Fort Devens, Massachusetts

FINAL PROPOSED PLAN

Barnum Road Maintenance Yards
AOCs 44 & 52

May 1994

ARMY PROPOSES CLEANUP PLAN FOR FORT DEVENS VEHICLE MAINTENANCE YARDS

The Army, in coordination with the U.S. Environmental Protection Agency (USEPA), is proposing a **cleanup** plan, referred to as a preferred alternative, to address **Areas of Contamination** (AOCs) at the vehicle maintenance yards off Barnum Road at Fort Devens, Massachusetts. The proposed cleanup is focused on soils (above the **groundwater**) which have been contaminated by releases of gasoline, motor oil, and other automotive fluids and includes two "**hot spots**": the soils associated with a reported release of "**mogas**" (motor vehicle gasoline) in 1985, and soils associated with leakage from a 1,000-gallon underground waste oil storage tank which was removed in May 1992. The Proposed Plan combines cleanup options recommended from among those that were evaluated during the **Site Investigation** (SI), **Supplemental Site Investigation** (SSI) and **Feasibility Study** (FS) performed for the AOCs. In accordance with Section 117(a) of the **Comprehensive Environmental Response, Compensation, and Liability Act** (CERCLA), the Army is publishing this Proposed Plan to provide opportunity for public review and comment on the cleanup alternatives, known as **remedial alternatives**, under consideration for the AOCs. The Army will consider public comments as part of the final decision-making process for selecting the cleanup remedy for the AOCs.

The Army's Preferred Alternative consists of multiple components dealing with the control of contaminants from fuel-related releases in unsaturated soils above the groundwater table in the maintenance yards. The following components make up the Preferred Alternative: 1) excavate contaminated soils in the Cannibalization Yard associated with releases from the former underground waste oil storage tank; 2) excavate

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Note: Words that appear in bold in this document are defined in the glossary.

contaminated soils in the Cannibalization Yard associated with the release of fuel from the mogas spill; 3) excavate the top two feet of soil throughout all the maintenance yards to remove soil contaminated by **crankcase** and other automotive releases; 4) place excavated soils in piles at the site for sampling and analysis; 5) **cold mix asphalt batch** soils which exceed site cleanup levels; 6) **backfill** excavations with stockpiled soil not found to be contaminated above site cleanup levels and with the cold mix asphalt batched material; 7) construct a pavement **wearing course** over the site; 8) sample groundwater **monitoring wells** for a period of five years following commencement of remedial activities; and 9) institute deed restrictions to prohibit removal of the top 2 feet of soil or asphaltic barrier. The Preferred Alternative is described in greater detail on pages 12 through 14 of this document.

This Proposed Plan:

1. Explains the opportunities for the public to comment on the remedial alternatives,

2. Includes a brief history of the AOCs and the principal findings of site investigations,

3. Provides a brief description of the Preferred Alternative and other alternatives evaluated in the FS,

4. Outlines the criteria used by the Army to propose an alternative for use at the AOCs and briefly analyzes whether the alternatives meet each criteria, and

5. Presents the Army's rationale for its preliminary selection of the Preferred Alternative.

To help the public participate in reviewing the cleanup options for the AOCs, this document also includes information about where interested citizens can find more detailed descriptions of the remedy process and the alternatives under consideration for AOCs 44 & 52 at Fort Devens.

THE PUBLIC'S ROLE IN EVALUATING REMEDIAL ALTERNATIVES

Public Informational Meeting

The Army will hold a public informational meeting on May 24, 1994 at 7:00 p.m. at the Fort Devens Club (Building 74) to describe the preferred alternative and other

alternatives evaluated in the Feasibility Study. The public is encouraged to attend the meeting to hear the presentation and to ask questions.

Public Comment Period

The Army is conducting a 30-day comment period from May 25 to June 24, 1994, to provide an opportunity for public involvement in the final cleanup decision. During the comment period, the public is invited to review this Proposed Plan, the SI Report, the FS Report, and the **Excavated Soils Management Plan (ESMP)** located at the public information repositories at the libraries in Ayer, Shirley, Lancaster, Harvard, and at Fort Devens.

Public Hearing

The Army will hold a formal public hearing on the Proposed Plan on June 15, 1994 at 7:00 p.m. at the Fort Devens Club followed by an informal question and answer period. During the formal public hearing, the public can provide oral or written comments on the proposed cleanup plan. Comments made at the hearing will be transcribed. A copy of the transcript will be added to the Fort Devens Administrative Record. The Administrative Record contains documents used by the Army to choose a remedy for the AOCs. This is made available to the public at the information repository locations listed on page 4.

Written Comments

If, after reviewing the information on the AOCs, you would like to comment in writing on the Army's Preferred Alternative, any of the other cleanup alternatives under consideration, or other issues relevant to the cleanup, please deliver your comments to the Army at the Public Hearing or mail your written comments (postmarked no later than June 24, 1994) to:

Mr. James C. Chambers, BRAC Environmental Coordinator
AFZD-EM-BEC
P.O. Box 1
Fort Devens, MA 01433
(508) 796-3114

Army's Review of Public Comment

The Army will review comments received from the public as part of the process of reaching a final decision on the most appropriate remedial alternative, or combination of alternatives, for cleanup of the Barnum Road Maintenance Yards. The Army's final choice of a remedy will be issued in a **Record of Decision (ROD)** for the AOCs this

summer. A Responsiveness Summary, a document that summarizes the Army's responses to comments received during the public comment period, will be issued with the ROD. Once the ROD is signed by the Deputy Assistant Secretary of the Army (Environment, Safety, and Occupational Health), the Fort Devens Installation Commander, and the USEPA Regional Administrator, it will become part of the Administrative Record.

Additional Public Information

Because this Proposed Plan provides only a summary description of the investigation of the AOCs and the cleanup alternatives considered, the public is encouraged to consult the Administrative Record, which contains the SI and FS reports, and other site documents, for a more detailed explanation of the AOCs and all of the remedial alternatives under consideration. The Administrative Record is available at the following locations:

Fort Devens Base Realignment and Closure Environmental Office
Building P12
Fort Devens, MA 01433
(508) 796-3114 (Mr. James C. Chambers)
Hours: Monday-Friday: 9:00 a.m. - 4:00 p.m.

Ayer Town Hall
Main Street
Ayer, MA 01432
(508) 772-8220 (Mr. Tim Higgins)
Hours: Monday-Friday: 9:00 a.m. - 4:00 p.m.

SITE HISTORY

AOCs 44 and 52 (collectively referred to as the Maintenance Yards in this Proposed Plan) are located on Barnum Road approximately one-half mile past the Barnum Gate on the Main Post (Figure 1). The total area of the Maintenance Yards is approximately 8.8 acres (Figure 2). The area is fenced and presently used for vehicle storage. AOC 44 is known as the Cannibalization Yard. It is an unpaved area where vehicles are stored before being dismantled for usable parts. Historically, 55-gallon drums of waste oil were also stored in the yard. AOC 52 is an unpaved maintenance yard where vehicles are stored while awaiting repairs. It was previously known as the TDA (Table of Distribution and Allowances) Maintenance Yard. Northwest of the Cannibalization Yard is a separately fenced vehicle storage yard known as the Regional Training Site - Maintenance (RTS) Yard. An area that is fenced-off southeast of the main portion of the TDA Maintenance Yard is known as the K-Yard.

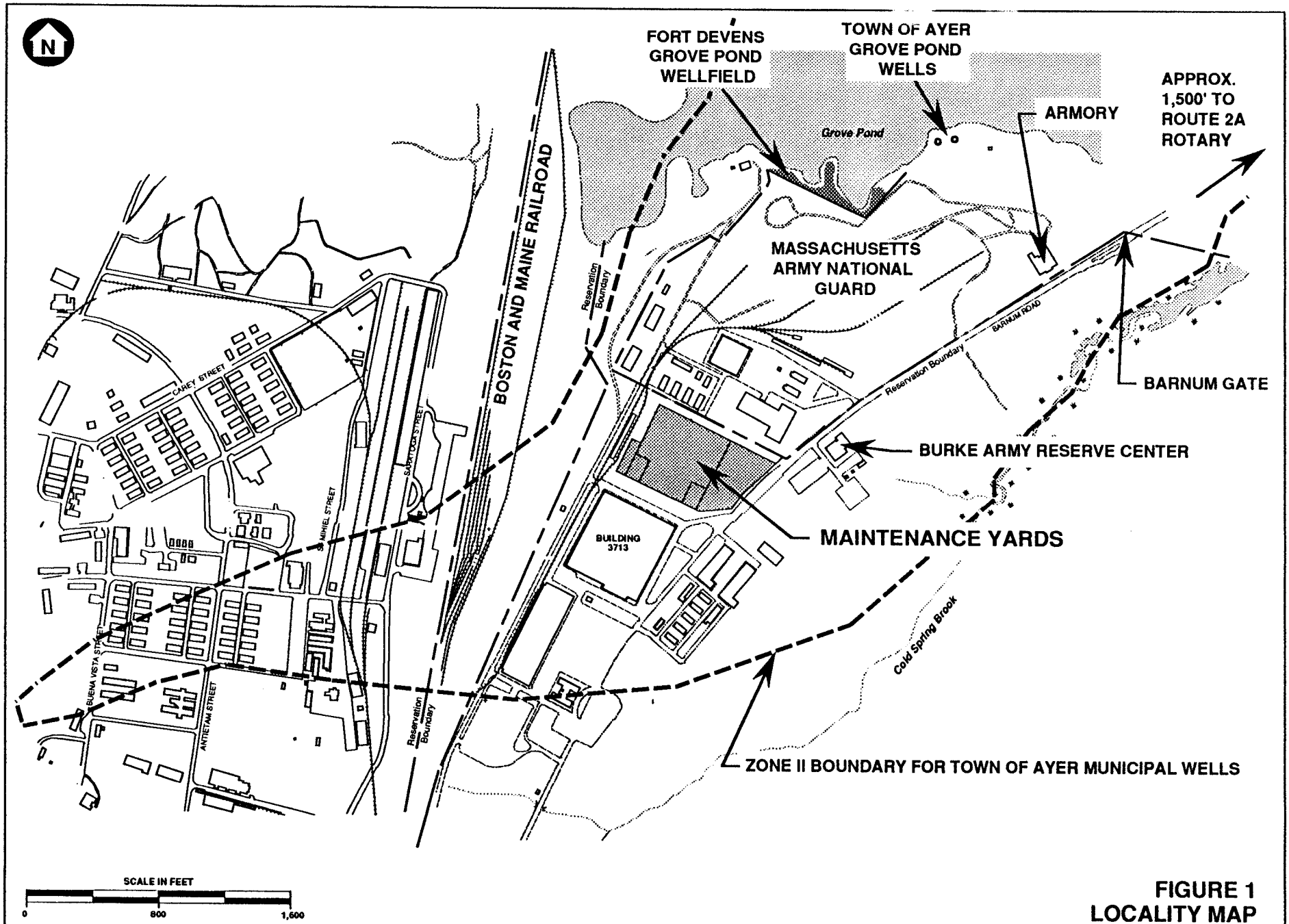

FIGURE 1
LOCALITY MAP
MAINTENANCE YARDS
FORT DEVENS, MA

ABB Environmental Services, Inc.

6917-07(I)

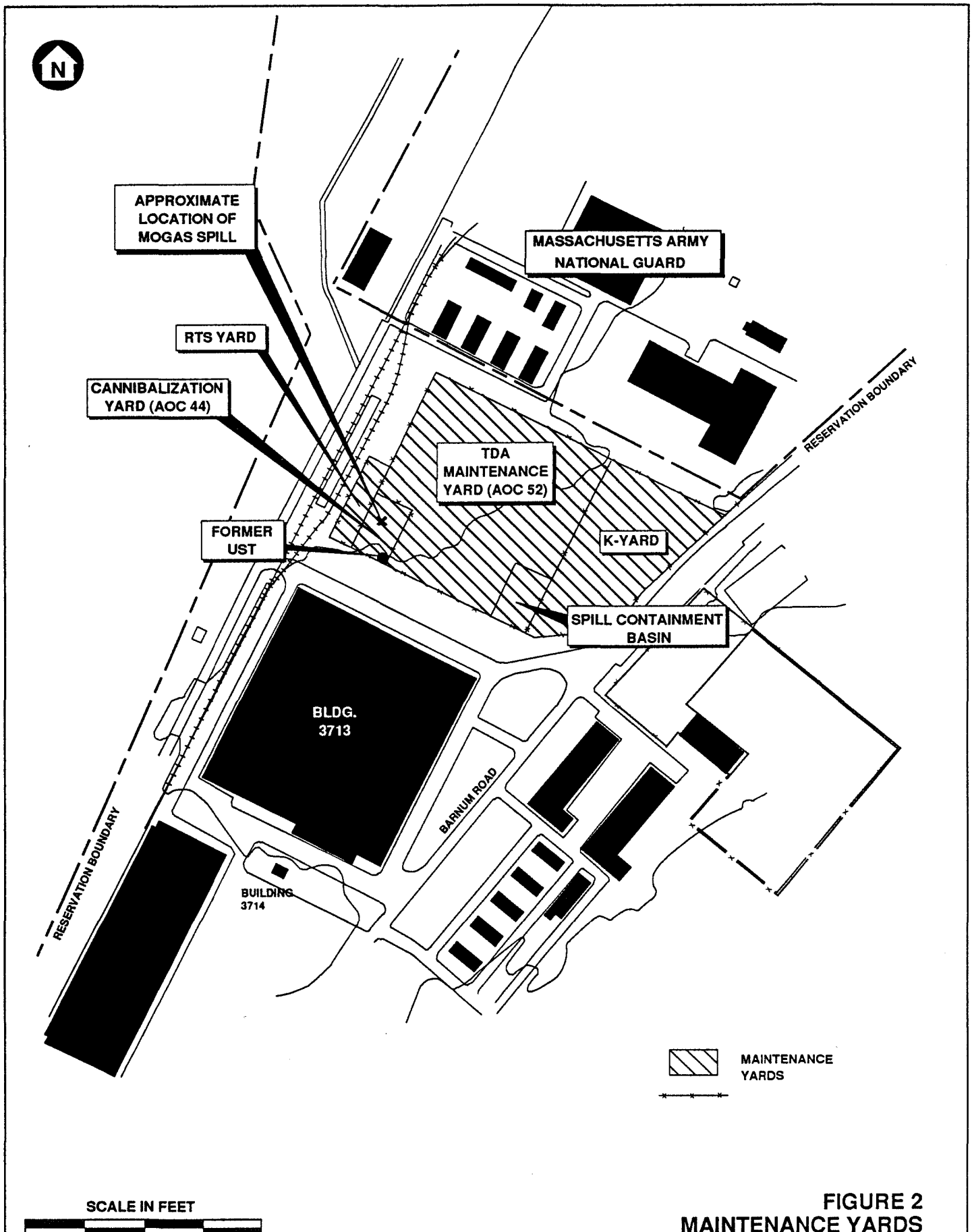

FIGURE 2
MAINTENANCE YARDS
FORT DEVENS, MA

ABB Environmental Services, Inc.

All four of these yards are unpaved and have a long and continuing history of vehicle storage; hence at the direction of the Army, they have all been included as AOCs 44 & 52 and combined as one site. Gasoline, motor oil, and other automotive fluids were likely released during vehicle dismantling operations. Individual releases are not likely to have been of any significant volume, but numerous releases during the period in which the yard has been used account for the soil contamination problem.

An estimated 20 gallons of mogas and hydraulic fluid were reportedly released near the center of the Cannibalization Yard in 1985 during the cannibalization process. Approximately 4 cubic yards of visibly contaminated soils were excavated immediately and containerized by Army personnel. A 1,000-gallon underground storage tank, formerly used to store waste oil, was located in the Cannibalization Yard until its removal in May 1992. Reportedly, the tank was observed during the removal to be in good condition with no holes or severe corrosion. However, inspection revealed that the fill pipe was improperly connected, allowing the pipe contents to leak at the connection. Later in July 1992, contaminated soils surrounding the removed tank were excavated. A total of 91 tons (approximately 120 cubic yards) of contaminated soils were removed from the waste oil storage tank area in May and July and shipped off-site for treatment and reuse.

Groundwater in the **aquifer** underlying the facility has been assigned to Class I under Commonwealth of Massachusetts regulations. Class I consists of groundwater that is designated as a source of potable water supply. Based on the 1992 SI water level survey, inferred groundwater flow from the Maintenance Yards is northeast toward Grove Pond. The town of Ayer currently owns and operates two water supply wells within 150 feet of the south side of Grove Pond and approximately one-half mile from the Maintenance Yards (Figure 1). The wells are currently used as a backup to the town's other supply wells on Spectacle Pond. As part of a plan for meeting future water needs, the town of Ayer is considering returning its two potable supply wells on Grove Pond to regular service. In addition, the town reportedly is investigating the installation of an additional water supply well near the existing Grove Pond wells at some future time. The town engaged a consultant to establish a **Zone II area of influence** around the wells which is defined as the conceptual zone of contribution to the wells under specific set of conditions which simulate the most severe pumping and recharge conditions that can be anticipated realistically. The report shows the Zone II area as including the Maintenance Yards (Figure 1). The Maintenance Yards are also located approximately 1,600 to 1,700 feet from the Fort Devens Grove Pond wellfield, which is within the default Zone II (one-half mile radius) of this Army wellfield. Currently there is no evidence that contaminants found in the soils of the Maintenance Yards are affecting groundwater quality.

RESULTS OF THE FIELD INVESTIGATIONS

ABB Environmental Services, Inc. conducted an SI at the Maintenance Yards beginning in 1992. Additionally, during preparation of the FS, data gaps were identified requiring a supplemental Site Investigation (SSI). The SI and SSI meet the requirements of a Remedial Investigation in defining the nature and extent of contamination at the Maintenance Yards. The SI and FS reports present the findings of the investigations and contain a summary of the investigations that were performed. The public is encouraged to review these documents.

In May 1992, samples were collected during the waste oil tank removal activities discussed in Site History. Laboratory analysis of soil samples from the bottom and one side of the tank excavation showed TPHC concentrations of 17,600 **parts per million (ppm)** and 9,780 ppm, respectively. Laboratory analysis was also conducted on a waste oil residue sample obtained from inside the tank. Results revealed levels of **semivolatile organic compounds (SVOCs)** and metals. SVOCs detected were naphthalene (110 ppm) bis(2-ethylhexyl)phthalate (128 ppm) and 2-methylnaphthalene (240 ppm). **Toxicity Characteristic Leaching Procedure (TCLP)** metals detected were cadmium (0.04 ppm), lead (0.4 ppm), nickel (0.05 ppm) and zinc (3.07 ppm). Analytical results did not reveal the presence of **volatile organic compounds (VOCs)** and **polychlorinated biphenyls (PCBs)**. Later in July 1992, soil samples were collected when the contaminated soils surrounding the removed tank were excavated. Laboratory tests on samples from two sidewalls and stockpile revealed residual TPHC concentrations ranging from 1,110 to 2,740 ppm.

Exploratory test pits, excavated (July 1991) in the storage yard for construction of a concrete spill-containment basin (see Figure 1) in the southeast corner of the TDA Maintenance Yard revealed zones of contaminated soil below the surface. Petroleum hydrocarbons were found at moderate-to-high concentrations in surface soil samples and at a low concentration in one sample from a 4-foot depth. Petroleum hydrocarbons were not detected in the 8-foot-deep soil samples.

In June 1993, ABB-ES conducted a SSI that entailed drilling four additional borings in the Cannibalization Yard in the vicinity of the excavated underground waste oil tank area and mogas spill area and then sampling soil from these borings to better define the extent of contamination. Soil sampling was generally at four depth intervals; 5, 10, 15 and 25 feet below ground surface. TPHC was detected in only two of 16 samples and at concentrations of 121 ppm and 38.1 ppm. SVOC compounds were also detected in only two of 16 samples at concentrations equal to and less than 1.4 ppm. Details of the SSI are included in the FS Report. The SI for the Maintenance Yards focused on sampling soil and groundwater for analysis of a variety of **organic** and **inorganic analytes** and for **total petroleum hydrocarbon compounds (TPHC)**. Sampling and analytical results from

the SI Report associated with the borings at the Maintenance Yards are summarized in the following paragraphs. Motor oil is a potential source of the organic and inorganic analytes detected. Metal cutting and welding activities may be an additional source of the inorganic analytes.The following general observations with regard to organic contamination are drawn from the SI soil data:

- **Aromatic** VOCs were detected in only 3 of 48 soil samples collected; and one of the samples was from a boring which is believed to be associated with the 1985 mogas spill.

- There appears to be no obvious lateral or vertical distribution pattern of VOCs in soil.

- SVOCs, predominantly **carcinogenic polynuclear aromatic hydrocarbons (cPAHs)**, were detected in 34 of 48 samples throughout the AOCs. SVOC concentrations are typically higher in surface samples and are generally absent or of lower concentration with depth. Investigations performed during the SSI tend to support the assessment that elevated cPAH concentrations found in at least three of the SI soil samples could be due to the presence of broken pieces of bituminous pavement in the soil. Details of this investigation are discussed in the FS Report.

- TPHC appears to mimic the distribution of SVOCs. This is consistent with the presumed release mechanism discussed previously. TPHC was detected in 38 of 48 samples. One boring, 44B-92-06X, which may be associated with the mogas spill, revealed TPHC concentrations at 8520 ppm, 7680 ppm and 1560 ppm at 0-2, 5-7 and 10-12 foot levels respectively. The average TPHC concentration from the other 35 samples across the site was 172 ppm.

- No lateral distribution pattern for SVOCs or TPHC is evident.

The following general observations with regard to inorganic contamination are drawn from the soil SI data:

- Generally, the same vertical trend in concentrations found for the SVOCs and TPHC appears to exist with the inorganic analytes (i.e., higher concentrations of inorganic analytes are found near the ground surface). Soils near the surface exhibit inorganic analyte concentrations generally two to three times higher than soils at 5-foot and 10-foot depths.

- Chromium, copper, nickel, zinc, sodium, and beryllium are analytes that show a pattern of consistent exceedances above **background** concentrations

presented in the SI Report. Chromium, copper, nickel, and zinc, which appear in almost all surface soil samples, could be the result of vehicle maintenance activity. Sodium is likely attributable to road salting. Beryllium occurs on a more random basis (in instances at higher concentration at greater depth) and is believed to be occurring naturally.

- On a lateral basis, there are a few locations where the surface soils appear to contain the most inorganic analytes.

Groundwater was encountered at a depth of approximately 28 feet below ground surface in the Maintenance Yards. Based on groundwater sampling conducted in July 1992, October 1992, June 1993, and September 1993 in the area, there is no evidence that contaminants found in the soils of the Maintenance Yards are affecting groundwater quality. Thus migration of contaminants associated with past maintenance yard activities via groundwater is not likely.

Additionally, **surface water** and **sediment** samples were collected from nearby Cold Spring Brook to assess potential contaminant migration from several SAs. No SVOCs or VOCs were detected in surface water and few inorganic analytes were detected. Sediment samples exhibited some organic compound contamination. The results of sediment sampling support the conclusion that contaminant migration via storm and surface water runoff is a possible source of sediment contamination in Cold Spring Brook. However, the sampling does not specifically isolate the Maintenance Yards as a source due to the numerous other areas which drain into the same stormwater collection system.

Summary of Risks

In the FS Report, human health risk estimates were generated for soil contamination associated with crankcase releases and the mogas spill in the Maintenance Yards. Risk estimates associated with one of three exposure scenarios evaluated exceed **acceptable limits** for carcinogens as detailed in the following paragraphs. Due to limited habitat and access, analyte concentrations found in the soils do not pose a significant risk to ecological receptors under foreseeable land use scenarios which are expected to remain commercial/industrial in nature. A complete explanation of the risks posed by contamination at the Maintenance Yards is presented in the **baseline risk assessment** of the FS Report.

Crankcase Releases

Crankcase releases have occurred across the Maintenance Yards for many years. Health risk estimates were developed for two exposure scenarios: one involving a construction

worker and the other involving a long-term worker employed at the Maintenance Yards for a working lifetime. The Maintenance Yards historically and currently have been used as vehicle maintenance areas. The future use of these areas is expected to remain commercial/industrial in nature. Under current and future use, it is possible that a worker could be exposed to chemicals detected in the soil if excavation were to occur. This might occur for utility repair or new building construction. It is also possible that an employee of nearby Building 3713 could contact contaminants in surface soil during an activity such as grounds maintenance.

Risk estimates made under a construction worker exposure scenario for crankcase releases at the Maintenance Yards fall within acceptable limits for both **carcinogens** and **noncarcinogens.** Risk estimates under a long-term worker exposure scenario exceed acceptable limits for carcinogens. The site contaminants that contribute most significantly to the risk are cPAHs.

Mogas Spill

Under current and future use, it is possible that a worker could be exposed to chemicals detected in soil if excavation were to occur. This might occur for utility repair or new building construction. Risk estimates made under a construction worker exposure scenario for the mogas spill at AOC 44 fall within acceptable limits for both carcinogens and noncarcinogens.

PROPOSED CLEANUP OBJECTIVES AND LEVELS

Using the information gathered during the SI and FS, remedial response objectives were identified for soil cleanup at the Maintenance Yards. Remedial response objectives consist of medium-specific goals for protecting human health and the environment. Primary remedial action objectives at the maintenance yards are to:

- Minimize direct contact/ingestion and inhalation with AOCs 44 & 52 surface soils which exceed the **USEPA Superfund target range of 1E-4 to 1E-6 excess cancer risk for carcinogens.**

- Reduce off-site run-off of contaminants that might result in concentrations in excess of ambient water quality standards and in background concentrations in nearby stream sediments.

- Reduce or contain the source of contamination to minimize migration of contaminants of concern which might result in groundwater concentrations in excess of drinking water standards.

To meet these objectives, the Army, in cooperation with USEPA and the Massachusetts Department of Environmental Protection (MADEP), has established soil cleanup levels that will be protective of public health and the environment. The remedial alternative selected for the AOCs will achieve the cleanup levels of 7 ppm average total cPAHs and 500 ppm TPHC. Based on the SI sampling results, 11 of 16 surface samples exceed 7 ppm total cPAHs. Only 5 of 16 surface samples exceed the 500 ppm TPHC level. However, because the contaminants occur randomly and potentially across all the yards, the entire area of the Maintenance Yards to a 2 foot depth will be addressed to meet the objective of being protective to human health. This amounts to a total unexcavated soil volume of approximately 28,400 cubic yards. For planning purposes, it was estimated that approximately 50% of the soil excavated will contain contaminants that exceed cleanup levels. This estimate was based on the belief that the highest concentrations of cPAHs are in the top 1 foot of soil and the sampling results discussed earlier. In the FS, it was also estimated that up to approximately 700 cubic yards of subsurface soil associated with the mogas spill and waste oil UST areas may exceed the 500 ppm cleanup level for TPHC. Depth of contamination is unknown in these areas. For planning purposes, contamination was assumed to extend to an average 17 foot depth.

THE ARMY'S PREFERRED ALTERNATIVE

The Army's selection of the preferred cleanup alternative for the Maintenance Yards at Fort Devens, as described in this Proposed Plan, is the result of a comprehensive evaluation and screening process. The FS was conducted to identify and analyze the alternatives considered for addressing soils contamination at the AOCs. The FS report describes the alternatives considered, as well as the process and criteria the Army used to narrow the list to seven potential alternatives. (For details on the Army's screening methodology, see Sections 3, 4, and 5 of the FS.) The following paragraphs describe the Preferred Alternative and the other alternatives that the Army retained for detailed analysis. The Army's Preferred Alternative, as presented in Section 6 of the FS, is Alternative 5 with the additional component of applying a pavement wearing course over the surface of the site. The components of this alternative and an explanation of each component is provided below:

Alternative 5: Asphalt Batching Site/Asphalt Batching Hot Spot Areas

Alternative 5 entails excavating the top two feet of soil across the site and contaminated soils in the Cannibalization Yard hot spot areas (total unexcavated soil volume estimated at 29,000 cubic yards); placing excavated soils in piles at the site for sampling and analysis; cold mix asphalt batching soils which exceed site cleanup levels; backfilling site excavations with stockpiled soil not found to be contaminated above cleanup levels and with the cold mix asphalt batched material; applying a pavement wearing course for a

vehicle parking surface over the Maintenance Yards; and performing groundwater monitoring at the Maintenance Yards.

Soils will be excavated, stockpiled, sampled, and analyzed following an approved Excavated Soils Management Plan (ESMP). The ESMP provides details for excavated soil management including stockpiling, sampling and analysis, and final soil treatment/disposition.

It is proposed that the soils of the Maintenance Yards be asphalt batched on-site because the environmental regulators have expressed, by policy, a preference for on-site treatment and reuse of treated soils at Fort Devens as opposed to removal off-site for treatment and\or disposal. This treatment method will result in the reuse of treated (asphalt batched) soils on Fort Devens in accordance with an approved ESMP.

Cold mix asphalt batching is a technology that entails recycling petroleum contaminated soil into a bituminous paving or road base product. Cold mix processes are performed at ambient temperatures. The process entails excavating and processing the soil through a crusher or screen to produce a physically uniform soil material. The soil is then blended with other aggregate (if required due to existing soil conditions) and asphalt emulsion in a **pugmill**. The finished product is then used as the base or subbase material for roadway or parking lot construction. The material can be either spread into thin lifts and compacted into the base/subbase by roller, or stockpiled for later use as a stabilized aggregate material. The asphalt batched material from AOCs 44 and 52 will be used as a base/subbase pavement course for parking lot construction at the Maintenance Yards.

The proposed pavement wearing course is not a required component in the Alternative 5 that is evaluated in the FS Report. The Army has chosen to add this component to Alternative 5 as part of the Preferred Alternative to ensure the integrity of the asphalt batched material as a parking lot base for current and future property use. Applying the asphalt batched material and paving course to the Maintenance Yards will increase the amount of runoff during rain events. Therefore the Preferred Alternative will include expansion of the existing stormwater collection system which could entail installing additional catch basins, new oil and grease traps, and additional stormwater piping. Investigations will be performed to determine what impacts the increased flow will have on the wetlands of Cold Spring Brook. Potentially, a retention basin and flow reducers will need to be incorporated into the design to minimize wetland impacts. Details of this work will be specified in the remedial design.

Sampling and analysis of groundwater from existing wells at the Maintenance Yards will be performed yearly for a period of five years upon commencement of remedial activities. Sampling will be for the same analytes tested for during the SI.

Restrictions on removal of the 2 foot cover or asphaltic barrier from the site are

applicable for Alternatives 5 to prevent any possible exposure to subsurface soils at the site. There is no current information that suggests that there are contaminant levels at the 2 to 5 foot level which would create a risk as a surface soil, if uncovered. However, precautions will be taken by applying an **institutional control** in the form of land use restrictions to prevent subsurface soil uncovering and potential exposure.

Alternative 5 will immobilize the contaminants exceeding cleanup levels present in the top 2 feet, thus minimizing direct contact/ingestion and inhalation of the soils having a carcinogenic risk. Excavating and asphalt batching hot spot areas in the Cannibalization Yard will reduce the mobility of organic contaminants present in the highest concentrations at the site. Additionally, Alternative 5 minimizes the potential of soil contaminants migrating off-site.

Costs for this alternative include expanding the existing stormwater collection system; excavating the top two feet of soil in the yards and hot spot areas; stockpiling the soil for sampling and analysis; asphalt batching the soil exceeding cleanup levels and backfilling the site; and applying a pavement wearing course over the batched material. O&M costs include labor, equipment, and expendable costs associated with annual groundwater sampling, and analytical costs for a 5 year period.

Estimated Time for Restoration: Approximately four months for treatment; restoration completed prior to closing of the Maintenance Yards.
Estimated Capital Costs: $1,865,000
Estimated Operation and Maintenance Costs: $72,000
(net present worth)
Estimated Total Costs: $1,937,000
(net present worth, assuming 10% discount rate)

OTHER ALTERNATIVES EVALUATED IN THE FS

The public is invited to comment not only on the Preferred Alternative, but also on the other six alternatives that the Army evaluated in detail . Each of these alternatives is described briefly below. A more detailed description of each alternative can be found in the FS. A summary of the Preferred Alternative and the six other alternatives is provided in Table 1.

Alternative 1: No Action

The No Action Alternative includes sampling of groundwater monitoring wells and stormwater catch basins located within and **downgradient** of the Maintenance Yards for up to five years. The No Action Alternative does not involve remedial actions to control

migration of contaminants or institutional controls to prevent exposure to contaminated soils within the Maintenance Yards. Alternative 1 is developed to provide a baseline for comparison with the other remedial alternatives.

Estimated Time for Restoration: not applicable
Estimated Capital Costs: $0
Estimated Operation and Maintenance Costs: $133,000
(net present worth)
Estimated Total Costs: $133,000
(net present worth, assuming 10% discount rate)

Alternative 2: Fencing/Asphalt Batching Hot Spot Areas

This alternative includes preventing access by maintaining fencing around the sites that would limit potential exposure pathways. Deed and land use restrictions would act as an institutional control to ensure that the fence remained intact in the future. Excavation and cold mix asphalt batching soil from the hot spot areas in the Cannibalization Yard would reduce the volume of contaminants present in the highest concentrations at the AOCs. Sampling and analysis of groundwater, stormwater and sediments within or downgradient of the Maintenance Yards would also be performed to monitor any adverse effects.

Estimated Time for Restoration: Approximately three weeks for treatment; restoration completed prior to closing of the Maintenance Yards
Estimated Capital Costs: $204,000
Estimated Operation and Maintenance Costs: $152,000
(net present worth)
Estimated Total Costs: $356,000
(net present worth, assuming 10% discount rate)

Alternative 3: Capping Site/Asphalt Batching Hot Spot Areas

This alternative entails excavating and asphalt batching the hot spot area soils using an on-site cold-mix process, **capping** the entire site with asphalt pavement, and groundwater monitoring. Deed and land use restrictions would act as an institutional control to ensure that the cap remained intact in the future. Excavation and asphalt batching hot spot area soils in the Cannibalization Yard would reduce the volume of contaminants present in the highest concentrations at the AOCs. Asphalt batched material from the hot spots can be used as paving base material. Sampling and analysis of groundwater within or downgradient of the Maintenance Yards would also be performed to monitor any adverse effects.

Estimated Time for Restoration: Approximately three months; restoration completed

prior to closing of the Maintenance Yards.
Estimated Capital Costs: $1,017,000
Estimated Operation and Maintenance Costs: $204,000
(net present worth)
Estimated Total Costs: $1,221,000
(net present worth, assuming 10% discount rate)

Alternative 7: Bioventing Site and Hot Spot Areas

This alternative entails **bioventing** the entire site and the hot spot areas, and performing groundwater monitoring. Details of the bioventing technology are discussed in Section 4.3 of the FS. This alternative includes initial nutrient injection in the areas by tractor and installation of approximately 20 bioventing wells, with associated piping, blower, and humidifier. To prevent short circuiting of air, an asphalt pavement cap would be installed over the entire area of the AOCs.

Estimated Time for Restoration: up to 10 years treatment; site restored approximately eight years after closing of the Maintenance Yards.
Estimated Capital Costs: $1,070,000
Estimated Operation and Maintenance Costs: $478,000
(net present worth)
Estimated Total Costs: $1,548,000
(net present worth, assuming 10% discount rate)

Alternative 8: Landfarming Site/Excavating and Landfarming Hot Spot Areas

This alternative entails mechanically screening out the asphalt pavement pieces from surface soil, **landfarming** the entire area of the AOCs, excavating and landfarming the hot spot area soils that exceed cleanup levels, and performing groundwater monitoring. Landfarming will reduce the contaminants present in the top two feet, thus minimizing direct contact/ingestion and inhalation of the soils. Additionally, the concentration of the contaminants of concern could be reduced in depths below 2 feet over the site area by applying excess nutrients and water to the soil surface. To enable the yards to be used in part during remediation, design would be based on treating a portion of the yard while the other portion remained functional as a maintenance yard. After yard closure, the remaining portion would be remediated.

Estimated Time for Restoration: up to seven years treatment. Site restored approximately five years after closing of the Maintenance Yards.
Estimated Capital Costs: $621,000
Estimated Operation and Maintenance Costs: $932,000
(net present worth)
Estimated Total Costs: $1,553,000

(net present worth, assuming 10% discount rate)

Alternative 9: Treatment of Site and Hot Spot Area Soils at a Central Soil Treatment Facility

Alternative 9 entails excavating the top two feet of soil across the site and contaminated soils in the Cannibalization Yard hot spot areas (total unexcavated soil volume estimated at 29,000 cubic yards); placing excavated soils in piles at the site for sampling and analysis; transporting soils which exceed site cleanup levels to a central soil treatment facility on base; and performing groundwater monitoring at the Maintenance Yards. As a pre-treatment process, surface soil in areas of the site containing bituminous pavement pieces would be screened mechanically to remove large sized fragments. The top two feet of soil from approximately 20% of the yard and the Cannibalization hot spot areas would be excavated first and would serve as a pilot test for the central soil treatment facility. The remaining 80% of the yard would continue to be utilized by the Army and would not be remediated as part of Alternative 9 until yard closure in 1996.

The proposed central soil treatment facility is discussed in the FS Report and Final Siting Study Report. The treatment methods to be used at the facility would be windrow **composting** and cold mix asphalt batching. Alternative 9 would reduce the contaminants present in the top 2 feet and hot spot areas excavated. Soils with contaminants exceeding cleanup levels would be removed from the site when the Maintenance Yards close, permitting immediate reuse of the site.

Estimated Time for Restoration: Site restoration complete approximately two months after closing of the Maintenance Yards.
Estimated Capital Costs: $2,739,000
(net present worth)
Estimated Operation and Maintenance Costs: $659,000
(net present worth)
Estimated Total Costs: $3,398,000
(net present worth, assuming 10% discount rate)

TABLE 1
SUMMARY OF ALTERNATIVES
PROPOSED PLAN
BARNUM ROAD MAINTENANCE YARDS
FORT DEVENS, MASSACHUSETTS

ALTERNATIVE	DESCRIPTION
Alternative 5 (Preferred Alternative): Asphalt Batching Site/Asphalt Batching Hot Spot Areas	• Excavate the top two feet across the site and contaminated soils in the hot spot areas. • Stockpile/sample/analyze soil and asphalt batch soil that exceeds cleanup levels. Install pavement wearing course over asphalt batched material. • Groundwater monitoring and deed restriction.
Alternative 1: No Action	• Groundwater and stormwater/sediment monitoring.
Alternative 2: Fencing/ Asphalt Batching Hot Spot Areas	• Excavate hot spot areas. • Asphalt batch hot spot area soils on site. • Maintain fencing around the Maintenance Yards and implement deed and land use restrictions. • Groundwater and stormwater/sediment monitoring.
Alternative 3: Capping Site/Asphalt Batching Hot Spot Areas	• Excavate hot spot areas. • Asphalt batch hot spot area soils on site. • Cap entire site with asphalt pavement and implement deed and land use restrictions. • Groundwater monitoring.
Alternative 7: Bioventing Site and Hot Spot Areas	• Install and operate bioventing system to treat the entire site and the hot spot soils. • Groundwater monitoring.
Alternative 8: Landfarming Site/ Excavating and Landfarming Hot Spot Areas	• Mechanically screen surface soil to remove pavement pieces. • Excavate hot spots. • Landfarm hot spot soils and site soils. • Groundwater monitoring and deed restrictions.
Alternative 9: Treatment of Site and Hot Spot Area Soils at a Central Soil Treatment Facility	• Excavate the top two feet across the site and contaminated soils in the hot spot areas. Mechanically screen to remove pavement pieces. • Stockpile/sample/analyze soil. Compost/asphalt batch soils that exceed cleanup levels at a central soil treatment facility or dispose/treat off-base if unsuitable for treatment on-base. • Groundwater monitoring and deed restrictions.

SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Nine criteria are used under CERCLA to select a remedy that meets the goals of protecting human health and the environment, maintaining protection over time, and minimizing untreated waste. Definitions of the nine criteria and a summary of the Army's evaluation of the six alternatives using the nine criteria are provided below:

1. **Overall Protection of Human Health and the Environment** 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 are properly eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

Alternative 1, the no action alternative, does not reduce risks. USEPA's target risk range would likely continue to be exceeded indefinitely for a site worker without some type of remediation. Alternatives 2 and 3 would eliminate risks by minimizing exposure (preventing access to the site and capping respectively). Alternative 5, the Preferred Alternative, would achieve an irreversible reduction in mobility of the contaminants. It is expected that remedial action time would be approximately four months. Alternative 7, bioventing, would achieve risk reduction by contaminant destruction in approximately 10 years. However, the risk also would be eliminated by minimizing exposure upon installation of the cap prior to the start of bioremediation. (A cap is required for the bioventing technology.) Alternative 8, landfarming, would achieve risk reduction by contaminant destruction in approximately seven years. Alternative 9, would be protective immediately following soil excavation, removal, and backfilling at the site, estimated to be within two months after operations in the Maintenance Yards cease (summer of 1996). The soil would then be remediated at a central Fort Devens soil treatment facility.

2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** addresses whether or not 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 ARAR cannot be met, the analysis of the alternative must provide the rationale for invoking a statutory waiver.

Although there are no chemical-specific ARARs for establishing cleanup levels for the soils at the Maintenance Yards, risk-based cleanup criteria have been developed. Alternatives 1, 2, 3, and 5 do not reduce contaminant concentrations to meet these cleanup levels; however, Alternatives 2, 3, and 5 do reduce risks by minimizing the potential for exposure to the contaminants. Alternatives 2 and 3 rely on institutional

controls to minimize the exposure to surface soils. Alternative 5 utilizes a treatment process (asphalt batching) to immobilize the contaminants in surface soils but requires restrictions on removal of the 2 foot cover or barrier from the site to prevent any possible exposure to subsurface soils (2 foot to 5 foot level where sampling was not performed). Although there is no current evidence that suggests contaminant levels at 2 to 5 feet below ground surface would create a risk if uncovered, precautions would be taken to prevent uncovering of subsurface soils. Alternatives 8 and 9 would meet surface soil cleanup objectives by using either in-situ or ex-situ response actions but also have similar cover restrictions for the same reasons as Alternative 5. Alternative 7 would treat surface and subsurface soils and would not have a 2 foot cover/barrier restriction.

The location-specific ARAR identified for the alternatives entails regulations that protect wetlands. Alternatives 1 and 2 will not reduce potential off-site runoff of contaminants in surface water from the Maintenance Yards to the wetlands. Alternatives 3, 5, 7, 8, and 9 all minimize the potential of off-site migration of soil contaminants via the stormwater system. Impacts to wetlands due to increased stormwater runoff from paved surfaces (Alternatives 2, 3, 5, and 7) would need to be considered during remediation and design of the stormwater collection system expansion. Additional location-specific ARARs for siting of hazardous waste treatment facilities would apply to the central soil treatment facility (Alternative 9).

Action-specific ARARs would be met by each alternative by incorporating these regulations and criteria into the design of the remedial actions and development of monitoring programs and long-term operation and maintenance plans.

3. Long-term Effectiveness and Permanence 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 1 provides no controls or treatment to protect human health and the environment. Alternatives 2 and 3 rely mainly on institutional controls to prevent exposure to the surface soils at the Maintenance Yards. Because the area is to be zoned for commercial/industrial use, these institutional controls would be reliable unless zoning is changed. Alternatives 5, 7, 8 and 9 utilize treatment technologies (in-situ and ex-situ) for permanently immobilizing or destroying the contaminants. All alternatives utilize groundwater monitoring for five years or for the duration of treatment at the site (whichever is longer) from the start of remediation. Groundwater monitoring is used as a means of assessing contaminant migration to the groundwater. In terms of risk reduction over the entire site, Alternatives 7, 8, and 9 might be considered the most effective in that the target contaminants are destroyed or physically removed in lieu of immobilizing as in Alternative 5.

4. Reduction of Toxicity, Mobility, or Volume through Treatment are three principal measures 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 level of 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.

All alternatives except Alternative 1 employ treatment as an important element. Alternatives 2 and 3 will each reduce the mobility of contaminants in the hot spot areas that will become asphalt batched material and be utilized as a pavement base course. Alternative 5 would reduce the mobility of contaminants in the hot spot area soils and in the top two feet of soil across the 8.8 acre site which exceed cleanup levels. Asphalt batched material will be the residual remaining after treatment, which will be placed in a layer on the surface of the site. Alternatives 7 and 8, which utilize biological treatment technologies entirely, will reduce the toxicity, mobility, and volume of soil contaminants and will produce no residuals after treatment. Alternative 7, which will entail bioventing the entire site, will treat the top two feet and hot spot areas with potential of reducing contaminant concentrations with decreasing effectiveness down to an approximate 10-foot depth across the site. Alternatives 8 and 9, which will entail landfarming and off-site treatment respectively, would treat the hot spot areas and the top two feet of soil. Alternative 8 would have the potential of reducing contaminant concentrations with decreasing effectiveness at depths below 2 feet. Alternative 9 removes the hot spot area soil and the top two feet of soil which exceed cleanup criteria from the site. The off-site treatment process entails biological treatment which reduces the toxicity, mobility, and volume of soil contaminants and produces no residuals after treatment. It also uses asphalt batching on some soil which would reduce the mobility of contaminants in the soil. Asphalt batched material will be the residual after treatment which would be used as roadway material.

5. Short-term Effectiveness refers to the likelihood of adverse impacts on human health or the environment that may be posed during the construction and implementation of an alternative until cleanup goals are achieved.

Alternative 1 would have the least impact during implementation because it would not involve construction or operation. Alternative 7 would also have minimal impact on the community, workers, and environment because remediation would take place in-situ. However, increased stormwater runoff from the cap would need to be controlled to minimize impacts on the wetland which receives drainage from this area. Runoff control would also be an issue for Alternatives 3, 5, and 2 (to a lesser extent) which would place the impermeable asphalt batched material over the site. Alternatives 2, 3, 5, 8, and 9 involve excavation and handling of contaminated soils. Adverse impacts

from potential worker exposure would be mitigated by protective clothing and equipment and safe work practices. Fugitive dust would be controlled by application of water during remedial actions.

Completion of remedial actions would be essentially immediate for Alternatives 2, 3, and 5 because work on site could be accomplished within a few weeks or months. On-site remedial actions associated with Alternative 9 would be completed near the end of 1996 (following closure of the Maintenance Yards). Alternative 8, landfarming, would take up to seven years to complete. Although bioventing (Alternative 7) could begin in 1994 without major disruption to normal operations, remediation is expected to take 10 years to complete, because this type of bioremediation is not as aggressive as landfarming or composting.

6. Implementability refers to the technical and administrative feasibility of an alternative, including the availability of materials and services for implementing the alternative; the ease or difficulty of conducting further remedial actions at a later date; and the effect the remedial alternative would have on continued operations at the Maintenance Yards.

Alternative 1, which only includes groundwater monitoring, would be the easiest alternative to implement at the site, and would have the least impact on future remedial actions and Maintenance Yards activities. Similarly, Alternative 2 would be relatively easy to construct and would have minimal impact on activities at the site. Alternatives 3 and 5 would be easy to construct because they involve asphalt batching/paving which utilize common construction practices. However, these alternatives would disrupt the yards for several weeks during stormwater collection system modification, excavation and paving. Also, if further action is warranted at a later date, the paving may need to be removed.

Alternative 9 involves excavating and transporting soil, which are common technologies. The composting technology has been used for treatment of sewage sludge and is also applicable to biodegradable contaminants in soil. This alternative would have minimal effect on future actions. However, implementation would impact Army activities by confining current operations to 80 percent of the yards until the Maintenance Yards close. An existing central soil treatment facility is not currently available; therefore, a facility would need to be sited and constructed. Construction of a facility with sufficient capacity to treat all of the soil at once would be difficult in terms of facility siting and other regulatory issues. Operation of the facility would be relatively simple and would not require skilled operators, but may require bioremediation specialists to monitor performance and troubleshoot on an as-needed basis.

Alternatives 7 and 8 would not be difficult to construct or operate but pose Zone II groundwater aquifer concerns. Nutrients for Alternatives 7 and 8 would need to be monitored so as to not impact either Grove Pond and its wetlands or the Grove Pond water supply wells. Stormwater collection system expansion would also be an issue for Alternative 7 since this alternative entails capping the entire site. Also, if further action is warranted at a later date, the paving may need to be removed. Alternative 8 would have minimal impact on future actions. Alternative 7 will create similar disturbances within the yards as Alternative 3 due to the installation of the bioventing system and stormwater piping and appurtenances, and the paving of the site. Alternative 8 will create similar disturbances within the yards as Alternative 9 since a portion of the yards would be closed to commence remediation.

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

The capital, operation and maintenance, and total cost for each alternative is provided as part of the alternative description in the preceding sections on "The Army's Preferred Alternative" and "Other Alternatives Evaluated in the FS".

8. State Acceptance addresses whether, based on its review of the SI, FS, ESMP 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 MADEP has accepted the Army's Proposed Plan and is reviewing the ESMP for the Maintenance Yards.

9. Community Acceptance addresses whether the public concurs with the Army's Proposed Plan. Community acceptance of this Proposed Plan will be evaluated based on comments received at the upcoming public meeting and during the public comment period.

Of the nine criteria, protection of public health and compliance with all ARARs are considered threshold requirements that must be met by all remedies. The consideration of alternatives is balanced with respect to long-term effectiveness and permanence; reductions of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. State and community concerns are considered modifying criteria factored into a final balancing of all criteria to select a remedy. Consideration of state and community comments may prompt the Army to modify aspects of the Preferred Alternative or decide that another alternative considered provides a more appropriate balance.

THE ARMY'S RATIONALE FOR PROPOSING THE PREFERRED ALTERNATIVE

Except for Alternative 1 (the no action alternative) all alternatives would provide for overall protection of human health and the environment by using institutional controls and/or active response actions. Alternatives 7, 8, 9 and the Preferred Alternative (Alternative 5) provide more reliable protection than the other alternatives because they utilize active response actions as a component of the remedy to remediate the surface soils. Alternatives 2 and 3 rely solely on institutional controls to minimize exposure to the surface soils. Alternatives 5, 8 and 9 would require restrictions on removal of the 2 foot cover or barrier from the site to prevent any possible exposure to subsurface soils. There is no current information that suggests that there are contaminant levels at the 2 to 5 foot level which would create a risk as a surface soil, if uncovered. However, precautions would be taken by applying land use restrictions to prevent under-surface soil exposure. Alternative 7 would treat surface and subsurface soils and would not have a 2 foot cover restriction. Alternatives 7 and 8 use in-situ biological treatment technologies which pose Zone II aquifer concerns if implemented at the Maintenance Yards. Nutrients for Alternatives 7 and 8 would need monitoring so as to not impact Grove Pond and its wetlands or the Grove Pond water supply wells. Also, Alternatives 7 and 8 require the longest times for site restoration (up to 10 years and 7 years respectively).

Remediation of the Maintenance Yards using Alternative 9 would not be complete until near the end of 1996 (following closure of the Maintenance Yards). Bioremediation would take up to 4 additional years at the treatment facility to reduce soil contaminants to cleanup levels. Remediation of the Maintenance Yard using the Preferred Alternative would be complete within approximately 4 months upon commencement of construction. The Preferred Alternative also reduces toxicity and mobility through treatment at lower cost than Alternative 9, and as an additional benefit provides greater aquifer protection through the construction of a low permeable pavement cap at the site.

Based on current information and analysis of the SI and FS reports, the Army believes that the Preferred Alternative for treatment of soils at the Maintenance Yards is consistent with the requirements of the Superfund law and its amendments, specifically Section 121 of CERCLA, and to the extent practicable, the **National Contingency Plan (NCP)**. In the Army's estimation, the Preferred Alternative would achieve the best balance among the criteria used by EPA to evaluate alternatives. The Preferred Alternative would provide short- and long-term protection of human health and the environment, would attain all federal and state ARARs, would reduce the toxicity and mobility of the contaminants in the soils through treatment, and would utilize permanent solutions to the maximum extent practicable.

FOR MORE INFORMATION

If you have questions about the site or would like more information, call or write to:

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GLOSSARY

Acceptable Limits: An acceptable upper bound risk level for developing cancer from exposure to suspected carcinogens established as the USEPA Superfund Target Range of 1E-4 to 1E-6 Excess Cancer Risk For Carcinogens; and the acceptable upper bound hazard for toxic effects from exposure to noncarcinogens established as a Hazard Index equal to 1.0.

Applicable or Relevant and Appropriate Requirements (ARARs): ARARs include any state or federal statute or regulation that pertains to protection of public health and the environment in addressing certain site conditions or using a particular cleanup technology at a Superfund site. The Army must consider whether a remedial alternative meets ARARs as part of the process for selecting a cleanup alternative for a Superfund site.

Aquifer: A layer of rock or soil than can supply usable quantities of groundwater to wells and springs. Aquifers can be a source of drinking water and provide water for other uses as well.

Aromatic: A major group hydrocarbon compounds derived chiefly from petroleum and coal tar. The name is due to their strong but not unpleasant odor. Compounds include benzene, ethylbenzene, toluene, and xylene.

Area of Contamination (AOC): A portion of a Superfund site where investigations have established that contamination exists and requires further assessment.

Backfilling: The process of replacing soil from an excavation.

Background: Term used in hazardous waste site investigations to describe the levels of naturally-occurring compounds in the environment, not related to the release of pollutants.

Baseline Risk Assessment: A qualitative or quantitative evaluation of human health and ecological risk resulting from exposure to a chemical or physical agent (pollutant); combines exposure assessment information with toxicity information to estimate risk. The baseline assessment evaluates the risks associated with existing conditions and their relative consequences should no further action be taken.

Bioventing: A bioremediation process which is used primarily for soil treatment that relies on mechanical means of drawing air through the soils to provide oxygen to the microorganisms.

Capping: The process of placing a barrier to protect material beneath. At Superfund sites, capping is generally applied to prevent contact with wastes and to prevent rain water from washing waste down to the groundwater.

Carcinogenic Polynuclear Aromatic Hydrocarbons (cPAHs): A class of organic chemicals that are used industrially in the production of automobile tires, rubber stoppers, and glass. Also, PAHs are often found as byproducts of the refining and combustion process of petroleum and coal. PAHs that are known to cause cancer in living tissue are referred to as carcinogenic PAHs (cPAHs).

Carcinogens: Compounds that cause cancer in living tissue. These compounds may either be known to create cancer in man or animals by exposure in industry or by ingestion, or may be known to create cancer in animals under experimental conditions.

Cleanup: Actions taken because of the release or threatened release of hazardous substances to reduce the risks to human health or the environment. The term "cleanup" is often used broadly to describe various aspects of a remedial response.

Cold Mix Asphalt Batching: A process where soils are treated with water-soluble asphalt mixtures to form a material which can be used as a paving base for roads or parking areas. This process is conducted on site and does not require heating to form the asphaltic material.

Composting: A bioremediation process which consists of spreading and treating soil in long windrow piles. Oxygen is supplied to naturally occurring soil microorganisms by mechanical turning or mixing of the soil. Mineral nutrients (naturally occurring substances used to enhance bioremediation, such as potassium, nitrogen, and phosphorus), soil moisture, and pH control (controlling the acidity of soil by chemical addition) are provided to soil microorganisms through addition and mixing.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The act created a special tax that goes to a Trust Fund, commonly known as Superfund, to investigate and clean up abandoned or uncontrolled hazardous waste sites.

Crankcase: The portion of a motor vehicle housing the crankshaft where lubricating oil is maintained.

Downgradient: The slope of the water table is the hydraulic gradient under which groundwater movement takes place. The term refers to the portion of groundwater which has migrated from the source.

Excavated Soils Management Plan (ESMP): A site-specific plan written for the excavation of AOCs 44 & 52 soils to ensure that soil excavation and handling and final disposition procedures are followed in accordance with approved guidelines.

Feasibility Study (FS): Report that summarizes the development and analysis of remedial alternatives that are considered for the cleanup of Superfund sites.

Groundwater: Water found beneath the earth's surface that fills pores between materials such as sand, soil, gravel, and cracks in bedrock and often serves as a principal source of drinking water.

Hot Spots: Portions of an AOC which are characterized by localized, elevated levels of contamination.

Institutional Controls: Controls placed on property to restrict access and future development, such as deed restrictions and fencing.

Inorganic Analytes: Chemical elements which include mineral materials such as salts and metals, and include iron, aluminum, arsenic, and zinc.

Landfarming: A bioremediation process which consists of tilling contaminated soils in place with a tractor while intermittently adding nutrients.

Mogas: Term used by the Army to describe motor vehicle fuel (gasoline).

Monitoring Wells: Wells drilled to "monitor" groundwater quality and movement. A well of this type does not supply water for drinking or industrial use. Samples from a monitoring well are analyzed to detect the presence of contaminants. Comparing water levels in monitoring wells shows the direction of groundwater flow.

National Contingency Plan (NCP): The federal regulation that guides the Superfund program.

Net Present Worth: The amount of money necessary to secure the promise of future payment, or series of payments, at an assumed interest rate.

Noncarcinogens: Compounds that are not known or suspected to cause cancer in living tissue (See carcinogens). Although these compounds are not cancer causing, they often warrant evaluation in a risk assessment due to other potential toxic effects in humans.

Organic Compounds: A group of chemical compounds composed primarily of carbon and hydrogen.

Parts Per Million (ppm): A unit of measure used to describe levels of contamination. For example, one gram of a contaminant in one million grams of soil is equal to one part per million.

Polychlorinated Biphenyls (PCBs): A class of organic compounds used since 1926 primarily in electrical transformers as insulators and coolants.

Pugmill: Equipment used to blend different materials together into a homogeneous mix.

Record of Decision (ROD): A public document that explains the cleanup alternative to be used at a National Priorities List (NPL) site. The ROD is based on information and technical analysis generated during the site investigation and FS and on consideration of the public comments and community concerns.

Remedial Alternative: Option evaluated to address the source and/or migration of contaminants at a Superfund site to meet cleanup goals.

Sediments: The sand or mud found at the bottom and sides of bodies of water, such as creeks, rivers, streams, lakes, swamps, and ponds. Sediments typically consist of soil, silt, clay, plant matter, and sometimes gravel.

Semivolatile Organic Compound (SVOC): A group of chemical compounds composed primarily of carbon and hydrogen that have less of a tendency to evaporate (or volatilize) into the air from water or soil than VOCs. SVOCs include substances such as naphthalenes and phthalates.

Site Investigation (SI): An investigation which evaluates the nature and extent of contamination at a hazardous waste site, and helps to direct the types of cleanup options that are developed in the FS. The SI and supplemental SI meet the requirements of a Remedial Investigation in defining the nature and extent of contamination at AOCs 44 and 52 under the supervision of the USEPA.

Siting Study Report: Report that evaluates potential sites for locating the Fort Devens central soil treatment facility. The report screens 12 potential sites using specified siting criteria and selects a preferred site. A conceptual design of the facility is provided in the report.

Superfund: The common name for CERCLA, the Comprehensive Environmental Response, Compensation, and Liability Act.

Supplemental Site Investigation (SSI): An additional site investigation which is performed to fill data gaps identified in the SI Report and to enable a complete

evaluation of the nature and extent of contamination at a hazardous waste site. The SI and supplemental SI meet the requirements of a Remedial Investigation in defining the nature and extent of contamination at AOCs 44 and 52 under the supervision of the USEPA.

Surface Water: Bodies of water on the surface of the earth, such as rivers, lakes, and streams.

Total Petroleum Hydrocarbon Compounds (TPHC): The measure of the level of hydrocarbon compounds in an environmental medium derived principally from petroleum products. The measurement does not identify individual compounds, but provides a total concentration.

Toxicity Characteristic Leaching Procedure (TCLP): Testing procedures used for characterizing wastes. Criteria is based on health standards and groundwater modeling.

USEPA Superfund Target Range of 1E-4 to 1E-6 Excess Cancer Risk For Carcinogens: The USEPA acceptable exposure level to known carcinogens as represented by an excess upper bound lifetime cancer risk between 10^{-4} and 10^{-6}. The cleanup of cancer causing substances is therefore intended to reduce risk of developing cancer to or below the range of one chance in one million to one chance in ten thousand.

Volatile Organic Compound (VOC): A group of chemical compounds composed primarily of carbon and hydrogen that are characterized by their tendency to evaporate (or volatilize) into the air from water or soil. VOCs include substances that are contained in common solvents and cleaning fluids.

Wearing Course: A bituminous pavement layer put on roads or parking lots which serves as the top smooth wearing surface.

Zone II Area of Influence: The conceptual zone of pumping and recharge conditions at a pumping well that can be realistically anticipated.