.G. suggests that Alternatives SHL-2, SHL-5, SHL-9, and SHL-10 all provide a similar level of protectiveness. However, Alternative SHL-2 does so at the lowest cost and is considered the most cost-effective of those four alternatives. The cost of Alternative SHL-9, although approximately 1.75 times as much as Alternative SHL-2, is still considered proportional to the benefits, and Alternative SHL-9 is also considered cost-effective. Alternative SHL-5 is very similar to Alternative SHL-9, but costs over twice as much as Alternative SHL-9 and over four times as much as Alternative SHL-2: it is not considered cost-effective. Alternative SHL-10, which costs nearly ten times as much as Alternative SHL-2, is not considered cost-effective. The costs of the selected remedy, Alternative SHL-2, in 1994 dollars are:

| | |
|---|---|
| Estimated Capital Cost: | $ 928,000 |
| Estimated Operation and Maintenance Cost (net present worth): | $ 1,291,000 |
| Estimated Total Cost (net present worth): | $ 2,219,000 |

Should the selected remedy fail to be protective, the contingency remedy, Alternative SHL-9, will be implemented, the overall effectiveness of which is proportional to its costs. The costs of the contingency remedy are presented below:

| | |
|---|---|
| Estimated Capital Cost: | $ 1,184,000 |
| Estimated Operation and Maintenance Cost (net present worth): | $ 2,690,000 |
| Estimated Total Cost (net present worth): | $ 3,874,000 |

D. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable.

Once the Army identified those alternatives that attain or, as appropriate, waive ARARs and that are protective of human health and the environment, the Army determined which alternative made use of permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which one of the identified alternatives provides the best balance of trade-offs among alternatives in terms of: (1) long-term effectiveness and permanence; (2) reduction of toxicity, mobility or volume through treatment; (3) short-term effectiveness; (4) implementability; and (5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility, and volume through treatment; and considered the preference for treatment as a principal element, the bias against off-site land disposal of untreated waste, and community and state acceptance. The selected remedy provides the best balance of trade-offs among the alternatives.

As described in Section IX, Summary of The Comparative Analysis of Alternatives, Alternative SHL-1 does not provide long-term effectiveness and permanence, while Alternatives SHL-2, SHL-5, SHL-9, and SHL-10 provide similar long-term effectiveness and permanence.

Alternatives SHL-1, SHL-2, and SHL-10 do not meet the statutory preference for treatment under CERCLA since these alternatives do not treat contaminants contained in groundwater or wastes at the site. Landfill capping which is a part of each alternative will reduce infiltration and the resulting leaching of contaminants, thus reducing contaminant mobility. Alternatives SHL-5 and SHL-9 meet the CERCLA statutory preference for treatment. These alternatives would reduce the mobility of contaminants by extracting the groundwater for treatment or disposal.

Among the five alternatives, Alternatives SHL-1 and SHL-2 have the least potential for adverse short-term effects while Alternative SHL-10 has the greatest potential. Alternatives SHL-5 and SHL-9 share a similar intermediate potential for adverse short-term effects.

Although Alternative SHL-1 is seen to have the easiest technical implementability, significant obstacles to current implementation or implementation of future remedial

actions are not foreseen for any of the alternatives. Implementation of Alternative SHL-9 does require a long-term discharge agreement between the Army and the Town of Ayer POTW.

Alternative SHL-1, the No Action alternative, does not require any capital commitment or any ongoing expenditure for operation and maintenance. Of the remaining alternatives, Alternative SHL-2 has the lowest estimated cost. Alternative SHL-5 costs approximately four times more than Alternative SHL-2, while Alternative SHL-9 costs approximately two times more than Alternative SHL-2. The estimated cost of Alternative SHL-10 is approximately ten times greater than the cost of Alternative SHL-2.

The Army believes Alternative SHL-2 provides the best balance among the alternatives that are protective and attain ARARs. Alternative SHL-2 offers potential long-term effectiveness with little potential for short-term risks. The alternative is readily implementable at a moderate cost. Although named Limited Action, Alternative SHL-2 is based on the presence of an existing landfill cover system designed to comply with applicable MADEP criteria. Installation of the cover system was only completed in 1993, and Alternative SHL-2 provides an opportunity to monitor and evaluate the effectiveness of the cover system at controlling groundwater contamination. The selection of Alternative SHL-2 is cost-effective and consistent with USEPA guidance contained in the USEPA document *Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites*, which states that the most practical remedial alternative for landfills is generally containment by capping.

The Army believes the contingency remedy, Alternative SHL-9, provides the next best balance among the alternatives that are protective and attain ARARs. Alternative SHL-9 offers potential long-term effectiveness, but compared to Alternative SHL-2 has a somewhat greater potential for short-term risks. The alternative is readily implementable at approximately twice the cost of Alternative SHL-2. Similar to Alternative SHL-2, Alternative SHL-9 is based on the presence of an existing landfill cover system designed to comply with applicable MADEP criteria. Alternative SHL-9 has groundwater extraction and treatment/disposal components to further control contaminant migration and potential exposure.

E. The Selected Remedy Does Not Satisfy the Preference for Treatment Which Permanently and Significantly Reduces the Toxicity, Mobility, and Volume of Hazardous Substances as a Principal Element

The principal element of the selected remedy is source control by containment of landfill materials. This element addresses the primary threat at the Shepley's Hill Landfill Operable Unit, which is potential residential use of contaminated groundwater, by controlling the leaching of landfill materials and the release of contaminants to groundwater. Therefore, the selected remedy does reduce contaminant mobility, but not by treatment. In-situ treatment, or alternately the excavation and treatment, of such a large, heterogeneous landfill as Shepley's Hill Landfill is considered impractical and not cost effective. If the selected remedy proves not to be protective, the contingency alternative (Alternative SHL-9), which includes groundwater extraction and treatment, will be implemented to attain cleanup levels.

## XII. DOCUMENTATION OF NO SIGNIFICANT CHANGES

The Army presented a proposed plan (preferred alternative) for remediation of Shepley's Hill Landfill Operable Unit on June 6, 1995. The components of the preferred alternative (Alternative SHL-2: Limited Action) included:

- survey of Shepley's Hill Landfill;
- evaluation/improvement of stormwater diversion and drainage;
- landfill cover maintenance;
- landfill gas collection system maintenance;
- long-term groundwater monitoring;
- long-term landfill gas monitoring;
- institutional controls;
- educational programs;
- 60 percent design of a groundwater extraction system
- annual reporting to MADEP and USEPA; and
- five-year site reviews.

New information obtained prior to the final selection of the remedy for Shepley's Hill Landfill Operable Unit resulted in a modification of the preferred alternative discussed in the proposed plan. The preferred alternative, Alternative SHL-2, was selected in part

because approval of landfill closure documents and official closure of the landfill by MADEP under applicable requirements of 310 CMR 19.000 were expected prior to Record of Decision signature. However, although construction of the cap on the landfill is complete, and the Army has submitted supporting documentation to MADEP, the landfill closure will not be officially complete until MADEP approves the documents.

Consequently, the selected remedy has been modified to include achievement by the Army of the official closure of the landfill by MADEP. The ARARs table has been modified to reflect this additional remedial requirement. This change to the remedy, though significant, has little or no effect on the scope, performance, or cost of the proposed remedy, and does not require additional public comment.

The contingency remedy, Alternative SHL-9, has also been modified from the proposed plan to include achievement by the Army of official closure of the landfill by MADEP pursuant to applicable requirements of 310 CMR 19.000.

## XIII. STATE ROLE

The Commonwealth of Massachusetts has reviewed the alternatives presented in the FS and proposed plan and concurs with the selected remedy for the Shepley's Hill Landfill Operable Unit. The Commonwealth has also reviewed the RI, RI Addendum, and FS to determine if the selected remedy complies with applicable or relevant and appropriate laws and regulations of the Commonwealth. A copy of the declaration of concurrence is attached as Appendix E.

# APPENDIX A

# APPENDIX A - FIGURES

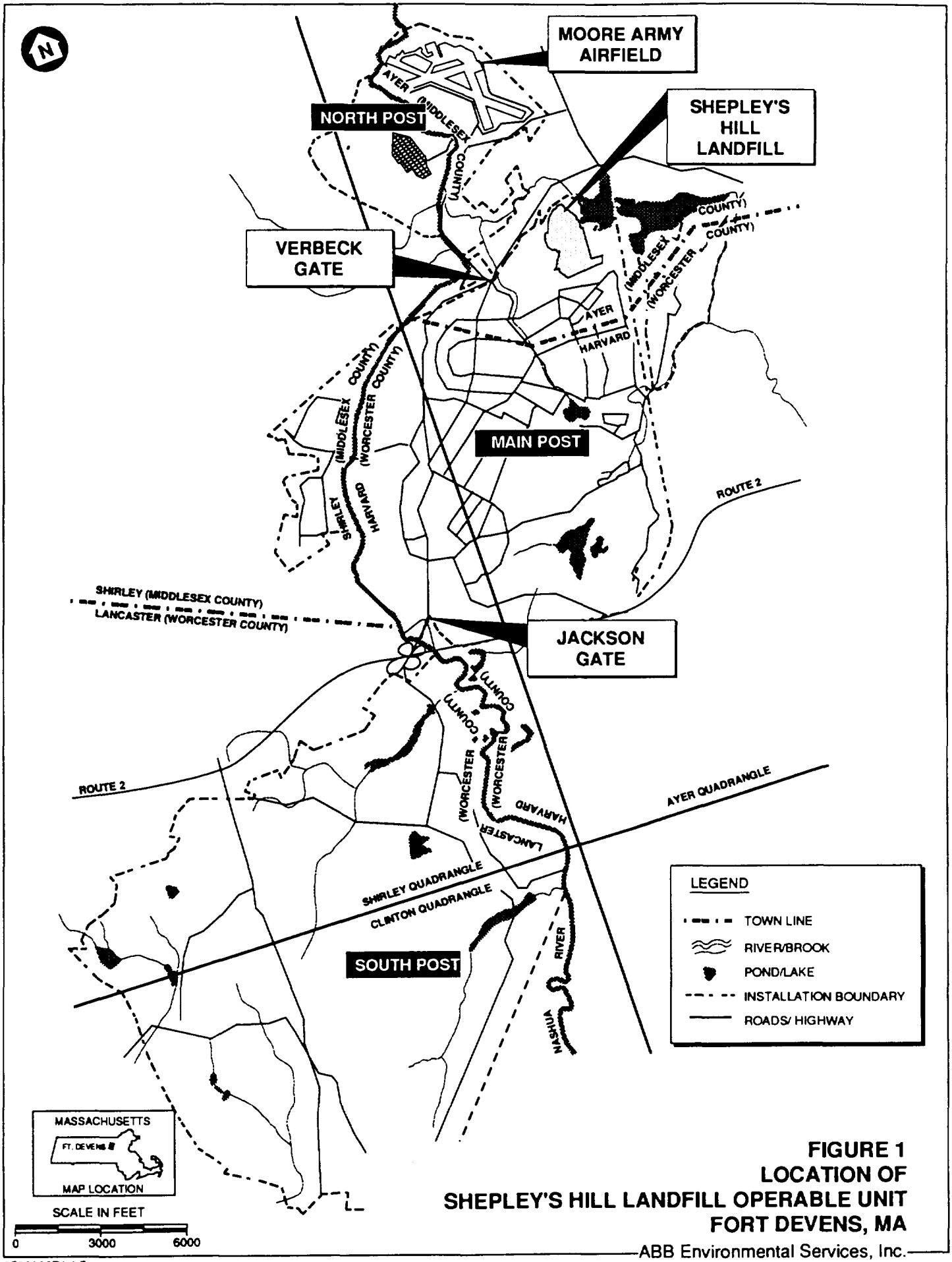


**FIGURE 1**
**LOCATION OF**
**SHEPLEY'S HILL LANDFILL OPERABLE UNIT**
**FORT DEVENS, MA**

ABB Environmental Services, Inc.

9502006D(a) 5

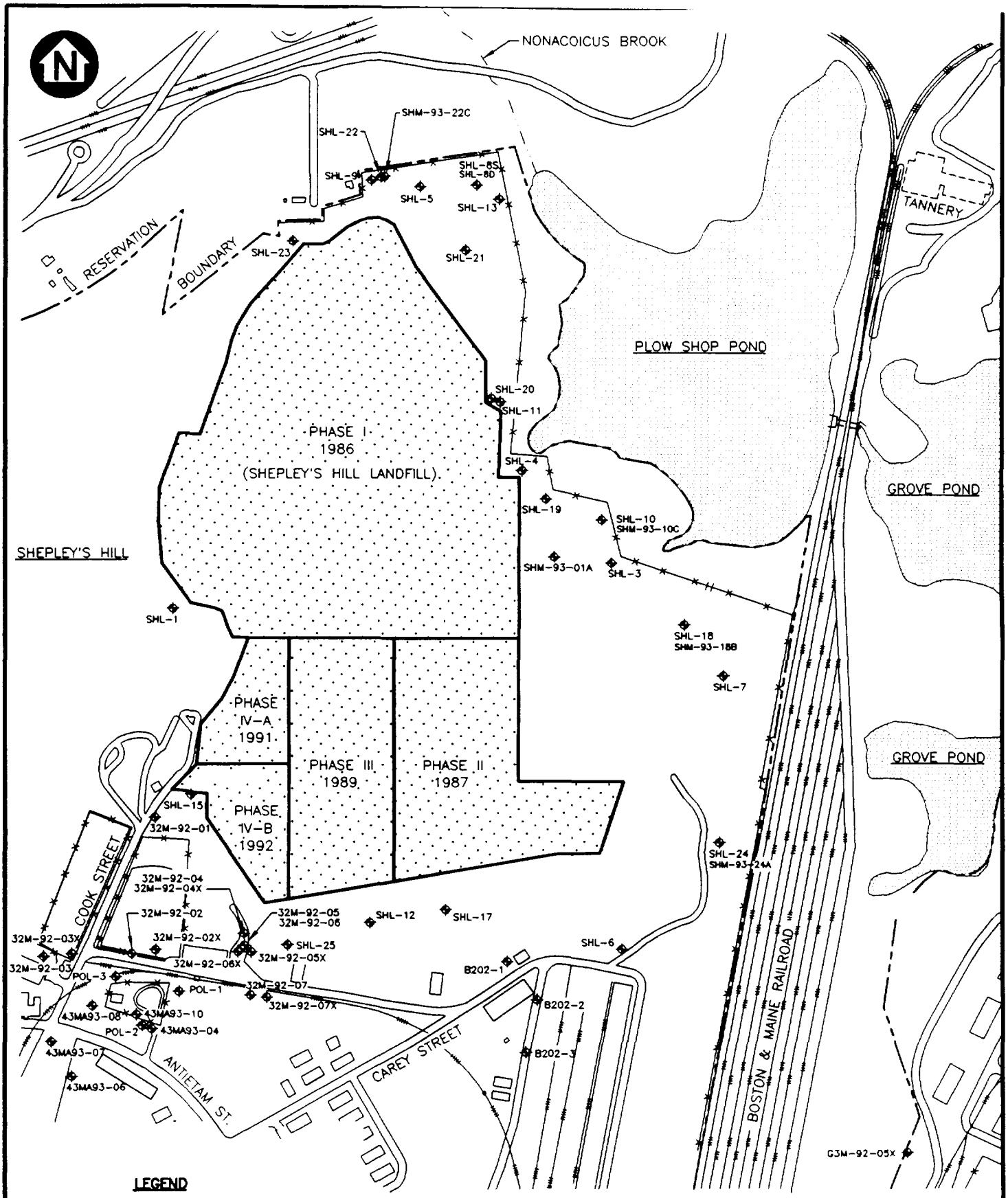


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**FIGURE 2**
**SHEPLEY'S HILL LANDFILL SITE MAP**
**FORT DEVENS, MA**
**ABB Environmental Services, Inc.**

# APPENDIX B

# APPENDIX B - TABLES

**TABLE 1**
**SUMMARY STATISTICS FOR SHEPLEY'S HILL LANDFILL GROUNDWATER WELL GROUP[1]**

**RECORD OF DECISION**
**SHEPLEY'S HILL LANDFILL OPERABLE UNIT**
**FORT DEVENS, MA**

| ANALYTE | FREQUENCY OF DETECTION | MAXIMUM DETECTED CONCENTRATION (µg/L) | ARITHMETIC MEAN (µg/L) | COPC (Y/N) |
|---|---|---|---|---|
| **UNFILTERED SAMPLES [2]** | | | | |
| 1,1-Dichloroethane | 4 / 14 | 4.4 | 0.86 | Y |
| 1,2-Dichloroethane | 5 / 14 | 9.9 | 0.97 | Y |
| 1,2-Dichloroethene (cis & trans) | 6 / 14 | 7 | 1.4 | Y |
| 1,2-Dichloropropane | 1 / 14 | 0.52 | 0.27 | Y |
| Acetone | 1 / 14 | 15 | 7 | N |
| Benzene | 3 / 14 | 1.7 | 0.51 | Y |
| Chloroethane | 1 / 14 | 5.5 | 1.3 | Y |
| Chloroform | 3 / 14 | 0.87 | 0.33 | N |
| Dichlorobenzenes (total) | 1 / 14 | 11 | 5.4 | Y |
| Toluene | 1 / 14 | 0.56 | 0.26 | N |
| Aluminum | 13 / 14 | 75500 | 4259 | Y |
| Antimony | 2 / 14 | 3.3 | 1.7 | Y |
| Arsenic | 12 / 14 | 390 | 101 | Y |
| Barium | 13 / 14 | 350 | 47.6 | Y |
| Calcium | 14 / 14 | 219000 | 54280 | Y |
| Chromium | 5 / 14 | 115 | 9 | Y |
| Cobalt | 1 / 14 | 54.6 | 14 | Y |
| Copper | 4 / 14 | 92.2 | 8.6 | Y |
| Iron | 14 / 14 | 97400 | 17608 | Y |
| Lead | 10 / 14 | 66.8 | 5.2 | Y |
| Magnesium | 14 / 14 | 24000 | 7603 | Y |
| Manganese | 14 / 14 | 9650 | 2045 | Y |
| Nickel | 1 / 14 | 177 | 22.9 | Y |
| Potassium | 13 / 14 | 31800 | 7119 | Y |
| Sodium | 14 / 14 | 67300 | 20749 | Y |
| Vanadium | 3 / 14 | 79.1 | 9.4 | Y |
| Zinc | 3 / 14 | 220 | 29.4 | Y |
| ***FILTERED SAMPLES [3]*** | | | | |
| Aluminum | 1 / 10 | 236 BB | NA | N |
| Antimony | 1 / 10 | 3.12 | 2 | Y |
| Arsenic | 6 / 10 | 270 | 71 | Y |
| Barium | 10 / 10 | 117 | 30 | Y |
| Calcium | 10 / 10 | 175000 | 37402 | Y |
| Iron | 7 / 10 | 91600 | 14427 | Y |
| Lead | 2 / 10 | 1.52 BB | NA | N |
| Magnesium | 9 / 10 | 19900 | 4679 | Y |
| Manganese | 10 / 10 | 9540 | 1812 | Y |
| Potassium | 9 / 10 | 10600 | 4127 | Y |
| Sodium | 10 / 10 | 64600 | 16934 | Y |
| Zinc | 1 / 10 | 25.5 | 11 | Y |

Notes:

NA = Not applicable

µg/L = Micrograms per liter

BB = Less than background concentration

1 From March and June 1993 sampling rounds

2 Unfiltered samples from monitoring wells SHL-3, SHL-4, SHL-5, SHL-9, SHL-10, SHL-11, SHL-18, SHL-19, SHL-20, SHL-22, SHM-93-01A, SHM-93-10C, SHM-93-18B, SHM-93-22C

3 Filtered samples from monitoring wells SHL-3, SHL-4, SHL-5, SHL-9, SHL-10, SHL-11, SHL-19 SHL-20, SHM-93-01A, SHM-93-18B

**TABLE 2**
**SUMMARY STATISTICS FOR SHEPLEY'S HILL LANDFILL GROUNDWATER**
**WELL GROUP 3[1]**

**RECORD OF DECISION**
**SHEPLEY'S HILL LANDFILL OPERABLE UNIT**
**FORT DEVENS, MA**

| ANALYTE | FREQUENCY OF DETECTION | MAXIMUM DETECTED CONCENTRATION (µg/L) | ARITHMETIC MEAN (µg/L) | COPC (Y/N) |
|---|---|---|---|---|
| **UNFILTERED SAMPLES[2]** | | | | |
| Aluminum | 2 / 4 | 4030 BB | 1800 | N |
| Arsenic | 2 / 4 | 17 | 8.4 | Y |
| Barium | 4 / 4 | 28 BB | 14 | N |
| Calcium | 4 / 4 | 15400 | 1100 | Y |
| Chromium | 2 / 4 | 7.38 BB | 5.1 | N |
| Iron | 4 / 4 | 5350 BB | 2500 | N |
| Lead | 2 / 4 | 7.38 | 3.4 | Y |
| Magnesium | 4 / 4 | 2850 BB | 1900 | N |
| Manganese | 4 / 4 | 1590 | 680 | Y |
| Potassium | 4 / 4 | 2080 BB | 1900 | N |
| Sodium | 4 / 4 | 17300 | 7600 | Y |
| **FILTERED SAMPLES[3]** | | | | |
| Barium | 1 / 1 | 8.71 BB | NA | N |
| Calcium | 1 / 1 | 11000 BB | NA | N |
| Magnesium | 1 / 1 | 1840 BB | NA | N |
| Manganese | 1 / 1 | 114 BB | NA | N |
| Potassium | 1 / 1 | 829 BB | NA | N |
| Sodium | 1 / 1 | 16400 | NA | Y |

Notes:
µg/L = Micrograms per liter
NA = Not applicable
BB = Less than background concentration
1 From March 1993 sampling round.
2 Unfiltered samples from monitoring wells SHL-8D, SHL-8S, SHL-13, SHL-21.
3 Filtered samples from monitoring well SHL-13.

**TABLE 3**
**SUMMARY STATISTICS FOR SHEPLEY'S HILL LANDFILL GROUNDWATER**
**WELL GROUP 4[1]**

**RECORD OF DECISION**
**SHEPLEY'S HILL LANDFILL OPERABLE UNIT**
**FORT DEVENS, MA**

| ANALYTE | FREQUENCY OF DETECTION | MAXIMUM DETECTED CONCENTRATION (µg/L) | ARITHMETIC MEAN (µg/L) | COPC (Y/N) |
|---|---|---|---|---|
| **UNFILTERED SAMPLES[2]** | | | | |
| Trichlorofluoromethane | 1 / 1 | 2.1 | NA | Y |
| Aluminum | 1 / 1 | 1330 BB | NA | N |
| Arsenic | 1 / 1 | 24 | NA | Y |
| Barium | 1 / 1 | 39.4 BB | NA | N |
| Calcium | 1 / 1 | 15600 | NA | Y |
| Iron | 1 / 1 | 1840 BB | NA | N |
| Lead | 1 / 1 | 3.69 BB | NA | N |
| Magnesium | 1 / 1 | 1900 BB | NA | N |
| Manganese | 1 / 1 | 1430 | NA | Y |
| Potassium | 1 / 1 | 3260 | NA | Y |
| Sodium | 1 / 1 | 7370 BB | NA | N |
| Zinc | 1 / 1 | 35.8 | NA | Y |
| **FILTERED SAMPLES[3]** | | | | |
| Barium | 1 / 1 | 26.2 BB | NA | N |
| Calcium | 1 / 1 | 16900 | NA | Y |
| Chromium | 1 / 1 | 6.95 BB | NA | N |
| Iron | 1 / 1 | 42.5 BB | NA | N |
| Lead | 1 / 1 | 1.63 BB | NA | N |
| Magnesium | 1 / 1 | 1860 BB | NA | N |
| Manganese | 1 / 1 | 1850 | NA | Y |
| Potassium | 1 / 1 | 1870 BB | NA | N |
| Sodium | 1 / 1 | 7630 BB | NA | N |
| Zinc | 1 / 1 | 28.8 | NA | Y |

Notes:
µg/L = Micrograms per liter
NA = Not applicable
BB = Less than background concentration
1 From March 1993 sampling record
2 Unfiltered samples from monitoring well SHL-15
3 Filtered samples from monitoring well SHL-15

**TABLE 4**
**SUMMARY STATISTICS FOR ANALYTE CONCENTRATIONS**
**IN PLOW SHOP POND BLUEGILLS (WHOLE FISH)[1]**

**RECORD OF DECISION**
**SHEPLEY'S HILL LANDFILL OPERABLE UNIT**
**FORT DEVENS, MA**

| ANALYTE | FREQUENCY OF DETECTION | MINIMUM CONCENTRATION | MAXIMUM CONCENTRATION | ARITHMETIC MEAN |
|---|---|---|---|---|
| **Pesticides (µg/kg)** | | | | |
| DDE | 2/5 | 21 | 29 | 12.92 |
| **Inorganics (mg/kg)** | | | | |
| Aluminum | 5/5 | 1.6 | 4.5 | 2.58 |
| Arsenic | 1/5 | 1.3 | 1.3 | 0.331 |
| Barium | 5/5 | 1.3 | 4.4 | 2.76 |
| Calcium | 5/5 | 23300 | 48800 | 31940 |
| Chromium | 5/5 | 0.48 | 0.93 | 0.656 |
| Cobalt | 4/5 | 0.1 | 0.16 | 0.108 |
| Copper | 5/5 | 0.44 | 0.6 | 0.506 |
| Iron | 5/5 | 42.4 | 130 | 79.72 |
| Lead | 1/5 | 0.16 | 0.16 | 0.072 |
| Magnesium | 5/5 | 496 | 754 | 568 |
| Manganese | 5/5 | 39.1 | 94.7 | 63.2 |
| Mercury | 5/5 | 0.19 | 0.54 | 0.368 |
| Selenium | 5/5 | 0.42 | 0.67 | 0.55 |
| Sodium | 5/5 | 1480 | 2290 | 1794 |
| Thallium | 1/5 | 0.1 | 0.1 | 0.06 |
| Zinc | 5/5 | 22.2 | 29.6 | 25.02 |

Notes:
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
1 Table inlcudes detected analytes only.
All detected analytes were included as COPCs.

TABLE 5
SUMMARY STATISTICS FOR ANALYTE CONCENTRATIONS
IN PLOW SHOP POND BULLHEAD AND BASS (FILLETS)[1]

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

| ANALYTE | FREQUENCY OF DETECTION | MINIMUM CONCENTRATION | MAXIMUM CONCENTRATION | ARITHMETIC MEAN |
|---|---|---|---|---|
| Pesticides (µg/kg) | | | | |
| DDE | 2/10 | 15 | 31 | 9.6675 |
| Inorganics (mg/kg) | | | | |
| Arsenic | 2/10 | 0.09 | 0.15 | 0.0497 |
| Calcium | 10/10 | 82.8 | 627 | 170.615 |
| Chromium | 2/10 | 0.19 | 0.24 | 0.123 |
| Cobalt | 2/10 | 0.11 | 0.11 | 0.056 |
| Copper | 10/10 | 0.08 | 0.24 | 0.174 |
| Iron | 10/10 | 1.7 | 27 | 8.195 |
| Magnesium | 10/10 | 252 | 344 | 279.15 |
| Manganese | 1/10 | 0.3 | 0.3 | 0.163 |
| Mercury | 9/10 | 0.12 | 4 | 1.144 |
| Selenium | 8/10 | 0.11 | 0.2 | 0.125 |
| Sodium | 10/10 | 283 | 509 | 420.85 |
| Zinc | 10/10 | 3.4 | 6.1 | 4.48 |

Notes:
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
1 Table includes detected analytes only.
All detected analytes were included as COPCs.

**TABLE 6**
**SUMMARY STATISTICS FOR PLOW SHOP POND SHALLOW SEDIMENT[1]**

**RECORD OF DECISION**
**SHEPLEY'S HILL LANDFILL OPERABLE UNIT**
**FORT DEVENS, MA**

| ANALYTE | FREQUENCY OF DETECTION | CONCENTRATION MEAN (µg/g) | CONCENTRATION MAXIMUM (µg/g) | COPC (Y/N) |
|---|---|---|---|---|
| **ORGANICS** | | | | |
| Acetone | 9/13 | 0.19 | 0.55 | N |
| Mmethylene chloride | 11/13 | 0.05 | 0.12 | N |
| 2-butanone | 5/13 | 0.04 | 0.13 | N |
| Benzo(a)anthracene | 1/13 | 0.22 | 1.1 | Y |
| Chrysene | 1/13 | 0.32 | 1.5 | Y |
| Fluoranthene | 1/13 | 0.5 | 3.4 | Y |
| Naphthalene | 1/13 | 0.32 | 1.6 | Y |
| Phenanthrene | 1/13 | 0.38 | 2.5 | Y |
| Pyrene | 3/13 | 0.97 | 4.35 | Y |
| DDE | 6/41 | 0.05 | 1.3 | Y |
| DDD | 4//41 | 0.07 | 1.8 | Y |
| DDT | 1/41 | 0.03 | 0.13 | Y |
| Heptachlor | 2/41 | 0.006 | 0.092 | N |
| **INORGANICS** | | | | |
| Aluminum | 41/41 | 7,938 | 24,000 | Y |
| Arsenic | 41/41 | 467 | 3,200 | Y |
| Barium | 38/41 | 108 | 344 | Y |
| Beryllium | 8/41 | 0.53 | 2.72 | Y |
| Cadmium | 13/41 | 9.8 | 60 | Y |
| Calcium | 39/41 | 8,074 | 20,100 | Y |
| Cobalt | 8/41 | 5.8 | 58.7 | Y |
| Chromium | 38/41 | 1,987 | 10,000 | Y |
| Copper | 30/41 | 39.7 | 132 | Y |
| Iron | 41/41 | 36,314 | 330,000 | Y |
| Lead | 40/41 | 125 | 632 | Y |
| Magnesium | 36/41 | 1,629 | 6,900 | Y |
| Manganese | 37/41 | 2,639 | 54,800 | Y |
| Mercury | 37/41 | 18.2 | 130 | Y |
| Nickel | 25/41 | 23 | 79.3 | Y |
| Potassium | 17/41 | 435 | 2,350 | Y |
| Selenium | 12/41 | 1.95 | 6.6 | Y |
| Sodium | 35/41 | 1,113 | 2,870 | Y |
| Vanadium | 15/41 | 24.6 | 166 | Y |
| Zinc | 17/41 | 88.6 | 403 | Y |

Notes:
µg/g = micrograms per gram

1. Based on sediment samples SE-SHL-01 through SE-SHL-13 (April 1993 RI) and SHD-92-01 through SHD-92-28 at depths of less than 1 foot.

**TABLE 7**
**CHEMICALS OF POTENTIAL CONCERN[1] IN HUMAN HEALTH RISK ASSESSMENT**
**SHEPLEY'S HILL LANDFILL**

**RECORD OF DECISION**
**SHEPLEY'S HILL LANDFILL OPERABLE UNIT**
**FORT DEVENS, MA**

| CHEMICAL OF POTENTIAL CONCERN | FISH TISSUE | SEDIMENT | GROUNDWATER | | |
|---|---|---|---|---|---|
| | | | WELL GROUP 1 | WELL GROUP 3 | WELL GROUP 4 |
| **Inorganics** | | | | | |
| Aluminum | X | X | X | | |
| Antimony | | | X | | |
| Arsenic | X | X | X | X | X |
| Barium | X | X | X | | |
| Beryllium | | X | | | |
| Calcium | X | X | X | X | X |
| Cadmium | | X | | | |
| Chromium | X | X | X | | |
| Cobalt | X | X | X | | |
| Copper | X | X | X | | |
| Iron | X | X | X | | |
| Lead | X | X | X | X | |
| Magnesium | X | X | X | | |
| Manganese | X | X | X | X | X |
| Mercury | X | X | | | |
| Nickel | | X | X | | |
| Potassium | | X | X | | X |
| Selenium | X | X | | | |
| Sodium | X | X | X | X | |
| Thallium | X | | | | |
| Vanadium | | X | X | | |
| Zinc | X | X | X | | X |

TABLE 7
CHEMICALS OF POTENTIAL CONCERN[1] IN HUMAN HEALTH RISK ASSESSMENT
SHEPLEY'S HILL LANDFILL

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

| CHEMICAL OF POTENTIAL CONCERN | FISH TISSUE | SEDIMENT | GROUNDWATER | | |
|---|---|---|---|---|---|
| | | | WELL GROUP 1 | WELL GROUP 3 | WELL GROUP 4 |
| **VOCs** | | | | | |
| Benzene | | | X | | |
| Chloroethane | | | X | | |
| Chloroform | | | X | | |
| 1,1-Dichloroethane | | | X | | |
| 1,2-Dichloroethane | | | X | | |
| 1,2-Dichloroethene (cis & trans) | | | X | | |
| 1,2-Dichloropropane | | | X | | |
| Trichlorofluoromethane | | | | | X |
| **SVOCs** | | | | | |
| Dichlorobenzenes (total) | | | X | | |
| Benzo(a)anthracene | | X | | | |
| Chrysene | | X | | | |
| Fluoranthene | | X | | | |
| Naphthalene | | X | | | |
| Phenanthrene | | X | | | |
| Pyrene | | X | | | |
| **Pesticides/PCBs** | | | | | |
| DDD | | X | | | |
| DDE | X | X | | | |
| DDT | | X | | | |

TABLE 8
SUMMARY OF COVER SYSTEM PERFORMANCE STANDARDS

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

| MASSACHUSETTS SOLID WASTE REGULATIONS 310 CMR 19.000 | RCRA SUBTITLE C 40 CFR 264 | RCRA SUBTITLE D 40 CFR 258 | MASSACHUSETTS HAZARDOUS WASTE REGULATIONS 310 CMR 30.000 | HOW COMPLIANCE IS ACHIEVED BY EXISTING COVER |
|---|---|---|---|---|
| Minimize percolation of water into landfill. | Minimize migration of liquids through landfill. | Minimize infiltration through landfill. | Minimize migration of liquids through landfill. | Geomembrane installations such as the existing one at Shepley's Hill Landfill have a permeability of 10 E -7 centimeters per second or less that minimizes infiltration and migration of liquid into landfilled waste. Sloped surface promotes runoff and minimizes infiltration. Vegetation promotes evapotranspiration. |
| | Have a permeability less than or equal to bottom liner or subsoils. | Have a permeability less than or equal to bottom liner or subsoils or less than 10 E-5 centimeters per second, whichever is less. | Have a permeability less than or equal to bottom liner. | Existing geomembrane permeability is less than that of sands underlying landfill. There is no bottom liner. |
| Promote drainage of precipitation. | Promote drainage and minimize erosion. | | Promote drainage and minimize erosion of cover. | The existing cover is sloped to promote drainage and vegetated to prevent erosion. |
| Minimize erosion of final cover. | | Minimize erosion of final cover. | | The existing cover is sloped and vegetated to minimize erosion. |
| | Function with minimum maintenance. | | Function with minimum maintenance. | The existing cover was constructed in a manner to minimize maintenance. Monitoring and maintenance of cover systems to maintain integrity is normal practice. |
| Facilitate gas venting. | | | | The existing collection piping and riser system facilitate gas venting. Analysis of gas samples from vents confirms that they function. |

(continued)

**TABLE 8**
**SUMMARY OF COVER SYSTEM PERFORMANCE STANDARDS**

**RECORD OF DECISION**
**SHEPLEY'S HILL LANDFILL OPERABLE UNIT**
**FORT DEVENS, MA**

| MASSACHUSETTS SOLID WASTE REGULATIONS 310 CMR 19.000 | RCRA SUBTITLE C 40 CFR 264 | RCRA SUBTITLE D 40 CFR 258 | MASSACHUSETTS HAZARDOUS WASTE REGULATIONS 310 CMR 30.000 | HOW COMPLIANCE IS ACHIEVED BY EXISTING COVER |
|---|---|---|---|---|
| Minimize percolation of water into landfill. | Minimize migration of liquids through landfill. | Minimize infiltration through landfill. | Minimize migration of liquids through landfill. | Geomembrane installations such as the existing one at Shepley's Hill Landfill have a permeability of 10 E -7 centimeters per second or less that minimizes infiltration and migration of liquid into landfilled waste. Sloped surface promotes runoff and minimizes infiltration. Vegetation promotes evapotranspiration. |
| Accommodate settling and subsidence to continue to meet performance standards. | Accommodate settling and subsidence to maintain cover integrity. | | Accommodate settling and subsidence to maintain cover integrity. | Landfill materials were compacted and graded during construction of the existing cap to accommodate settling. Maintenance actions are possible to maintain cover integrity if or when settling occurs. |
| Ensure isolate of wastes from environment. | | | | The existing cover isolates wastes from potential terrestrial receptors by covering them with soil and lowers groundwater to elevations interpreted to be below waste. |

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

| AUTHORITY | LOCATION CHARACTERISTIC | REQUIREMENT | STATUS | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|---|---|---|
| Federal Regulatory Authority | Floodplains | Floodplain Management Executive Order No. 11988, [40 CFR Part 6, App. A] | Applicable | Requires federal agencies to evaluate the potential adverse effects associated with direct and indirect development of a floodplain. Alternatives that involve modification/construction within a floodplain may not be selected unless a determination is made that no practicable alternative exists. If no practicable alternative exists, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of the floodplain. | To the extent that any activity associated with this alternative takes place in the floodplain, the activity will be altered to comply with the law. |
| | Wetlands | Protection of Wetlands Executive Order No. 11990 | Applicable | Under this Order, federal agencies are required to minimize the destruction, loss, or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands.<br>If remediation is required within wetland areas, and no practical alternative exists, potential harm must be minimized and action taken to restore natural and beneficial values. | To the extent that any activity associated with this alternative takes place in wetlands, the activity will be altered to comply with the law. |

(continued)

**TABLE 9**
**SYNOPSIS OF FEDERAL AND STATE ARARs FOR ALTERNATIVE SHL-2: LIMITED ACTION**

**RECORD OF DECISION**
**SHEPLEY'S HILL LANDFILL OPERABLE UNIT**
**FORT DEVENS, MA**

| AUTHORITY | LOCATION CHARACTERISTIC | REQUIREMENT | STATUS | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|---|---|---|
| | Surface Waters Endangered Species | Fish and Wildlife Coordination Act [16 USC 661 et seq.; 40 CFR Part 302] | Applicable | Actions which affect species/habitat require consultation with U.S. Department of the Interior, U.S. Fish and Wildlife Service, and National Marine Fisheries Service, and/or state agencies, as appropriate, to ensure that proposed actions do not jeopardize the continued existence of the species or adversely modify or destroy critical habitat. The effects of water-related projects on fish and wildlife resources must be considered. Action must be taken to prevent, mitigate, or compensate for project-related damages or losses to fish and wildlife resources. Consultation with the responsible agency is also strongly recommended for on-site actions. Under 40 CFR Part 300.38, these requirements apply to all response activities under the NCP. | No off-site remedial actions performed for this alternative. On-site actions would be minimal and would include agency consultation prior to implementation. |
| | Endangered Species | Endangered Species Act [16 USC 1531 et seq.; 50 CFR Part 402] | Applicable | This act requires action to avoid jeopardizing the continued existence of listed endangered or threatened species or modification of their habitat. | To minimize impact, landfill cover maintenance would be performed after nesting areas of the Grasshopper Sparrow have been identified. |

(continued)

**TABLE 9**
**SYNOPSIS OF FEDERAL AND STATE ARARs FOR ALTERNATIVE SHL-2: LIMITED ACTION**

**RECORD OF DECISION**
**SHEPLEY'S HILL LANDFILL OPERABLE UNIT**
**FORT DEVENS, MA**

| AUTHORITY | LOCATION CHARACTERISTIC | REQUIREMENT | STATUS | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|---|---|---|
| State Regulatory Authority | Floodplains Wetlands | Massachusetts Wetland Protection Act and Regulations [MGL c. 131 s. 40; 310 CMR 10.00] | Applicable | Wetlands and land subject to flooding are protected under this Act and these regulations. Activities that will remove, dredge, fill, or alter protected areas (defined as areas within the 100-year floodplain) are subject to regulation and must file a Notice of Intent with the municipal conservation commission and obtain a Final Order of Conditions before proceeding with the activity. A Determination of Applicability or Notice of Intent must be filed for activities such as excavation within a 100 foot buffer zone. The regulations specifically prohibit loss of over 5,000 square feet of bordering vegetated wetland. Loss may be permitted with replication of any lost area within two growing seasons. | If remedial activities alter more than 5,000 square feet of protected area, the affected area will be restored within two growing seasons. |
| | Endangered Species | Massachusetts Endangered Species Act and implementing regulations [MGL c. 131A, s. 1 et seq.; 321 CMR 8.00] | Applicable | Actions must be conducted in a manner which minimizes the impact to Massachusetts listed endangered species and species listed by the Massachusetts Natural Heritage Program. | To minimize impacts, landfill cover maintenance would be performed after nesting areas of the Grasshopper Sparrow have been identified. |

(continued)

**TABLE 9**
**SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION**

**RECORD OF DECISION**
**SHEPLEY'S HILL LANDFILL OPERABLE UNIT**
**FORT DEVENS, MA**

| AUTHORITY | LOCATION CHARACTERISTIC | REQUIREMENT | STATUS | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|---|---|---|
| | Area of Critical Environmental Concern | Areas of Critical Environmental Concern [301 CMR 12.00] | Relevant and Appropriate | An Area of Critical Environmental Concern is of regional, state, or national importance or contains significant ecological systems with critical inter-relationships among a number-of-components. An eligible area must contain features from four or more of the following groups: (1) fishery habitats; (2) coastal feature; (3) estuarine wetland; (4) inland wetland; (5) inland surface water; (6) water supply area (i.e., aquifer recharge area); (7) natural hazard area (i.e., floodplain); (8) agricultural area; (9) historical/archeological resources; (10) habitat resource (i.e., for endangered wildlife; or (11) special use areas. | Activities must be controlled to minimize impacts to nesting areas of the Grasshopper Sparrow. |

(continued)

**TABLE 9**
**SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION**

**RECORD OF DECISION**
**SHEPLEY'S HILL LANDFILL OPERABLE UNIT**
**FORT DEVENS, MA**

| AUTHORITY | CHEMICAL MEDIUM | REQUIREMENT | STATUS | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|---|---|---|
| Federal Regulatory Authority | Groundwater | Safe Drinking Water Act, National Primary Drinking Water Standards, MCLs [40 CFR Parts 141.11 - 141.16 and 141.50-191.51] | Relevant and Appropriate | The National Primary Drinking Water Regulation establishes MCLs and non-zero Maximum Contaminant Level Goals for several common organic and inorganic contaminants. These MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques. | MCLs will be used to evaluate the performance of this alternative. If MCLs are exceeded, the remedy will be re-evaluated. |
| State Regulatory Authority | Surface water | Massachusetts Surface Water Quality Standards [314 CMR 4.00] | Applicable | Massachusetts Surface Water Quality Standards designate the most sensitive uses for which surface waters of the Commonwealth are to be enhanced, maintained and protected and designate minimum water quality criteria for sustaining the designated uses. Surface waters at Fort Devens are classified as Class B. Surface waters assigned to this class are designated as habitat for fish, other aquatic life and wildlife, and for primary and secondary contact recreation. | Discharges associated with remedial actions will be controlled/monitored to ensure that surface waters meet standards. |

(continued)

**TABLE 9**
**SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION**

**RECORD OF DECISION**
**SHEPLEY'S HILL LANDFILL OPERABLE UNIT**
**FORT DEVENS, MA**

| AUTHORITY | CHEMICAL MEDIUM | REQUIREMENT | STATUS | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|---|---|---|
| | Groundwater | Massachusetts Groundwater Quality Standards [314 CMR 6.00] | Applicable | Massachusetts Groundwater Quality Standards designate and assign uses for which groundwaters of the Commonwealth shall be maintained and protected and set forth water quality criteria necessary to maintain the designated uses. Groundwater at Fort Devens is classified as Class I. Groundwaters assigned to this class are fresh groundwaters designated as a source of potable water supply. | MCLs will be used to evaluate the performance of this alternative. If MCLs are exceeded, the remedy will be re-evaluated. |
| | Groundwater | Massachusetts Drinking Water Standards and Guidelines [310 CMR 22.00] | Relevant and Appropriate | The Massachusetts Drinking Water Standards and Guidelines list MMCLs which apply to water delivered to any user of a public water supply system as defined in 310 CMR 22.00. Private residential wells are not subject to the requirements of 310 CMR 22.00; however, the standards are often used to evaluate private residential contamination especially in CERCLA activities. | MMCLs will be used to evaluate the performance of this alternative. If MMCLs are exceeded, the remedy will be re-evaluated. |

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

| AUTHORITY | CHEMICAL MEDIUM | REQUIREMENT | STATUS | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|---|---|---|
| | Air | Massachusetts Ambient Air Quality Standards [310 CMR 6.00] | Relevant and Appropriate | Regulations specify primary and secondary ambient air quality standards to protect public health and welfare for certain pollutants | Ambient Air Quality Standards will be used to evaluate the performance of this alternative. If standards are exceeded, the remedy will be re-evaluated. |
| | Air | Massachusetts Air Pollution Control Regulations [310 CMR 7.00] | Relevant and Appropriate | Regulations pertain to the prevention of emissions in excess of Massachusetts or national ambient air quality standards or in excess of emission limitations in those regulations. | Ambient Air Quality Standards will be used to evaluate the performance of this alternative. If standards are exceeded, the remedy will be re-evaluated. |

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARs FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

| AUTHORITY | ACTION | REQUIREMENT | STATUS | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|---|---|---|
| Federal Regulatory Authority | Solid waste landfill construction, operation, closure, and post-closure | Resource Conservation and Recovery Act (RCRA) [Subtitle D, 40 CFR 258] | Relevant and Appropriate | RCRA Subtitle D regulates the generation, transport, storage, treatment, and disposal of solid wastes. Regulations at 40 CFR 258 govern preparedness and prevention, closure, and post-closure at municipal solid waste landfills. | Performance of this alternative will be evaluated to determine compliance with the substantive requirements of federal solid waste regulations. If the substantive requirements are not met at the appropriate time, the remedy will be re-evaluated. |
| | Hazardous waste landfill construction, operation, closure, and post-closure | Resource Conservation and Recovery Act (RCRA) [Subtitle C, 40 CFR 260,264] | Relevant and Appropriate | RCRA Subtitle C regulates the generation, transport, storage, treatment, and disposal of hazardous wastes. Regulations at 40 CFR 264 govern preparedness and prevention, closure, and post-closure at landfills. | Performance of this alternative will be evaluated to determine compliance with the substantive requirements of federal hazardous waste regulations. If the substantive requirements are not met at the appropriate time, the remedy will be re-evaluated. |
| State Regulatory Authority | Solid waste landfill construction, operation, closure, and post-closure. | Massachusetts Solid Waste Management Regulations [310 CMR 19.000] | Applicable | These regulations outline the requirements for construction, operation, closure, and post-closure at solid waste management facilities in the Commonwealth of Massachusetts. | This alternative includes components to meet closure and post-closure requirements at Shepley's Hill Landfill. |

(continued)

**TABLE 9**
**SYNOPSIS OF FEDERAL AND STATE ARARs FOR ALTERNATIVE SHL-2: LIMITED ACTION**

**RECORD OF DECISION**
**SHEPLEY'S HILL LANDFILL OPERABLE UNIT**
**FORT DEVENS, MA**

| AUTHORITY | ACTION | REQUIREMENT | STATUS | REQUIREMENT SYNOPSIS | ACTION TO BE TAKEN TO ATTAIN REQUIREMENT |
|---|---|---|---|---|---|
| | Hazardous waste landfill construction, operation, closure, and post-closure | Massachusetts Hazardous Waste Regulations [310 CMR 30.00] | Relevant and Appropriate | Regulates handling, storage, treatment, disposal, and record keeping at hazardous waste facilities. | Performance of this alternative will be evaluated to determine compliance with the substantive requirements of Massachusetts hazardous waste regulations. If the substantive requirements are not met at the appropriate time, the remedy will be re-evaluated. |

# APPENDIX C

# 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 the Shepley's Hill Landfill Operable Unit.

The Army held a 30-day public comment period from June 1 to June 30, 1995 to provide an opportunity for interested parties to comment on the Feasibility Study (FS), proposed plan, and other documents developed to address the cleanup of contaminated groundwater at the Shepley's Hill Landfill Operable Unit at Fort Devens, Massachusetts. The FS developed and evaluated various options (referred to as remedial alternatives) to address human health and ecological risk from exposure to contaminated groundwater and potential migration of substances present in groundwater at the Shepley's Hill Landfill Operable Unit. The Army identified its preferred alternative for cleanup of groundwater in the proposed plan issued on May 31, 1995.

All documents on which the preferred alternative were based were placed in the Administrative Record for review. The Administrative Record contains all supporting documentation considered by the Army in choosing the remedy for Shepley's Hill Landfill Operable Unit. The Administrative Record is available to the public at the Fort Devens Base Realignment and Closure (BRAC) Environmental Office, Building P12, Fort Devens, and at the Ayer Town Hall, Main Street, Ayer. 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 the Record of Decision.

This Responsiveness Summary is organized into the following sections:

I. **Overview of Remedial Alternatives Considered in the FS Including the Selected Remedy**-This section briefly outlines the remedial alternatives evaluated in detail in the FS and presented in the proposed plan, including the Army's selected remedy.

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 and not formally responded to during the public comment period. A transcript of the public meeting consisting of all comments received during this meeting and the Army's responses to these comments is provided in Attachment A of this Responsiveness Summary.

*********

## I. OVERVIEW OF REMEDIAL ALTERNATIVES CONSIDERED IN THE FS INCLUDING THE SELECTED REMEDY

Ten remedial alternatives were developed in the FS report and screened based on implementability, effectiveness, and cost to narrow the number of remedial alternatives for detailed analysis. Of the initial ten, five were retained for detailed evaluation. The five retained alternatives are:

### A. Alternative SHL-1: No-Action

The No Action alternative does not contain any remedial action components beyond the existing landfill cover system to reduce or control potential risks. No institutional controls would be implemented to prevent future human exposure, and existing activities to maintain existing systems and monitor for potential future releases would be stopped. Alternative SHL-1 is developed to provide a baseline for comparison with the other remedial alternatives.

### B. Alternative SHL-2: Limited Action

Alternative SHL-2 contains components to maintain and potentially improve the effectiveness of the existing landfill cover system and to satisfy the Landfill Post-Closure Requirements of 310 CMR 19.142 to reduce potential future exposure to contaminated groundwater. Key components of this alternative include:

- landfill closure in accordance with applicable requirements of 310 CMR 19.000;
- survey of Shepley's Hill Landfill;
- evaluation/improvement of stormwater diversion and drainage;
- landfill cover maintenance;
- landfill gas collection system maintenance;
- long-term groundwater monitoring;
- long-term landfill gas monitoring;
- institutional controls;
- educational programs;
- 60 percent design of a groundwater extraction system;
- annual reporting to Massachusetts Department of Environmental Protection (MADEP) and USEPA; and
- five-year site reviews.

The Army's selected remedy is Alternative SHL-2, with Alternative SHL-9 as the contingency remedy.

C. Alternative SHL-5: Collection/Ion Exchange Treatment/Surface Water Discharge

Alternative SHL-5 consists of components that, together with the components of Alternative SHL-2, would provide additional controls to prevent off-site migration of contaminated groundwater. Key components of Alternative SHL-5 include:

- landfill closure in accordance with applicable requirements of 310 CMR 19.000;
- design, construction, operation, and maintenance of groundwater extraction, treatment, and discharge facilities;
- survey of Shepley's Hill Landfill;
- evaluation/improvement of stormwater diversion and drainage;
- landfill cover maintenance;
- landfill gas collection system maintenance;
- long-term groundwater monitoring;
- long-term landfill gas monitoring;
- institutional controls;
- educational programs;
- annual reporting to MADEP and USEPA; and
- five-year site reviews.

The major difference between Alternative SHL-5 and Alternative SHL-2 is the construction and operation of groundwater extraction, treatment, and discharge facilities. Data collected during predesign studies would be used to optimize the size and location of groundwater extraction wells at Shepley's Hill Landfill. Contaminated groundwater would be treated in an on-site groundwater treatment facility that (subject to treatability studies) includes carbon adsorption, sand filtration, and ion exchange treatment units and discharges through an effluent pipeline to Nonacoicus Brook.

D. Alternative SHL-9: Collection/Discharge to POTW

Alternative SHL-9 adds the components of groundwater extraction and discharge to the Town of Ayer publicly owned treatment works (POTW) to Alternative SHL-2 to provide additional control to prevent off-site migration of contaminated groundwater. Key components of Alternative SHL-9 include:

- landfill closure in accordance with applicable requirements of 310 CMR 19.000;
- design, construction, operation, and maintenance of groundwater extraction and discharge facilities;
- survey of Shepley's Hill Landfill;
- evaluation/improvement of stormwater diversion and drainage;
- landfill cover maintenance;
- landfill gas collection system maintenance;
- long-term groundwater monitoring;
- long-term landfill gas monitoring;
- institutional controls;
- educational programs;
- annual reporting to MADEP and USEPA; and
- five-year site reviews.

The major difference between Alternative SHL-9 and Alternative SHL-2 is the construction and operation of groundwater extraction and discharge facilities. Data collected during predesign studies would be used to optimize the size and location of groundwater extraction wells at Shepley's Hill Landfill. Following construction of the groundwater extraction facilities, contaminated groundwater would be pumped to a discharge manhole anticipated to be located on Scully Road near the north end of the landfill. There, the groundwater would combine with domestic wastewater and flow to the Town of Ayer POTW for treatment and subsequent discharge. The Ayer POTW,

with a capacity of 1.79 million gallons per day (MGD), would be able to handle the additional anticipated volume of 20 to 30 gallons per minute (0.029 to 0.043 MGD).

Review of available groundwater monitoring data suggests that pretreatment of the groundwater will not be needed to meet existing pretreatment standards established by the Town of Ayer. The Army would monitor the groundwater discharge to the POTW, however, and if necessary install pretreatment facilities to meet pretreatment standards. The Army would pay a sewer user fee to the town based on the volume of water discharged to the POTW.

E. Alternative SHL-10: Installation of RCRA Cap

Alternative SHL-10 consists of building a new landfill cover system on top of the existing cover system at Shepley's Hill Landfill. The new cover system would be designed to meet Resource Conservation and Recovery Act (RCRA) performance criteria and design guidance for hazardous waste landfills. The principal component of the new cover system would be a 24-inch layer of low permeability soil in intimate contact with a geomembrane. Maintenance activities, monitoring and reporting requirements, and institutional controls would be similar to those of Alternative SHL-2.

## II. BACKGROUND ON COMMUNITY INVOLVEMENT

Community concern and involvement have been low throughout the history of Shepley's Hill Landfill. Although the Army has kept the community and other interested parties informed of site activities through regular and frequent informational meetings, fact sheets, press releases, and public meetings, no members of the public attended the public informational meeting on the proposed plan or the public hearing.

In February 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 Fort Devens. As part of this plan, the Army established a Technical Review Committee (TRC) in early 1992. 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, MADEP, local officials and the community. Until January 1994, when it was replaced by the Restoration Advisory Board (RAB), the committee generally met quarterly to review and provide technical comments on schedules, work plans, work products, and proposed

activities for the Study Areas at Fort Devens. The Remedial Investigation (RI), RI Addendum, and FS reports, proposed plan, and other related support documents were all submitted to the TRC or RAB for their review and comment.

The Army, as part of its commitment to involve the affected communities, forms a RAB when an installation closure involves transfer of property to the community. The Fort Devens RAB was formed in February 1994 to add members of the Citizen's Advisory Committee (CAC) to the TRC. The CAC had been established previously to address Massachusetts Environmental Policy Act/Environmental Assessment issues concerning the reuse of property at Fort Devens. The RAB consists of 28 members (15 original TRC members plus 13 new members) who are representatives from the Army, USEPA Region I, MADEP, local governments and citizens of the local communities. It meets monthly and provides advice to the installation and regulatory agencies on Fort Devens cleanup programs. Specific responsibilities include: addressing cleanup issues such as land use and cleanup goals; reviewing plans and documents; identifying proposed requirements and priorities; and conducting regular meetings that are open to the public. The Army presented the proposed plan for the Shepley's Hill Landfill Operable Unit at the May 4, 1995 RAB meeting.

On May 31, 1995, the Army issued a fact sheet to citizens and organizations, to provide the public with a brief explanation of the Army's preferred remedy for cleanup of groundwater at the Shepley's Hill Landfill Operable Unit. The fact sheet also described the opportunities for public participation and provided details on the upcoming public comment period and public meetings.

During the week of May 22, the Army published a public notice announcing the proposed plan, public informational meeting, and public hearing in the Times Free Press and the Lowell Sun. A public notice announcing the public hearing was published the week of June 12, 1995 in the Times Free Press and the week of June 19, 1995 in the Lowell Sun. The Army also made the proposed plan available to the public at the information repositories at the libraries in Ayer, Shirley, Lancaster, Harvard and at Fort Devens.

From June 1 to June 30, 1995, the Army held a 30-day public comment period to accept public comments on the alternatives presented in the FS and the proposed plan and on other documents released to the public. On June 6, 1995, the Army held an informal informational meeting at Fort Devens to present the Army's proposed plan to the public and discuss the cleanup alternatives evaluated in the FS. This meeting also provided the opportunity for open discussion concerning the proposed cleanup. On June 27, 1995, the

Army held an informal public hearing at Fort Devens to discuss the proposed plan and to accept verbal or written comments from the public.

All supporting documentation for the decision regarding the Shepley's Hill Landfill Operable Unit is contained in the Administrative Record for review. The Administrative Record is a collection of all the documents considered by the Army in choosing the remedy for the Shepley's Hill Landfill Operable Unit. On June 2, 1995, the Army made the Administrative Record available for public review at the Fort Devens BRAC Environmental Office, and at the Ayer Town Hall, Ayer, Massachusetts. An index to the Administrative Record is available at the USEPA Records Center, 90 Canal Street, Boston, Massachusetts and is provided as Appendix D.

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

No comments were received during the public comment period.

# ATTACHMENT A - PUBLIC HEARING TRANSCRIPT

ABB ENVIRONMENTAL SERVICES, INC.

PROPOSED PLAN

SHEPLEY'S HILL LANDFILL OPERABLE UNIT

FORT DEVENS, MASSACHUSETTS

PUBLIC HEARING

HELD AT:

FORT DEVENS, MASSACHUSETTS

TUESDAY, JUNE 27, 1995

7:00 P.M.

(Robin Gross, Registered Professional Reporter)

# Attorneys Notes

Doris O. Wong Associates

P R O C E E D I N G S

MR. CHAMBERS: Welcome, everybody, to Fort Devens. My name is James Chambers. I'm the BRAC environmental coordinator for the U.S. Army here at Fort Devens.

Tonight's hearing is in regards to the remedial action proposed plan for Shepley's Hill Landfill, and I'd like to open up the floor to comments. We do have a court stenographer here tonight to officially record your comments.

I'd like to recognize Ms. Lynn Welsh from the Massachusetts Department of Environmental Protection; Mr. James Byrne of the U.S. Environmental Protection Agency; Mr. Gerry Keefe from the U.S. Environmental Protection Agency; Mr. Charles George from the U.S. Army Environmental Center; and Mr. Paul Exner and Mr. Stan Reed representing ABB Environmental Services.

(Recess taken)

MR. CHAMBERS: It's now 7:30. Let the record show that we were prepared to make a presentation this evening and no members of the public showed.

The 30th of June is the last day for

submitting written comments. Thank you.

(Whereupon, the hearing was adjourned at 7:30 p.m.)

C E R T I F I C A T E

I, Robin Gross, Registered Professional Reporter, do hereby certify that the foregoing transcript, Volume I, is a true and accurate transcription of my stenographic notes taken on June 27, 1995.

Robin Gross

Registered Professional Reporter

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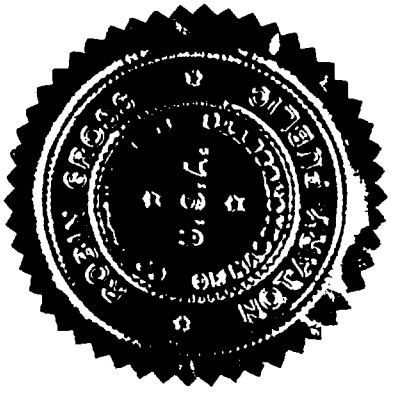

# APPENDIX D

# APPENDIX D - ADMINISTRATIVE RECORD INDEX

# Fort Devens

## Group 1A Sites
## Shepley's Hill Landfill Operable Unit
## Administrative Record File

## Index

Prepared for
New England Division
Corps of Engineers

by
ABB ENVIRONMENTAL SERVICES, INC.
107 Audubon Road, Wakefield, Massachusetts 01880 (617) 245-6606

# Introduction

This document is the Index to the Administrative Record File for Fort Devens Group 1A Shepley's Hill Landfill Operable Unit. Section I of the Index cites site-specific documents and Section II cites guidance documents used by U.S. Army staff in selecting a response action at the site. Some documents in this Administrative Record File Index have been cited but not physically included. 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.

The Administrative Record File is available for public review at EPA Region I's Office in Boston, Massachusetts, at the Fort Devens Environmental Management Office, Fort Devens, Massachusetts, and at the Ayer Town Hall, 1 Main Street, Ayer, Massachusetts. Supplemental/Addendum volumes may be added to this Administrative Record File. Questions concerning the Administrative Record should be addressed to the Fort Devens Base Realignment and Closure Office (BRAC).

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

Section I

Site-Specific Documents

# ADMINISTRATIVE RECORD FILE INDEX

for
Fort Devens Group 1A Site
Shepley's Hill Landfill Operable Unit

Compiled: September 29, 1995

## 1.0 Pre-Remedial

### 1.2 Preliminary Assessment

Cross Reference: The following Reports, Comments, and Responses to Comments (entries 1 through 6) are filed and cited as entries 1 through 6 in minor break 1.2 Preliminary Assessment of the Fort Devens Group 1A Administrative Record File Index.

Reports

1. "Final Master Environmental Plan for Fort Devens," Argonne National Laboratory (April 1992).
2. "Preliminary Zone II Analysis for the Production Wells at Fort Devens, MA, Draft Report", ETA Inc. (January 1994).

Comments

3. Comments Dated May 1, 1992 from Walter Rolf, Montachusett Regional Planning Commission on the April 1992 "Final Master Environmental Plan for Fort Devens," Argonne National Laboratory.
4. Comments Dated May 7, 1992 from James P. Byrne, EPA Region I on the April 1992 "Final Master Environmental Plan for Fort Devens," Argonne National Laboratory.
5. Comments Dated May 23, 1994 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the January 1994 "Preliminary Zone II Analysis for the Production Wells at Fort Devens, MA, Draft Report", ETA Inc.

Responses to Comments

6. Response Dated June 29, 1992 from Carrol J. Howard, Fort Devens to the May 7, 1992 Comments from James P. Byrne, EPA Region I.

3.0 Remedial Investigation (RI)

3.2 Sampling and Analysis Data

Reports

1. Cross Reference: "Method for Determining Background Concentrations - Inorganic Analytes in Soil and Groundwater - Fort Devens," ABB Environmental Services, Inc. (January 20, 1993) [Filed and cited as entry number 1 in minor break 3.2 Sampling and Analysis Data of the Fort Devens Group 1A Sites Administrative Record Index].

3.4 Interim Deliverables

The following Reports and Comments (entries 1 through 2) are filed and cited as entries 1 and 2 in minor break 3.4 of the Group 1A Administrative Record Index File.

Reports

1. "Final Ground Water Flow Model at Fort Devens," Engineering Technologies Associates, Inc. (May 24, 1993).

Comments

2. Comments Dated February 1, 1993 from James P. Byrne, EPA Region I and D. Lynne Chappell, Commonwealth of Massachusetts Department of Environmental Protection on the October 30, 1992 "Draft Final Ground Water Flow Model at Fort Devens," Engineering Technologies Associates, Inc.

3.5 Applicable or Relevant and Appropriate Requirements (ARARs)

Cross Reference: The following report (entries 2 and 3) are filed and cited as entries 1 and 2 in minor break 3.5 Applicable or Relevant and Appropriate Requirements (ARARs) of the Fort Devens Groups 3, 5, & 6 Sites Administrative Record Index unless otherwise noted below.

Reports

1. Cross Reference: "Draft Assessment of Chemical-Specific Applicable or Relevant and Appropriate Requirements (ARARs) for Shepley's Hill Landfill and Cold Spring Brook Landfill, Fort Devens, Massachusetts," U.S. Army Toxic and Hazardous Materials Agency (May 21, 1992). [Filed and cited as entry number 1 in

minor break 3.5 Applicable or Relevant and Appropriate Requirements (ARARs) of the Fort Devens Group 1A Sites Administrative Record File Index].

2. "Draft Applicable or Relevant and Appropriate Requirements (ARARs) for CERCLA Remedial Actions," U.S. Army Toxic and Hazardous Materials Agency (May 21, 1992).
3. "Draft Assessment of Location-Specific Applicable or Relevant and Appropriate Requirements (ARARs) for Fort Devens, Massachusetts," U. S. Army Toxic and Hazardous Materials Agency (September 1992).

3.6 Remedial Investigation (RI) Reports

Cross Reference: The following Reports, Comments, and Responses to Comments (entries 1 through 15) are filed and cited in minor break 3.6 Remedial Investigation (RI) Reports of the Group 1A Administrative Record Index unless otherwise noted below.

Reports

1. "Final Remedial Investigation Report, Group 1A - Volume I," Ecology and Environment, Inc. (April 1993).
2. "Final Remedial Investigation Report, Group 1A - Volume II," Ecology and Environment, Inc. (April 1993).
3. "Final Remedial Investigation Addendum Report - Volume I, "ABB Environmental Services, Inc. (December 1993)
4. "Final Remedial Investigation Addendum Report - Volume II, "ABB Environmental Services, Inc. (December 1993)
5. "Final Remedial Investigation Addendum Report - Volume III, "ABB Environmental Services, Inc. (December 1993)
6. "Final Remedial Investigation Addendum Report - Volume IV, "ABB Environmental Services, Inc. (December 1993)

Comments

7. Comments Dated February 8, 1993 from James P. Byrne, EPA Region I on the December 1992 "Draft Final Remedial Investigations Report," Ecology and Environment, Inc.
8. Comments Dated February 11, 1993 from D. Lynne Chappell, Commonwealth of Massachusetts Department of Environmental Protection on the December 1992 "Draft Final Remedial Investigations Report," Ecology and Environment, Inc.
9. Comments Dated June 1, 1993 from James P. Byrne, EPA Region I on the April 1993 "Final Remedial Investigation Report, Group 1A - Volume I-II," Ecology and Environment, Inc.

10. Comments Dated June 18, 1993 from D. Lynne Chappell, Commonwealth of Massachusetts Department of Environmental Protection on the April 1993 "Final Remedial Investigation Report, Group 1A - Volume I-II," Ecology and Environment, Inc.
11. Comments Dated September 2, 1993 from James P. Byrne, EPA Region I on the July 26, 1993 "Draft Remedial Investigation Addendum Report," ABB Environmental Services, Inc.
12. Comments Dated September 9, 1993 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the July 26, 1993 "Draft Remedial Investigation Addendum Report," ABB Environmental Services, Inc.
13. Comments Dated January 21, 1994 from Molly Elder, Commonwealth of Massachusetts Department of Environmental Protection on the December 21, 1993 "Final Remedial Investigation Addendum Report'" ABB Environmental Services, Inc.
14. Comments Dated February 15, 1994 from James P. Byrne, EPA Region I on the December 21, 1993 "Final Remedial Investigation Addendum Report," ABB Environmental Services, Inc.

Responses to Comments

15. Responses Dated December 21, 1994 from U.S. Army Environmental Center on the following document: "Draft Remedial Investigation Addendum Report," ABB Environmental Services, Inc.

3.7 Work Plans and Progress Reports

Cross Reference: The following Reports, Comments, and Responses to Comments (entries 1 through 3) are filed and cited in minor break 3.7 Work Plans and Progress Reports of the Group 1A Administrative Record Index unless otherwise noted below.

Reports

1. "Final Work Plan and Field Sampling Plan - Remedial Investigation," Ecology and Environment, Inc. (February 1992).

Comments

2. Letter from Carrol J. Howard, Fort Devens to D. Lynne Chappell, Commonwealth of Massachusetts Department of Environmental Protection (March 3, 1992). Concerning confirmation that the state is waiving its right to comment on the February 1992 "Final Work Plan and Field Sampling Plan - Remedial Investigation," Ecology and Environment, Inc.

3. Letter from James P. Byrne, EPA Region I to F. Timothy Prior, Fort Devens (March 19, 1992). Concerning approval of the February 1992 "Final Work Plan and Field Sampling Plan - Remedial Investigation," Ecology and Environment, Inc.

4.0 Feasibility Study (FS)

4.1 Correspondence

Cross Reference: The following Letters and Comments (entries 1 and 2) are filed and cited as entries 1 and 2 in minor break 4.1 Correspondence of the Fort Devens Group 1A Sites Administrative Record Index.

Letters

1. Letter Dated July 25, 1994 from James C. Chambers, Department of the Army, Headquarters Fort Devens, Brac Environmental Coordinator, on the Army's proposed triggers for implementing contingency remedial actions at the Shepley's Hill Landfill Operable Unit at Fort Devens.

Comments

2. Comments Dated August 16, 1994 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the Letter Dated July 25, 1994 from James C. Chambers on the Contingency Thresholds for Alternative SHL-2 at Shepley's Hill Landfill.

4.4 Interim Deliverables

Cross Reference: The following documents (entries 1 through 4) are filed and cited as entries 1 through 4 in minor break 4.4 Interim Deliverables of the Group 1A Sites Administrative Record File Index.

Reports

1. "Draft Alternatives Screening Report," ABB Environmental Services, Inc. (July 26, 1993).

Comments

2. Comments Dated September 2, 1993 from James P. Byrne, EPA Region I on the July 26, 1993 "Draft Alternatives Screening Report." ABB Environmental Services, Inc.

3. Comments Dated September 9, 1993 and September 20, 1993 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the July 26, 1993 "Draft Alternatives Screening Report." ABB Environmental Services, Inc.

Responses to Comments

4. Responses Dated March 18, 1994 from U.S. Army Environmental Center on the following document: Draft Alternatives Screening Report, dated July 26, 1993.

4.6 Feasibility Study (FS) Reports

Cross Reference: The following Letters, Reports, Comments, Responses to Comments and Responses to Responses to Comments (entries 1 through 16) are filed and cited in minor break 4.6 Feasibility Study (FS) Reports of the Fort Devens Group 1A Sites Administrative Record Index.

Reports

1. "Draft Feasibility Study Shepley's Hill Landfill Operable Unit," ABB Environmental Services, Inc. (March 18, 1994).
2. "Revised Draft Feasibility Study, Shepley's Hill Landfill Operable Unit, Fort Devens Feasibility Study for Group 1A Sites," ABB Environmental Services, Inc. (September 1994).
3. "Revised Draft Shepley's Hill Groundwater Operable Unit Feasibility Study and Contingency Triggers," (Letter Dated November 30, 1994 from Major Pease).
4. "Final Feasibility Study Shepley's Hill Landfill Operable Unit, Fort Devens Feasibility Study for Group 1A Sites," ABB Environmental Services, Inc. (February 1995).

Comments

5. Comments Dated April 28, 1994 form James P. Byrne, EPA Region I on the March 18, 1994 "Draft Feasibility Study Shepley's Hill Landfill Operable Unit," (ABB Environmental Services, Inc.).
6. Comments Dated May 5, 1994 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the March 18, 1994 "Draft Feasibility Study Shepley's Hill Landfill Operable Unit," (ABB Environmental Services, Inc. ).
7. Comments Dated November 10, 1994 from James P. Byrne, USEPA, on the "Revised Draft Feasibility Study for Shepley's Hill Landfill Operable Unit," (ABB Environmental Services, Inc.).

8. Comments Dated November 15, 1994 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the September 1994 "Revised Draft Feasibility Study. Shepley's Hill Landfill Operable Unit," (ABB Environmental Services, Inc.).
9. Comments Dated January 11, 1995 from James P. Byrne, USEPA, on the "Revised Draft Feasibility Study for Shepley's Hill Landfill Operable Unit," ABB Environmental Services, Inc.
10. Comments Dated January 11, 1995 from James P. Byrne, USEPA, on the Proposed Feasibility Study Language For Alternative SHL-2, Shepley's Hill Landfill Source Control Operable Unit.
11. Comments Dated January 23, 1995 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the November 30, 1994 "Revised Draft Shepley's Hill Groundwater Operable Unit Feasibility Study and Contingency Triggers".
12. Comments Dated March 27, 1995 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the "Final Feasibility Study, Shepley's Hill Landfill Operable Unit," (ABB Environmental Services, Inc.).

Responses to Comments

13. Responses Dated September 1994 from U.S. Army Environmental Center on the following document: Draft Feasibility Study Shepley's Hill Landfill Operable Unit, Feasibility Study For Group 1A Sites, Fort Devens, Massachusetts.
14. Responses Dated February 1995 from U.S. Army Environmental Center on the following document: revised Draft Feasibility Study Shepley's Hill Landfill Operable Unit, Feasibility Study for Group 1A Sites, Fort Devens, Massachusetts.

Responses to Responses to Comments

15. Rebuttal Dated November 15, 1994 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the Responses to Comments on the Draft Feasibility Study, Shepley's Hill Landfill Operable Unit.
16. Responses Dated June 1995 from U.S. Army Environmental Center on the following documents: Final Feasibility Study, Draft Proposed Plan and Draft Fact Sheet Shepley's Hill Landfill Operable Unit.

4.7 Work Plans and Progress Reports

Cross Reference: The following Reports, Comments, and Responses to Comments (entries 1 through 10) are filed and cited in minor break 4.7 Work Plans and Progress Reports of the Fort Devens Group 1A Sites Administrative Record Index unless otherwise noted below.

Reports

1. "Final Feasibility Study Work Plan," ABB Environmental Services, Inc. (August 1992).
2. "Final Data Gap Activity Work Plan," ABB Environmental Services, Inc. (March 31, 1993).

Comments

3. Comments Dated September 14, 1992 from James P. Byrne, EPA Region I on the August 1992 "Final Feasibility Study Work Plan," ABB Environmental Services, Inc.
4. Comments Dated September 21, 1992 from D. Lynne Chappell, Commonwealth of Massachusetts Department of Environmental Protection on the August 1992 "Final Feasibility Study Work Plan," ABB Environmental Services, Inc.
5. Comments Dated January 11, 1993 from James P. Byrne, EPA Region I on the December 1992 "Draft Final Data Gap Activities Work Plan," ABB Environmental Services, Inc.
6. Comments Dated January 20, 1993 from D. Lynne Chappell, Commonwealth of Massachusetts Department of Environmental Protection on the December 1992 "Draft Final Data Gap Activities Work Plan," ABB Environmental Services, Inc.
7. Comments Dated February 17, 1993 from James P. Byrne, EPA Region I and D. Lynne Chappell, Commonwealth of Massachusetts Department of Environmental Protection on the December 1992 "Draft Final Data Gap Activities Work Plan," ABB Environmental Services, Inc.
8. Comments Dated April 21, 1993 and April 26, 1993 from James P. Byrne, EPA Region I on the March 31, 1993 "Final Data Gap Activity Work Plan," ABB Environmental Services, Inc.
9. Comments Dated May 13, 1993 from D. Lynne Chappell on the March 31, 1993 "Final Data Gap Activity Work Plan," ABB Environmental Services, Inc.

Responses to Comments

10. Responses Dated May 1993 from U.S. Army Environmental Center on the following document: Final Data Gap Activity Work Plan, dated March 31, 1993.

4.9 Proposed Plan for Selected Remedial Action

1. Cross Reference: "Draft Proposed Plan, Shepley's Hill Landfill AOCs 4,5, & 18, Fort Devens, Massachusetts," ABB Environmental Services, Inc. (February 1995). [Filed and cited as entry number 1 in minor break 4.9 Proposed Plan for Selected Remedial Action in the Fort Devens Group 1A Sites Administrative Record File Index.]
2. Cross Reference: "Proposed Plan, Shepley's Hill Landfill AOCs 4, 5, & 18, Fort Devens, Massachusetts," ABB Environmental Services, Inc. (May 1995). [Filed and cited as entry number 2 in minor break 4.9 Proposed Plan for Selected Remedial Action in the Fort Devens Group 1A Sites Administrative Record File Index.]

Comments

3. Cross Reference: Comments Dated March 30, 1995 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the February 1995 "Draft Proposed Plan, Shepley's Hill Landfill," (ABB Environmental Services, Inc.). [Filed and cited as entry number 3 in minor break 4.9 Proposed Plan for Selected Remedial Action in the Fort Devens Group 1A Sites Administrative Record File Index.]
4. Cross Reference: Comments Dated July 17, 1995 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the May 1995 Proposed Plan for Shepley's Hill Landfill Operable Unit, Fort Devens, Massachusetts (ABB Environmental Services, Inc.).

Responses to Comments

5. Cross Reference: Responses Dated June 1995 from U.S. Army Environmental Center on the following documents: Final Feasibility Study, Draft Proposed Plan and Draft Fact Sheet Shepley's Hill Landfill Operable Unit. [Filed and cited as entry number 19 in minor break 4.6 Proposed Plan for Selected Remedial Action in the Fort Devens Group 1A Sites Administrative Record File Index.]

## 5.0 Record of Decision

Cross Reference: The following Reports, Comments, and Responses to Comments (entries 1 through 6) are filed and cited in minor break 5.4 Record of Decision of the Fort Devens Group 1A Sites Administrative Record Index unless otherwise noted below.

### 5.4 Record of Decision

Reports

1. "Draft Record of Decision Shepley's Hill Landfill Operable Unit, Fort Devens, Massachusetts", ABB Environmental Services, Inc. (July 1995).
2. "Revised Draft Record of Decision Shepley's Hill Landfill Operable Unit, Fort Devens, Massachusetts", ABB Environmental Services, Inc. (August 1995).
3. "Final Record of Decision Shepley's Hill Landfill Operable Unit, Fort Devens, Massachusetts", ABB Environmental Services, Inc. (September 1995).

Comments

4. Comments Dated August 17, 1995 from James P. Byrne, USEPA Region I on the July 1995 Draft Record of Decision for Shepley's Hill Landfill Operable Unit, Fort Devens, Massachusetts (ABB Environmental Services, Inc.).
5. Comments Dated August 18, 1995 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the July 1995 Draft Record of Decision, Shepley's Hill Landfill Operable Unit, Fort Devens, Massachusetts (ABB Environmental Services, Inc.).
6. Comments Dated September 13, 1995 from James P. Byrne, USEPA Region I on the August 1995 Revised Draft Record of Decision Shepley's Hill Landfill Operable Unit, Fort Devens, Massachusetts (ABB Environmental Services, Inc.).

6.0 Remedial Design (RD)

6.6 Work Plans and Progress Reports

Cross Reference: The following Reports and Comments (entries 1 through 3) are filed and cited in minor break 6.6 Remedial Design (RD) Work Plans and Progress Reports of the Fort Devens Group 1A Sites Administrative Record Index unless otherwise noted below.

Reports

1. "Final Delivery Order Work Plan for Predesign Investigations, Areas of Contamination (AOCs) 4, 5, & 18 Shepley's Hill Landfill, Fort Devens, Massachusetts," Stone & Webster Environmental Technology & Services (June 1995).

Comments

2. Comments Dated July 11, 1995 from James P. Byrne, USEPA Region I on the June 1995 Final Delivery Order Work Plan for Predesign Investigations Shepley's Hill Landfill, Fort Devens, Massachusetts" (Stone & Webster Environmental Technology & Services).
3. Comments Dated July 26, 1995 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the June 1995 Final Delivery Order Work Plan, Areas of Contamination (AOCs) 4, 5, & 8, Shepley's Hill Landfill

10.0 Enforcement

10.16 Federal Facility Agreements

1. Cross Reference: "Final Federal Facility Agreement Under CERCLA Section 120," EPA Region I and U.S. Department of the Army (November 15, 1991) with attached map [Filed and cited as entry number 1 in minor break 10.16 Federal Facility Agreements of the Fort Devens Group 1A Sites Administrative Record Index].

13.0 Community Relations

13.2 Community Relations Plans

Reports

1. Cross Reference: "Final Community Relations Plan," Ecology and Environment, Inc. (February 1992) [Filed and cited as entry number 1 in minor break 13.2 Community Relations Plans of the Fort Devens Group 1A Sites Administrative Record Index].
2. Cross Reference: "Fort Devens Community Relations Plan for Environmental Restoration, 1995 Update," ABB Environmental Services, Inc. (May 1995). [Filed and cited as entry number 2 in minor break 13.2 Community Relations Plans of the Fort Devens Group 1A Sites Administrative Record Index].

Comments

3. Cross Reference: Letter from James P. Byrne, EPA Region I to F. Timothy Prior, Fort Devens (March 19, 1992). Concerning approval of the February 1992 "Final Community Relations Plan," Ecology and Environment, Inc. [Filed and cited as entry number 2 in minor break 13.2 Community Relations Plans of the Fort Devens Group 1A Sites Administrative Record Index].
4. Cross Reference: Comments Dated July 17, 1995 from James P. Byrne, USEPA, Region I, on the May 1995 Fort Devens Community Relations Plan for Environmental Restoration, 1995 Update (ABB Environmental Services, Inc.). [Filed and cited as entry number 4 in minor break 13.2 Community Relations Plans of the Fort Devens Group 1A Sites Administrative Record Index].

13.5 Fact Sheets

1. Cross Reference: "Shepley's Hill Landfill Draft Fact Sheet, Fort Devens, Massachusetts," ABB Environmental Services, Inc. (February 1995). [Filed and cited as entry number 1 in minor break 13.5 Fact Sheets of the Group 1A Sites Administrative Record File Index.]
2. Cross Reference: "Fact Sheet 2, Shepley's Hill Landfill Proposed Plan, Fort Devens, Massachusetts Environmental Restoration Program," ABB Environmental Services, Inc. (May 1995). [Filed and cited as entry number 2 in minor break 13.5 Fact Sheets of the Group 1A Sites Administrative Record File Index.]

Comments

3. Cross Reference: Comments Dated March 30, 1995 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the February 1995 "Shepley's Hill Landfill Draft Fact Sheet, Fort Devens, Massachusetts," (ABB Environmental Services, Inc.). [Filed and cited as entry number 3 in minor break 13.5 Fact Sheets of the Group 1A Sites Administrative Record File Index.]

Responses to Comments

4. Cross Reference: Responses Dated June 1995 from U.S. Army Environmental Center on the Final Feasibility Study, Draft Proposed Plan and the Draft Fact Sheet, Shepley's Hill Landfill Operable Unit, Fort Devens, Massachusetts. [Filed and cited as entry number 19 in minor break 4.6 Feasibility Study Reports of the Group 1A Sites Administrative Record File Index.]

13.11 Technical Review Committee Documents

Cross Reference: The following Reports, Comments, and Responses to Comments (entries 1 through 8) are filed and cited in minor break 13.11 Technical Review Committee Documents of the Group 1A Administrative Record Index unless otherwise noted below.

1. Technical Review Committee Meeting Agenda and Summary (March 21, 1991).
2. Technical Review Committee Meeting Agenda and Summary (June 27, 1991).
3. Technical Review Committee Meeting Agenda and Summary (September 17, 1991).
4. Technical Review Committee Meeting Agenda and Summary (December 11, 1991).
5. Technical Review Committee Meeting Agenda and Summary (March 24, 1992).
6. Technical Review Committee Meeting Agenda and Summary (June 23, 1992).
7. Technical Review Committee Meeting Agenda and Summary (September 29, 1992).
8. Technical Review Committee Meeting Agenda and Summary (January 5, 1993).

17.0 Site Management Records

17.6 Site Management Plans

Cross-Reference: The following Reports, Comments, and Responses to Comments (entries 1 through 9) are filed and cited in minor break 17.6 Site Management Records of the Groups 3, 5, & 6 Administrative Record Index unless otherwise noted below.

Reports

1. "Final Quality Assurance Project Plan," Ecology and Environment, Inc. (November 1991).
2. "General Management Procedures, Excavated Waste Site Soils, Fort Devens, Massachusetts," ABB Environmental Services, Inc. (January 1994).
3. "Final Project Operations Plan, Fort Devens, Massachusetts", ABB Environmental Services, Inc. (May 1995).
4. "Project Operations Plan, Fort Devens, Massachusetts," ABB Environmental Services, Inc. (June 1995).

Comments

5. Cross Reference: Comments from James P. Byrne, EPA Region I on the November 1991 "Final Quality Assurance Project Plan," Ecology and Environment, Inc. [These Comments are filed and cited as a part of entry number 8 in the Responses to Comments section of this minor break].
6. Comments Dated December 16, 1993 from Molly J. Elder, Commonwealth of Massachusetts Department of Environmental Protection on the November 1993 "Draft General Management Procedures, Excavated Waste Site Soils, Fort Devens, Massachusetts," ABB Environmental Services, Inc.
7. Comments Dated December 27, 1993 from James P. Byrne, EPA Region I on the November 1993 "Draft General Management Procedures, Excavated Waste Site Soils, Fort Devens, Massachusetts," ABB Environmental Services, Inc. [Filed and cited as entry number 4 in minor break 4.4 Interim Deliverables of the AOCs 44/52 Administrative Record Index.]
8. Comments Dated March 11, 1994 from D. Lynne Welsh, Commonwealth of Massachusetts Department of Environmental Protection on the January 1994 "General Management Procedures, Excavated Waste Site Soils, Fort Devens, Massachusetts," ABB Environmental Services, Inc.

Responses to Comments

9. Cross-Reference: U. S. Army Environmental Center Responses to Comments on the following documents: Feasibility Study Report; Biological Treatability Study Report; Feasibility Study Report - New Alternative 9; Draft General Management Procedures Excavated Waste Site Soils; and Draft Siting Study Report, dated January 25, 1994. [These Responses to Comments are filed and cited as a part of entry number 7 in the Responses to Comments section of minor break 4.4 Interim Deliverables of the AOCs 44/52 Administrative Record Index.]

Responses to Comments

10. Response from Fort Devens to Comments from James P. Byrne, EPA Region I on the November 1991 "Final Quality Assurance Project Plan," Ecology and Environment, Inc.
11. Cross-Reference: U.S. Army Environmental Center Responses to Comments for the following documents: Final Feasibility Study Report; Draft Proposed Plan; Revised Draft Proposed Plan; Draft Excavated Soils Management Plan; Final General Management Procedures Excavated Waste Site Soils; and Biological Treatability Study Report, dated May 1994. [These Responses to Comments are filed and cited as entry number 8 in the Responses to Comments section of minor break 4.4 Interim Deliverables of the AOCs 44/52 Administrative Record Index.]

17.9 Site Safety Plans

Cross Reference: The following Reports and Comments (entries 1 through 3) are filed and cited as entries 1 through 3 in minor break 17.9 Site Safety Plans of the Group 1A Sites Administrative Record File Index unless otherwise noted below.]

Reports

1. "Final Health and Safety Plan," Ecology and Environment, Inc. (November 1991).

Comments

2. Cross Reference: Comments from James P. Byrne, EPA Region I on the November 1991 "Final Health and Safety Plan," Ecology and Environment, Inc. [These Comments are filed and cited as a part of entry number 8 in minor break 17.6 Site Management Plans of the Group 1A Sites Administrative Record File Index].

Responses to Comments

3. Response from Fort Devens to Comments from James P. Byrne, EPA Region I on the November 1991 "Final Health and Safety Plan," Ecology and Environment, Inc.
Reports

# Section II

## Guidance Documents

## GUIDANCE DOCUMENTS

The following guidance documents were relied upon during the Fort Devens cleanup. These documents may be reviewed, by appointment only, at the Environmental Management Office at Fort 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 Monitoring Well, 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: QAMS-005/80, 1983.
8. 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 9355.3-01, EPA/540/3-89/004, 1986.
9. U.S. Environmental Protection Agency. Test Methods for Evaluating Solid Waste: EPA SW-846 Third Edition, September 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/540/1-89/002), 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.

# APPENDIX E

# APPENDIX E - DECLARATION OF STATE CONCURRENCE

Commonwealth of Massachusetts
Executive Office of Environmental Affairs
**Department of Environmental Protection**
Central Regional Office

William F. Weld
Governor
Trudy Coxe
Secretary, EOEA
David B. Struhs
Commissioner

September 18, 1995

Mr. John De Villars
Regional Administrator
U.S. Environmental Protection Agency
Region I
JFK Federal Building
Boston, MA 02203

RE: ROD Concurrence, Shepley's Hill Landfill, AOCs 4, 5 and 18, Fort Devens, MA

Dear Mr. De Villars:

The Massachusetts Department of Environmental Protection (MADEP) has reviewed the preferred remedial alternative recommended by the Army and the EPA for the final cleanup of the Shepley's Hill Landfill, the core provisions of which are summarized below. The MADEP has worked closely with the Army and EPA in the development of the preferred alternative and is pleased to concur with the Army's choice of the remedial alternative.

The MADEP has evaluated the preferred alternative for consistency with M.G.L. c. 21E (21E) and the Massachusetts Contingency Plan (MCP). The remedial alternative addresses the entire landfill as one operable unit and includes the following components:

- Completion of any outstanding closure requirements identified under 310 CMR 19.000;
- Survey of Shepley's Hill Landfill;
- Evaluation/improvement of stormwater diversion and drainage;
- Landfill cover maintenance;
- Long-term groundwater and landfill gas monitoring;
- Institutional controls;
- Educational programs;

- Design of groundwater extraction system;
- Annual reporting to MADEP and USEPA; and
- Five-year site reviews.

The MADEP's concurrence with the preferred remedial alternative is based upon the expectation that it will result in a permanent solution as defined in 21E and the MCP and that contaminant concentrations achieved during the implementation of the remedial alternative will meet the MCP standards.

The MADEP would like to thank EPA, in particular the Fort Devens Remedial Project Manager, Jim Byrne, for their efforts to ensure that the Massachusetts environmental requirements were met in the selection of the remedial alternative. We look forward to continuing to work with EPA in the implementation of the remedial alternative. If you have any questions, please contact Lynne Welsh at (508) 792-7653, ext. 3851.

Sincerely,

Cornelius J. O'Leary
Regional Director
MADEP, CERO

cc: Fort Devens Mailing List (cover letter only)
Edward Kunce, MADEP
Jay Naparstek, MADEP
Informational Repositories
Jim Byrne, EPA
Charles George, AEC
Mark Applebee, ACOE
Judy Kohn, Mass Land Bank

# APPENDIX F

# APPENDIX F - GLOSSARY OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AOC | Area of Contamination |
| ARAR | Applicable or Relevant and Appropriate Requirement |
| AWQC | Ambient Water Quality Criteria |
| BRAC | Base Realignment and Closure Act |
| CAC | Citizen's Advisory Committee |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| CMR | Code of Massachusetts Regulations |
| 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 |
| DRMO | Defense Reutilization and Marketing Office |
| FS | Feasibility Study |
| HI | Hazard Index |
| IAG | Interagency Agreement |
| IRP | Installation Restoration Program |
| MADEP | Massachusetts Department of Environmental Protection |
| MCL | Maximum Contaminant Level |
| MEP | Master Environmental Plan |
| MGD | million gallons per day |
| MMCL | Massachusetts Maximum Contaminant Level |
| NPL | National Priorities List |
| NCP | National Contingency Plan |
| NPDES | National Pollutant Discharge Elimination System |
| PCB | polychlorinated biphenyl |
| POTW | publicly owned treatment works |
| ppb | parts per billion |
| PVC | polyvinyl chloride |

## GLOSSARY OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| RAB | Restoration Advisory Board |
| RCRA | Resource Conservation and Recovery Act |
| RfD | Reference Dose |
| RI | remedial investigation |
| SA | Study Area |
| SARA | Superfund Amendments and Reauthorization Act of 1986 |
| SVOC | semivolatile organic compound |
| TAL | Target Analyte List |
| TCL | Target Compound list |
| TOC | total organic carbon |
| TRC | Technical Review Committee |
| µg/L | micrograms per liter |
| USAEC | U.S. Army Environmental Center |
| USEPA | U.S. Environmental Protection Agency |
| VOC | volatile organic compound |