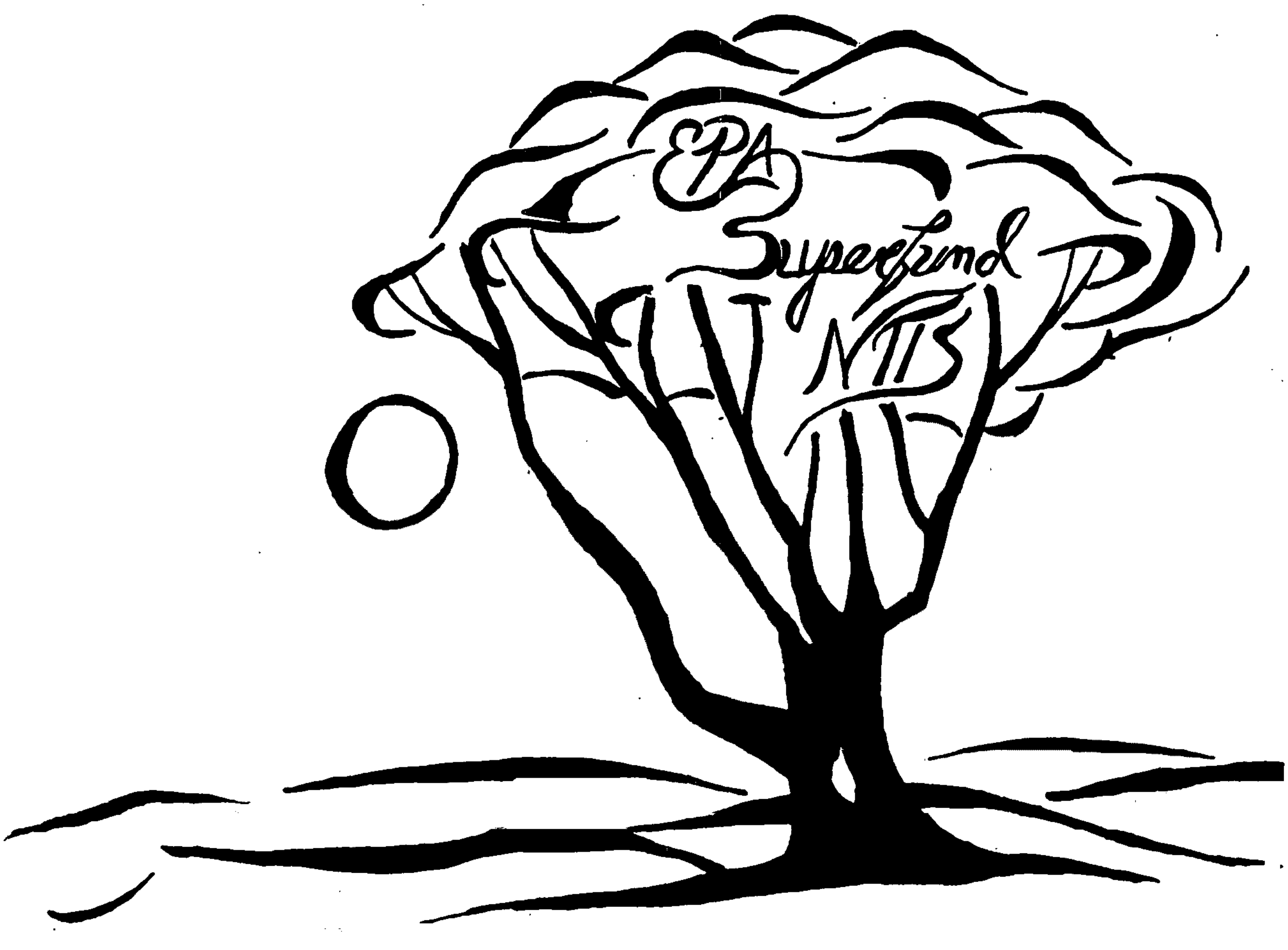
PB94-963701
EPA/ROD/R01-94/086
July 1994

EPA Superfund
Record of Decision:

Loring Air Force Base
(O.U. 6) Site, ME
4/4/1994

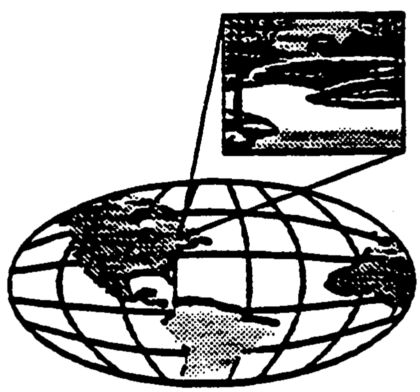


FINAL

OPERABLE UNIT 6 (OU 6) RECORD OF DECISION

March 1994

The Air Force



Rebuilding Our Environment

Installation Restoration Program

Loring Air Force Base, Maine

FINAL

Loring Air Force Base

OU 6 RECORD OF DECISION

Prepared for:

42nd Support Group
42nd Civil Engineering Squadron
Environmental Management Flight
Loring Air Force Base, Maine
DSN: 920-2257 Com: (207) 999-2257

Prepared by:

Service Center: Hazardous Waste Remedial Actions Program
Oak Ridge, Tennessee

Contractor: ABB Environmental Services, Inc.
Portland, Maine

Project No. 7626-08

March 1994

OU 6 RECORD OF DECISION
LORING AIR FORCE BASE

TABLE OF CONTENTS

OU 6 RECORD OF DECISION
LORING AIR FORCE BASE

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

OU 6 RECORD OF DECISION
LORING AIR FORCE BASE

TABLE OF CONTENTS
(continued)

OU 6 RECORD OF DECISION
LORING AIR FORCE BASE

LIST OF FIGURES

OU 6 RECORD OF DECISION
LORING AIR FORCE BASE

LIST OF TABLES

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Loring AFB (LAFB) Operable Unit (OU) 6, consists of the Railroad Maintenance Site (RRMS), East Gate Waste Storage Tanks Site (EGWST), and Fuel Drop Sites (FDS) North 1 and 2 (FDS-N1 and FDS-N2, respectively), South-Active (FDS-SA) and South-Former (FDS-SF).

STATEMENT OF BASIS AND PURPOSE

This decision document was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP); 40 CFR Part 300 et seq (1990). It is based on the administrative record for the site, which was developed in accordance with Section 113(k) of CERCLA and which is available for public review at the information repositories located at Robert A. Frost Memorial Library, 238 Main Street, Limestone, Maine and the Office of Public Affairs at 42 CES/CEVR, 7300 Pennsylvania Road, Loring AFB, Maine. It presents the selected remedial action for the RRMS at LAFB OU 6 that will provide excavation and off-base disposal or treatment of contaminated soil. Through the remedial action at the RRMS, the U.S. Air Force (USAF) plans to remedy the threat to human health and the environment posed by contaminated soil at the RRMS. This decision document also presents the selected No Action decision for the EGWST, FDS-N1, FDS-N2, FDS-SA, and FDS-SF.

The State of Maine Department of Environmental Protection (MEDEP) concurs with the selected remedy for the RRMS and with the No Action remedy under CERCLA for FDS-N1, FDS-N2, and FDS-SA. In separate actions which are not part of this Record of Decision (ROD), the Air Force is taking non-CERCLA remedial actions at EGWST and FDS-SF pursuant to state requirements under an Air Force/State Two-Party Supplement to the Federal Facility Agreement (FFA) being signed simultaneously with this ROD.

ASSESSMENT OF RRMS

Actual or threatened releases of hazardous substances from the RRMS, if not addressed by implementing the response action selected in this ROD, may pose an imminent and substantial endangerment to the environment.

DESCRIPTION OF THE SELECTED REMEDY

For the RRMS, the key components of the selected remedial action alternative are:

1) mobilization and site preparation;

2) excavation of contaminated surface and/or subsurface soil;

3) disposal of excavated material in an off-base licensed landfill or treatment facility;

4) restoration of the site; and

5) site review including confirmation sampling.

This remedy addresses the principle threats posed by the contamination found at the RRMS.

For the EGWST, FDS-N1, FDS-N2, FDS-SA, and FDS-SF sites, the Air Force has determined that No Action under CERCLA is necessary. The No Action alternatives involve only monitoring of the sites to verify that no unacceptable exposures will occur in the future. Under the No Action alternatives, no treatment or containment of the sites will occur under CERCLA and no institutional controls will be required pursuant to CERCLA to restrict access to these sites.

STATUTORY DETERMINATIONS

The selected remedy for the RRMS is protective of human health and the environment, complies with federal and state Applicable or Relevant and Appropriate Requirements (ARARs) for this action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable, and may satisfy the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, depending on the method of treatment and/or disposal chosen during the design phase.

The method of disposal or treatment of the excavated soils will be determined during the remedial design phase. The determination will reflect the requirements of CERCLA 120(b)(1) that "remedial actions in which treatment which permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances, pollutants or contaminants as a principal element are to be preferred over remedial alternatives not involving such treatment."

Because this remedy will not result in hazardous substances remaining on-site above risk-based levels, the five-year review will not apply to this action.

As the decision for No Action under CERCLA has been made for the EGWST, FDS-N1, FDS-N2, FDS-SA, and FDS-SF sites at OU 5, the statutory requirements of CERCLA Section 121, for remedial actions are not applicable because risk-based levels are not exceeded at these sites and no five-year review will be undertaken.

DECLARATION

The foregoing represents the selection of the remedial action under CERCLA for the RRMS by the USAF and the U.S. Environmental Protection Agency (USEPA), Region I.

It also represents the determination by USAF and USEPA that no remedial action is necessary under CERCLA at the EGWST, FDS-N1, FDS-N2, FDS-SA, and FDS-SF sites.

Concur and recommend for immediate implementation:

By: ______________________ Date: March 22, 1994

Alan K. Olsen
Director
Air Force Base Conversion Agency

By: ______________________ Date: 4/4/94

John P. DeVillars
Regional Administrator
USEPA Region I

DECISION SUMMARY

This decision summary for the Operable Unit (OU) 6 sites at Loring AFB is organized in the following manner to facilitate understanding the rationale for the decisions made relative to each of the six sites which comprise OU 6. Part A addresses the Railroad Maintenance Site (RRMS), and is further subdivided into 13 sections: Section A.1, Site Name, Location, and Description; Section A.2, Site History and Enforcement Activities; Section A.3, Community Participation; Section A.4, Scope and Role of Response Action; Section A.5, Summary of Site Characteristics; Section A.6, Summary of Site Risks; Section A.7, Development and Screening of Alternatives; Section A.8, Description of Alternatives; Section A.9, Summary of the Comparative Analysis of Alternatives; Section A.10, The Selected Remedy; Section A.11, Statutory Determinations; Section A.12, Documentation of No Significant Changes; and Section A.13, State Role.

Part B addresses the East Gate Waste Storage Tanks Site (EGWST) and the Fuel Drop Sites (FDSs), and is subdivided into nine sections: Section B.1, Site Name, Location, and Description; Section B.2, Site History and Enforcement Activities; Section B.3, Community Participation; Section B.4, Scope and Role of No Action Remedy; Section B.5, Summary of Site Characteristics; Section B.6, Summary of Site Risks; Section B.7, Description of No Action Alternative; Section B.8, Documentation of No Significant Changes; and Section B.9, State Role.

PART A RAILROAD MAINTENANCE SITE

A.1 SITE NAME, LOCATION, AND DESCRIPTION

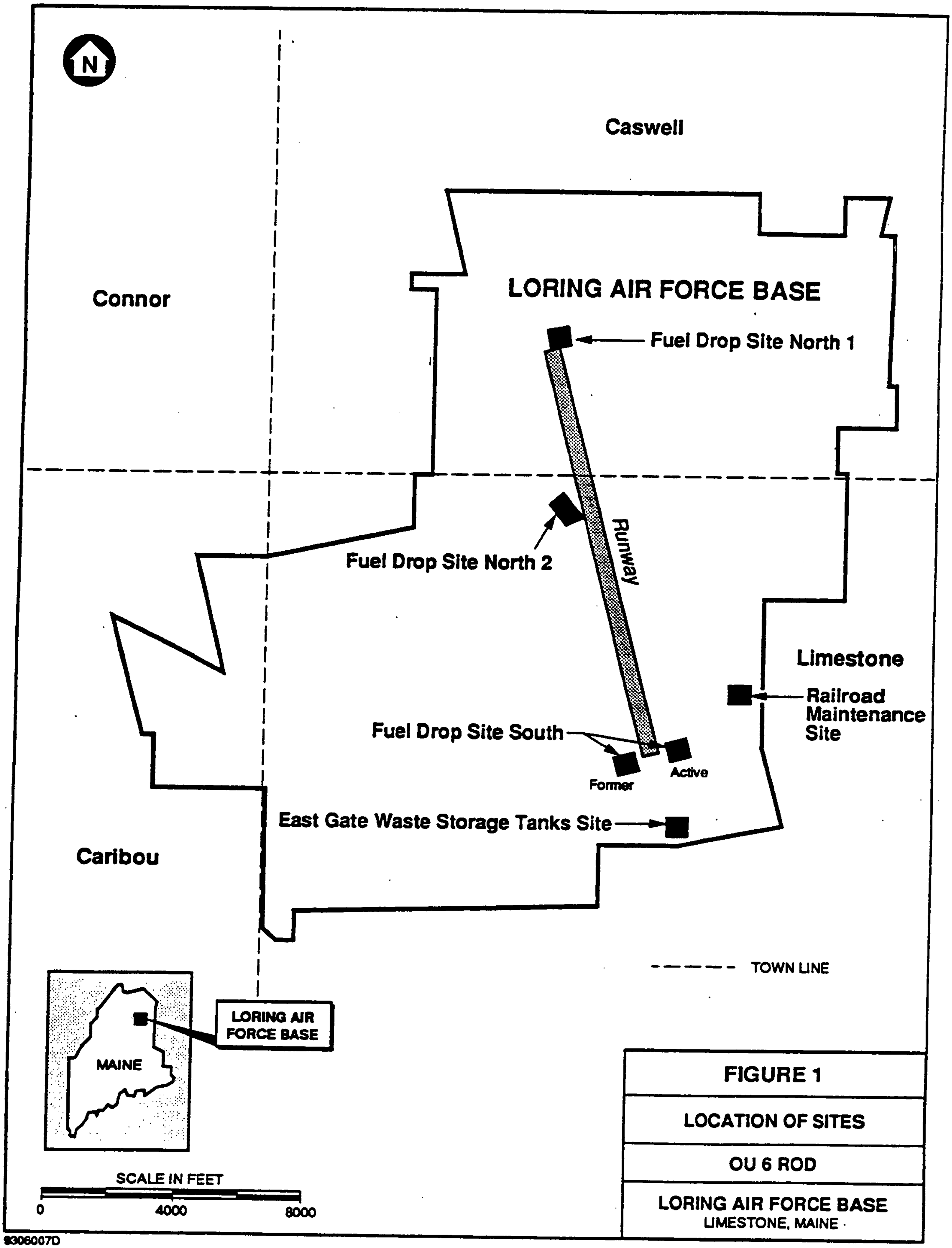
Loring Air Force Base (LAFB) is a National Priorities List (NPL) site. There are currently several areas of concern within LAFB that are under investigation. The areas of concern at LAFB have been organized into 21 operable units (OUs) for remediation purposes. This ROD relates to the Source Control Remedial Action for OU 6, which is comprised of the following sites: the RRMS; the EGWST; and FDSs North 1 and 2 (FDS-N1 and FDS-N2, respectively), South-Active (FDS-SA) and South-Former (FDS-SF) (Figure A.1-1).

LAFB, in northeastern Maine, is bordered on the south and east by the Town of Limestone, on the north by the towns of Caswell and Connor, and on the west by the City of Caribou. The base is approximately three miles west of the United States/Canadian border and covers approximately 9,000 acres. Base operations are expected to gradually decrease until base closure in September 1994.

Because of its primary mission, LAFB personnel are engaged in various operations, a number of which require the use, handling, storage, or disposal of hazardous materials and substances. In the past, these materials entered the environment through accidental spills, leaks in supply piping, landfilling operations, burning of liquid wastes during fire training exercises, and the cumulative effects of operations conducted at the base's flightline and industrial areas. As part of the Department of Defense's (DOD) Installation Restoration Program (IRP), LAFB has initiated activities to identify, evaluate, and remediate former disposal or spill sites containing hazardous materials.

Since initiation of the IRP, the base has been placed on the U. S. Environmental Protection Agency's (USEPA) NPL of sites and will be remediated according to the Federal Facility Agreement (FFA) entered into among USAF, the USEPA, and the state of Maine Department of Environmental Protection (MEDEP).

Part A of the ROD relates to the RRMS. The RRMS is located in the southeastern corner of LAFB about 800 feet from the eastern base boundary.


N
Caswell
Connor
LORING AIR FORCE BASE
Fuel Drop Site North 1
Runway
Fuel Drop Site North 2
Limestone
Railroad
Maintenance
Site
Fuel Drop Site South
Active
Former
East Gate Waste Storage Tanks Site
Caribou
TOWN LINE
LORING AIR
FORCE BASE
MAINE
SCALE IN FEET
0
4000
8000
FIGURE 1
LOCATION OF SITES
OU 6 ROD
LORING AIR FORCE BASE
LIMESTONE, MAINE
9306007D

A.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

This section summarizes the uses, response history, and enforcement activities at the RRMS.

A.2.1 LAND USE AND RESPONSE HISTORY

A more detailed description of the RRMS history can be found in the Remedial Investigation Report/Focused Feasibility Study (RI/FFS).

The RRMS area was used as a maintenance yard for railroad equipment. In 1984, investigators conducting the preliminary assessment (PA) observed 19 drums stored at the site. Some drums were empty, while others contained heavy oil and antifreeze formerly used in maintenance operations at the site. According to verbal reports from base personnel, the drums were placed on-site sometime during the early 1980s. The drum contents were analyzed and properly disposed of by LAFB Civil Engineering. Analytical results from the drum sampling could not be located (CH_2M Hill, 1984). Investigators also observed three areas of stained soil adjacent to a shack in a small clearing. It appeared that these stained areas were the result of surface spills associated with railroad maintenance activities. Based on these observations and the proximity to the base boundary, the site was identified as a potential location where practices may have impacted the environment. The RRMS was added to the IRP for further investigation. In 1989, oil-stained soil was removed from two areas as part of a removal action. Confirmation sample results indicated that all the contaminated soil was not removed (ABB-ES, 1990).

A.2.2 ENFORCEMENT HISTORY

The enforcement history of OU 6 is summarize as follows:

- In 1984, a Preliminary Assessment (PA) was completed by CH_2M Hill detailing historical hazardous material usage and waste disposal practices at LAFB.

- Initial Site Investigation (SI) field work to determine if contaminants were present at the OU 6 sites was conducted in 1985 by R.F. Weston, Inc.

- A Remedial Investigation (RI) process by ABB-ES commenced in 1988 and continued into 1993.
- LAFB was added to the NPL in February of 1990.
- The Air Force entered into an FFA in 1991 with the USEPA and MEDEP regarding the cleanup of environmental contamination at LAFB.
- A Focused Feasibility Study (FFS) was conducted in 1993 for the RRMS, EGWST, and the FDS-SF to determine alternatives for remediation of contamination based on information presented in the RI.

A.3 COMMUNITY PARTICIPATION

Throughout LAFB's history, the community has been active and involved to a high level in base activities. The Air Force and USEPA have kept the community and other interested parties apprised of LAFB activities through informational meetings, fact sheets, press releases, public meetings, site tours and open houses, and Technical Review Committee (TRC) meetings. Membership of the TRC is comprised of Air Force, USEPA, MEDEP, and local officials and community representatives.

During August of 1991, the LAFB community relations plan (CRP) was released. The CRP outlined a program to address community concerns and keep citizens informed about and involved during remedial activities.

On June 24, 1992, Air Force made the administrative record available for public review at the Robert A. Frost Memorial Library, 238 Main Street, Limestone, Maine and at the Office of Public Affairs, 42 CES/CEVR, 7300 Pennsylvania Road, Loring AFB, Maine. The Air Force published a notice and brief analysis of the Proposed Plan in the Bangor Daily News and the Aroostook Republican on July 28, 1993, and made the plan available to the public at the Robert A. Frost Memorial Library.

LAFB held informational meetings on February 23, 1993 in Limestone, March 24, 1993, in Caribou, and April 28, 1993 in Fort Fairfield, Maine to discuss the results of the RI and the clean-up alternatives presented in the FFS, and to present the Air Force's Proposed Plan. Also during this meeting, the Air Force answered questions from the public. From July 28 through August 27, 1993, the Air Force held a 30-day public comment period to accept public input on the alternatives presented in the RI/FFS and the Proposed Plan and on any other documents previously released to the public. On August 23, 1993, LAFB personnel and regulatory representatives held a public meeting to discuss the Proposed Plan and to accept any oral comments. A transcript of this meeting is included in Appendix A, and the comments received during the comment period and the Air Force's response to these comments are included in the Responsiveness Summary in Appendix B.

A.4 SCOPE AND ROLE OF RESPONSE ACTION

The selected remedy for the RRMS is a source control action which provides for excavation of contaminated soil and its disposal off-base at a licensed landfill or treatment facility.

For the RRMS, the key components of the selected remedial action alternative are:

1) mobilization and site preparation;

2) excavation of contaminated surface and/or subsurface soil;

3) disposal of excavated material in an off-base licensed landfill or treatment facility;

4) restoration of the site; and

5) site review including confirmation sampling.

The nature and distribution of contaminants in groundwater will be evaluated as part of OU 12 investigations. The groundwater characterizations are incomplete at the time of this ROD. Additional action will be taken if the groundwater investigation indicates that action is required.

This remedial action will minimize the environmental risks associated with exposure to contaminated surface and subsurface soils at the site.

A.5 SUMMARY OF SITE CHARACTERISTICS

Sections 6.0 of the RI/FFS contains an overview of the RI and field activities at OU 6 through 1991, and Section 11.0 presents the results of a supplemental soil boring and sampling program conducted in 1993 to address data gaps (ABB-ES, 1993b). The significant findings of these investigation are summarized below.

The nature and distribution of contaminants in both surface and subsurface soils at the RRMS are described in the following subsections. Groundwater sampling results are discussed briefly because they provide possible indicators of the impact that contaminants detected in soil may have on groundwater quality. However, the nature and distribution of contaminants in groundwater will be evaluated as part of OU 12 investigations. Surface water is not addressed because no surface water exists at the site. Air contamination is not addressed because there is no evidence indicating that air contamination exists at the site.

A.5.1 SURFACE SOIL

Investigations were conducted between 1985 and 1993 to characterize the nature and extent of contamination at the site. These investigations included power auger borings, excavation of test pits, installation of shallow overburden and bedrock monitoring wells, and field and laboratory analysis of soil and groundwater samples. Laboratory samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides and polychlorinated biphenyls (PCBs), and Target Analyte List (TAL) inorganic compounds using Contract Laboratory Program (CLP) methodology. Some of these samples were also analyzed for total petroleum hydrocarbons (PHC).

Data gathered in 1988 indicated the presence of PHCs including polynuclear aromatic hydrocarbons (PAHs) in soil. To address the soil contamination, a removal action was implemented by the Air Force in 1989. During the removal action, soil was excavated from two oil-stained areas. Approximately 375 cubic yards were excavated from one area and 200 cubic yards were excavated from the other. The detection of PHCs in confirmation samples indicated that not all contamination had been removed.

Figure A.5-1 shows the distribution of contaminants in surface soil at the RRMS. The primary contaminants identified in surface soil at RRMS are PHCs and

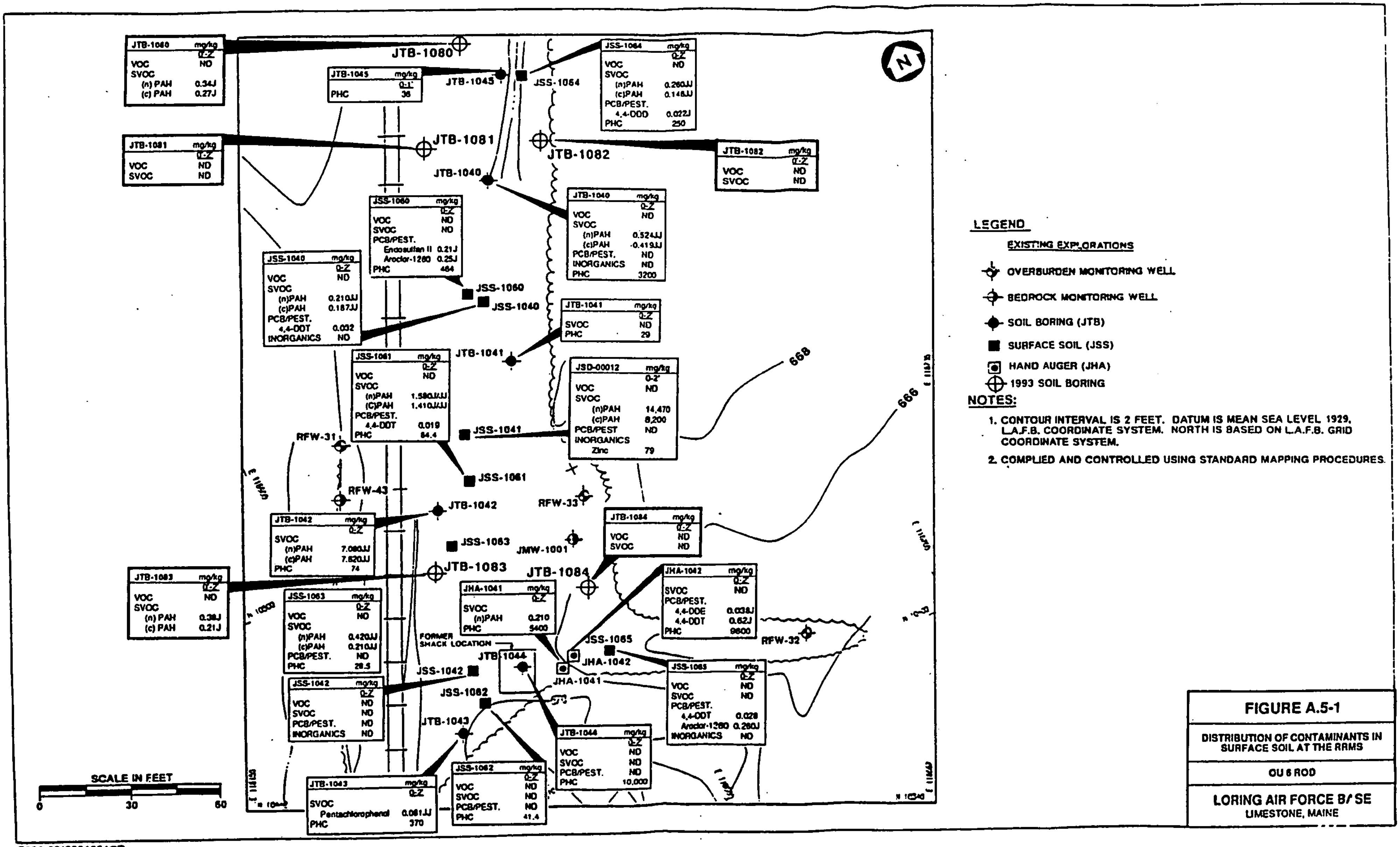


FIGURE A.5-1

DISTRIBUTION OF CONTAMINANTS IN SURFACE SOIL AT THE RRMS

OU 6 ROD

LORING AIR FORCE BASE
LIMESTONE, MAINE

7626-02/9201051CD

carcinogenic and non-carcinogenic PAHs. PHC analyses detected the highest concentrations in the area where the shack was located, in the area where investigators had observed stained soil during the PA, and in the northern portion of the site. The off-site laboratory detected PHCs in seven surface soil samples at concentrations ranging from 28.5 mg/kg (JSS-1063) to 10,000 mg/kg (JTB-1044). PAHs were detected in samples from across the site with the highest detections within 40 feet of the southern edge of the large 1989 excavation. The concentration of PAHs in the majority of samples could not be quantified, since only one CLP sample, JSS-1041, had detections of PAHs that were above the Contract Required Quantitation Limits (CRQLs) (non-carcinogenic PAHs at 14.47 mg/kg and carcinogenic PAHs at 8.2 mg/kg). These detections may represent contaminated soil from the stained area that was not removed in 1989 and was spread over this area by the track clearing operations that occurred after the removal action. Carcinogenic and non-carcinogenic PAHs were detected in six other samples at concentrations that were below the CRQLs or that were estimated because of failure to meet all USEPA quality control guidelines.

Other organic compounds that were detected by off-site analyses include pentachlorophenol, Endosulfan II, and Aroclor-1260. The pesticide Endosulfan II was qualitatively detected in one sample at an estimated concentration of 0.21 mg/kg. No LAFB background concentration has been established for this compound; however, the infrequent detection and low estimated concentration indicate that it may be from pesticide applications. The PCB Aroclor-1260 was qualitatively detected in two samples at estimated concentrations of 0.250 and 0.260 mg/kg; the potential source of this compound is unknown. Pentachlorophenol was qualitatively detected in one sample at an estimated concentration of 0.081 mg/kg, which is below the sample quantitation limit (SQL). Pentachlorophenol is a wood preservative and may have leached out of railroad ties.

The only inorganic compound detected above LAFB background was zinc. Zinc was detected at 79 mg/kg which is very close to the maximum background concentration of 74 mg/kg. If the zinc detected is related to past site activities, its low concentration indicates that it could have come from a galvanized metal object that was set on the ground and rusted (i.e., a metal pail).

A.5.2 Subsurface Soil

Figure A.5-2 shows the distribution of contaminants in subsurface soil at the RRMS. The primary contaminants detected in off-site laboratory analyses in RRMS subsurface soil are low concentrations of PHCs in the 4- to 6-foot sample from JTB-1042 (25 mg/kg) at the former shack location and in the 2- to 4-foot sample from JTB-1044 (66 mg/kg) southwest of the large area of soil removal, and a detection in 1993 of fluoranthene, a non-carcinogenic PAH, in the 8- to 10-foot sample from JTB-1080 (0.53 mg/kg) in the northern part of the site. These low concentrations may represent limited downward migration of surface spills.

CLP analyses also detected PAHs in two samples from the pre-1993 investigation at concentrations below the CRQLs. In addition, two samples from 1993 at JTB-1080 also showed carbazole, an incomplete combustion by-product, and some other previously undetected PAHs. No inorganics were detected at concentrations above LAFB background ranges.

A.5.3 Groundwater

One round of groundwater sampling was collected at the RRMS each year from 1988 through 1991. Contaminants were only detected sporadically and at low concentrations. Fuel-related compounds (i.e., xylene) were detected in soil at the site. The PHCs, 2-methylnaphthalene, and oil and grease detected in groundwater may indicate that soil contamination is impacting groundwater. The potential sources of vinyl chloride and phenol, each detected in one sample, are unknown. Groundwater will be evaluated in OU 12.

A.5.4 Migration Pathways

The media into which chemicals migrate can affect the types of exposures that could occur. Potential migration pathways at the RRMS are by wind (advection of volatiles, or wind erosion of soil particles with adhering contaminants), leaching through soils by water infiltration, and groundwater. Based on topographic relief at the site and the interpreted distribution of contaminants, minimal overland flow of contaminants is anticipated. The detection concentrations of VOCs and TPHs in the groundwater at the site, indicates that contaminants may have migrated from the surface through the unsaturated zone and locally to the saturated zone.

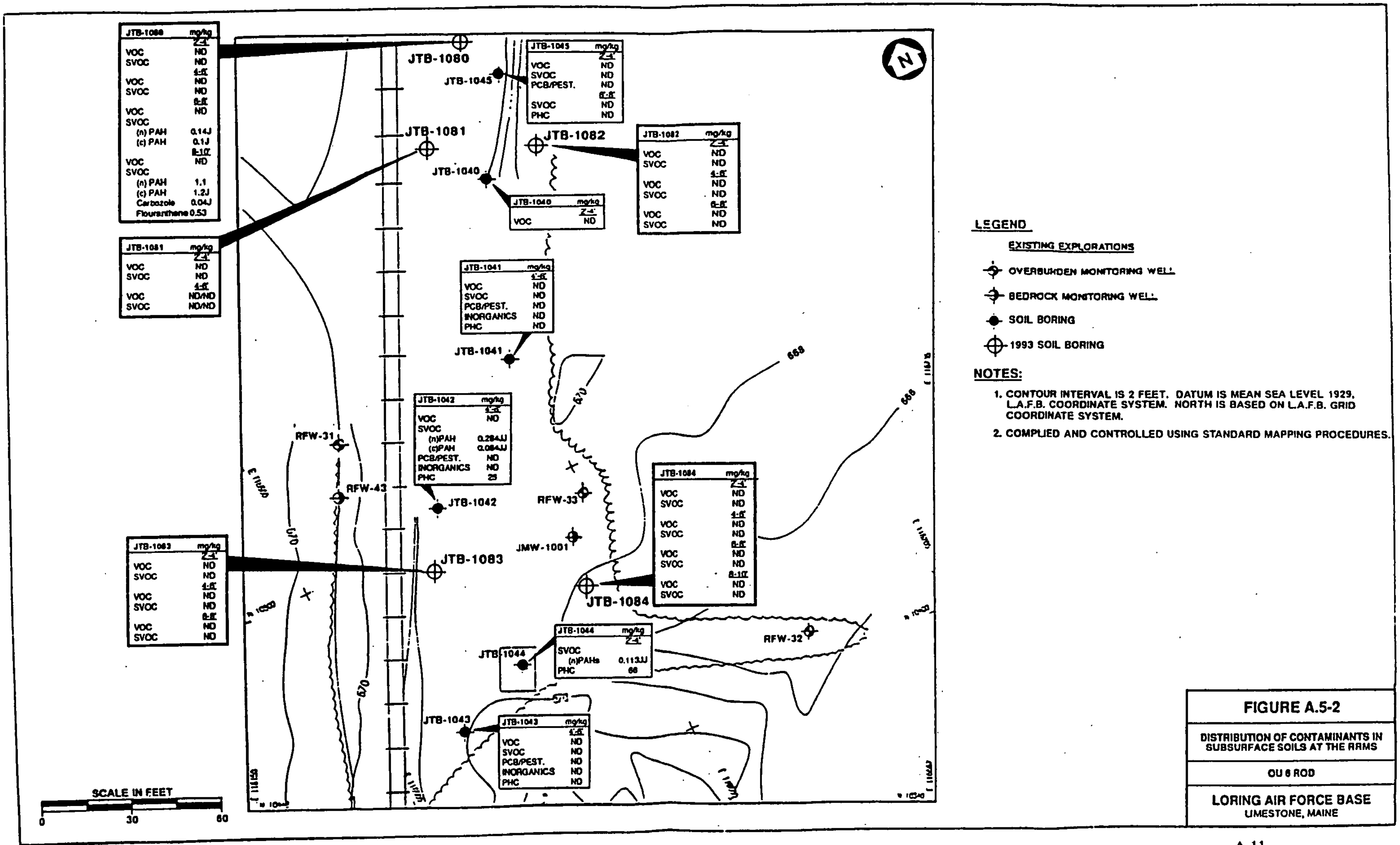


FIGURE A.5-2

DISTRIBUTION OF CONTAMINANTS IN SUBSURFACE SOILS AT THE RRMS

OU 6 ROD

LORING AIR FORCE BASE
LIMESTONE, MAINE

Contaminant migration in the vadose zone is limited by the physical properties of the bulk contaminants and the pore size available for migration. Further migration of contaminants may occur as leaching and degradation of contaminants continues in the dissolved phase. Rainfall and snowmelt will continue to infiltrate and percolate through the soil at the site and provide the mechanism for the leaching of soluble contaminants.

A discussion of site characteristics can be found in the RI/FFS in Sections 6.0 and 11.0.

A.6 SUMMARY OF SITE RISKS

A Risk Assessment was performed to estimate the potential risks to human health and the environment from exposure to contaminants associated with the RRMS. 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.

The results of the human health risk assessment for the site are discussed below followed by a discussion of the ecological risk assessment. As discussed below, the human health risk assessment under all scenarios did not exceed USEPA's acceptable risk of $1x10^{-4}$. However, the ecological risk assessment demonstrated that there was an unacceptable risk.

A.6.1 HUMAN HEALTH RISK ASSESSMENT

The contaminants of concern to human health identified for the RRMS, listed in Table A.6-1, were selected for evaluation in the risk assessment and include 33 surface soil and 11 subsurface soil contaminants of concern. These contaminants constitute a representative subset of the contaminants identified at the site during the RI. The 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 Subsection 8.2.3, Tables 8-6 and 8-7, of the RI/FFS (ABB-ES, 1993b).

Human health risks associated with exposure to the contaminants of concern were quantitatively evaluated under both current (groundskeeper and child trespasser) and future (residential and construction worker) land-use scenarios. Several hypothetical exposure pathways were developed to reflect the potential for exposure to surface and subsurface soils. The following is a brief summary of the exposure pathways

TABLE A.6-1
CONTAMINANTS OF CONCERN TO HUMAN HEALTH
RAILROAD MAINTENANCE SITE

OU 6 ROD
LORING AIR FORCE BASE

COMPOUND	RANGE OF SQLs** (mg/kg)	FREQUENCY OF DETECTION	MAXIMUM DETECTED CONCENTRATION (mg/kg)	MINIMUM DETECTED CONCENTRATION (mg/kg)	MEAN (mg/kg)	BACKGROUND RANGE (mg/kg)
Surface Soil						
Zinc	**	5/5	79	19.3	62.9	45-74
4,4'-DDD	0.0044 - 0.022	1/11	0.022	0.022	0.00822	<0.0076 - 0.47
4,4'-DDE	0.0044 - 0.022	1/11	0.038	0.038	0.00922	<0.0076 - 0.14
4,4'-DDT	0.0074 - 0.022	4/11	0.062	0.019	0.0171	<0.0076 - 0.94
Aroclor-1260	0.074 - 0.22	2/11	0.26	0.25	0.107	NA
Endosulfan II	0.0044 - 0.022	1/11	0.021	0.021	0.00817	NA
2-Methylnaphthalene	0.38 - 1.941	1/16	0.15	0.15	0.16	NA
Acenaphthene	0.38 - 1.941	1/16	0.23	0.23	0.165	NA
Acenaphthylene	0.38 - 1.941	2/16	0.15	0.14	0.131	NA
Anthracene	0.38 - 1.941	2/16	0.26	0.16	0.139	NA
Benzo(a)anthracene	0.38 - 1.941	3/16	1.1	0.079	0.236	NA
Benzo(a)pyrene	0.38 - 1.941	2/16	1.1	0.9	0.238	NA
Benzo(b)fluoranthene	0.38 - 1.941	6/16	3.1	0.086	0.464	NA
Benzo(g,h,i)perylene	0.38 - 1.941	2/16	0.72	0.68	0.201	NA
Benzo(k)fluoranthene	0.38 - 1.941	2/13	0.11	0.06	0.104	NA
Benzoic acid	2.1 - 9.412	3/11	0.29	0.069	*	NA
Butylbenzylphthalate	0.38 - 0.51	2/16	0.94	0.88	0.321	NA
Chrysene	0.38 - 1.941	4/16	2.2	0.077	0.353	NA
Di-n-butylphthalate	0.38 - 0.51	4/16	0.63	0.062	0.247	NA
Di-n-octylphthalate	0.38 - 0.51	2/16	0.77	0.7	0.3	NA
Dibenz(a,h)anthracene	0.38 - 1.941	1/16	0.15	0.15	0.16	NA
Dibenzofuran	0.38 - 1.941	1/16	0.27	0.27	0.168	NA
Diethylphthalate	0.38 - 0.51	3/16	0.82	0.17	0.29	NA
Fluoranthene	0.38 - 1.868	7/16	4.3	0.11	0.537	NA
Fluorene	0.38 - 1.941	1/16	0.4	0.4	0.176	NA
Indeno(1,2,3-c,d)pyrene	0.38 - 1.941	2/16	0.82	0.75	0.211	NA
Naphthalene	0.38 - 1.941	1/16	0.23	0.23	0.165	NA
Pentachlorophenol	2 - 9.412	1/16	0.081	0.081	*	NA
Phenanthrene	0.38 - 1.941	3/16	4	0.084	0.389	NA
Pyrene	0.38 - 1.941	5/16	3.8	0.1	0.484	NA
Bis(2-ethylhexyl)phthalate	0.38 - 0.51	3/16	4.5	0.083	0.737	NA
Total Carcinogenic PAHs			8.58		1.76	NA
Totals PAHs without RfDs			13.83		2.81	NA

continued

TABLE A.6-1
CONTAMINANTS OF CONCERN TO HUMAN HEALTH
RAILROAD MAINTENANCE SITE

OU 6 ROD
LORING AIR FORCE BASE

COMPOUND	RANGE OF SQLs** (mg/kg)	FREQUENCY OF DETECTION	MAXIMUM DETECTED CONCENTRATION (mg/kg)	MINIMUM DETECTED CONCENTRATION (mg/kg)	MEAN (mg/kg)	BACKGROUND RANGE (mg/kg)
Subsurface Soil						
Butylbenzylphthalate	0.363 – 0.388	2/6	0.22	0.21	0.196	NA
Chrysene	0.363 – 0.388	1/6	0.084	0.084	0.0453	NA
Di-n-butylphthalate	0.363 – 0.388	2/6	0.11	0.1	0.159	NA
Di-n-octylphthalate	0.363 – 0.388	2/6	0.25	0.23	0.204	NA
Diethylphthalate	0.363 – 0.388	2/6	0.13	0.11	0.164	NA
Fluoranthene	0.363 – 0.388	2/6	0.14	0.06	0.0333	NA
Phenanthrene	0.363 – 0.388	1/6	0.044	0.044	0.0386	NA
Pyrene	0.363 – 0.388	2/6	0.1	0.053	0.0255	NA
Bis(2-ethylhexyl)phthalate	0.363 – 0.371	4/6	1.2	0.076	0.474	NA
Total Carcinogenic PAHs			0.084		0.0453	NA
Totals PAHs without RfDs			0.368		0.1427	NA

NOTES:

See Section 2.7.1 of RI/FFS for discussion.

Range of Sample Quantitation Limits for parameters reported as "not detected" in a sample.

NA = No background data available.

evaluated. A more thorough description can be found in Subsection 8.2 of the RI/FFS (ABB-ES, 1993b).

Current exposure scenarios include occupational land use (adult-groundskeeper) and recreational land use (child-trespasser). Future scenarios include adult and child resident and occupational adult (i.e., construction worker for subsurface soils). Soil exposure includes incidental ingestion, dermal absorption, and inhalation of particulates for both current and future land use scenarios. Exposure to groundwater was not considered as an exposure pathway, because groundwater will be considered in a separate operable unit. The potential future land use by a farm family (referred to as the resident farmer scenario) was considered and eliminated from further evaluation based on soil limitations not due to contamination that make soils generally unsuitable for cultivated crops, pasture, or hayland (e.g., surface stoniness) (USDA-SCS, 1986).

Different exposure levels were evaluated for the exposure pathways in the risk assessment. The parameters and assumptions used to determine the exposure levels for each pathway are described in Tables A through J in Appendix J of the RI/FFS (ABB-ES, 1993b). For dermal contact and ingestion of soils in the residential scenario, a child was evaluated based on the assumed exposure of 182 days per year (it is assumed that the soil is frozen or snow-covered 26 weeks of the year) for six years, with 24 years for an adult (USEPA, 1991a). For the current groundskeeper scenario, dermal contact and ingestion of soils was based on an assumed exposure of 26 days per year (1 day per week for 26 weeks) for 25 years (USEPA, 1991a). For the future construction worker, dermal contact and ingestion exposure was assumed to be for 130 days per year for 1 year. For the residential inhalation pathway, an exposure time of 16 hours per day was assumed for a period of 70 years for both the child and adult (USEPA, 1991a). This exposure time was utilized in all OU 6 RI calculations for residential scenarios. For the groundskeeper, the inhalation exposure was assumed to be 8 hours per day, 26 days per year, and for the construction worker, the inhalation exposure was assumed to be 8 hours per day, 130 days per year. For each pathway evaluated, an average and a reasonable maximum exposure (RME) estimate was generated corresponding to exposure to the average and the maximum concentration detected in that particular medium.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying the exposure level with the chemical-specific cancer potency factor. Cancer potency 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., 1×10^{-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 as defined 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 USEPA's measure of the potential for non-carcinogenic health effects. A hazard quotient (HQ) 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. Reference doses have been developed by USEPA to protect sensitive individuals over the course of a lifetime and they reflect a daily exposure level that is likely to be without an appreciable risk of an adverse health effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. The HQ is often expressed as a single value (e.g., 0.3) indicating the ratio of the stated exposure to the reference dose 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). The target risk level for noncarcinogenic effects is an HI of 1.0 (USEPA, 1989b). If the ratio is less than 1.0, no adverse health effect is anticipated. If the ratio exceeds 1.0, there may be a concern for potential noncancer effects. (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).

Table A.6-2 depicts the risk summary for the contaminants of concern to human health in surface soil evaluated to reflect present and potential future incidental ingestion, dermal contact, and inhalation exposure pathways corresponding to the average and the RME scenarios.

Quantitative estimates of both carcinogenic and non-carcinogenic risks were calculated for each contaminant of concern identified and each complete exposure scenario selected for evaluation in the exposure assessment. The equations for

TABLE A.6-2
RISK SUMMARIES
RAILROAD MAINTENANCE SITE

OU 6 ROD
LORING AIR FORCE BASE

	AVERAGE		MAXIMUM	
	Total Cancer Risk	Total Hazard Index	Total Cancer Risk	Total Hazard Index
CURRENT USE				
Incidental Ingestion of Surface Soil: Groundskeeper	2E-07	0.00003	1E-06	0.00007
Dermal Contact with Surface Soil: Groundskeeper	8E-07	0.00006	4E-06	0.0002
Inhalation Exposure to Particulates: Groundskeeper	3E-09	NA	2E-08	NA
TOTAL: Groundskeeper	**1E-06**	**0.00009**	**5E-06**	**0.0003**
Incidental Ingestion of Surface Soil: Older Child Exploring	3E-07	0.00009	1E-06	0.0002
Dermal Contact with Surface Soil: Older Child Exploring	1E-06	0.0003	7E-06	0.001
TOTAL: Older Child	**2E-06**	**0.0004**	**8E-06**	**0.001**
FUTURE USE				
Incidental Ingestion of Surface Soil: Residential Adult	3E-06	0.0004	2E-05	0.001
Dermal Contact with Surface Soil: Residential Adult	5E-06	0.0004	2E-05	0.002
Inhalation Exposure to Particulates: Residential Adult	2E-08	NA	9E-08	NA
TOTAL: Residential Adult	**8E-06**	**0.0008**	**4E-05**	**0.003**
Incidental Ingestion of Surface Soil: Residential Child	7E-06	0.004	4E-05	0.01
Dermal Contact with Surface Soil: Residential Child	1E-05	0.004	5E-05	0.01
Inhalation Exposure to Particulates: Residential Child	3E-08	NA	1E-07	NA
TOTAL: Residential Child	**2E-05**	**0.007**	**9E-05**	**0.02**
Incidental Ingestion of Surface Soil: Construction Worker	1E-08	0.00009	2E-08	0.0002
Dermal Contact with Surface Soil: Construction Worker	4E-09	0.00003	7E-09	0.00006
Inhalation Exposure to Particulates: Construction Worker	6E-11	NA	1E-10	NA
TOTAL: Construction Worker	**2E-08**	**0.0001**	**3E-08**	**0.0003**
Ingestion of Groundwater: Residential Adult (Summers Model) – North Area			9E-06	0.006
Dermal contact with groundwater: Residential Adult			1E-05	0.0014
TOTAL: Residential Adult			**2E-05**	**0.008**
Ingestion of Groundwater: Residential Adult (Summers Model) – South Area			3E-05	0.02
Dermal contact with groundwater: Residential Adult			4E-05	0.007
TOTAL: Residential Adult			**7E-05**	**0.03**

NOTES:
NA – Toxicity data not available to evaluate risks

22-Oct-93 \TabA.6-2

calculating chemical-specific and pathway-specific cancer risks and hazard quotients are presented in Appendix J, Section 2.0, of the RI/FFS (ABB-ES, 1993b). The quantitative risk estimate tables for the RRMS are presented in Tables 1 through 20 in Appendix J of the RI Report.

Surface Soils

The highest cancer risk associated with exposure to surface soils under current land use is for the recreational (older child/trespassing) exposure with a cancer risk = $2x10^{-6}$ for the average exposure scenario and a cancer risk = $8x10^{-6}$ for the reasonable maximum exposure (RME) scenario (Table A.6-2). These are below MEDEP's target cancer risk level ($1x10^{-5}$) and did not exceed USEPA's acceptable risk of $1x10^{-4}$. Carcinogenic PAHs are responsible for the majority of risk associated with exposure to surface soils (PAHs = $8x10^{-6}$ for the RME scenario).

The potential future residential land-use scenario presents the greatest potential risk to human health (see Table A.6-2), because of the potential for long-term, repetitive exposure to soil contaminants and the conservative assumptions involving soil ingestion rates. The highest carcinogenic risks are associated with future residential exposure to children ($2x10^{-5}$ for the average exposure scenario; $9x10^{-5}$ for the RME scenario) and adults ($8x10^{-6}$ for the average exposure scenario and $4x10^{-5}$ for the RME scenario). These risk estimates represent the sum of the ingestion, dermal, and inhalation pathways for soil. The average exposure scenario risk for children and the RME risk for both adults and children exceed MEDEP's target cancer risk level of $1x10^{-5}$, but none exceeds USEPA's acceptable risk of $1x10^{-4}$. The total 30-year residential risk (the sum of the child and adult residential exposures) is $3x10^{-5}$ for the average exposure scenario and $1x10^{-4}$ for the RME scenario. The RME risk is equal to USEPA's limit while the average exposure scenario risk is below the USEPA's limit and slightly exceeds MEDEP's target level. Cancer risks for all other soil exposure scenarios are below the MEDEP target cancer risk level. Exposure to carcinogenic PAHs accounts for most of the risk involving contaminated surface soils (i.e., future residential exposure to children: $8x10^{-5}$ [RME scenario]; future residential exposure to adults: $4x10^{-5}$ [RME scenario]).

HI values for all soil-related exposure scenarios are below 1.0. Non-carcinogenic health risks are not of concern.

The concentrations of contaminants potentially leached from the soil were derived using the Summers Model (Appendix L of the RI/FFS). These concentrations were used to evaluate potential risks from chemicals that do not have a groundwater standard. Evaluation of the future groundwater ingestion scenario using the modeled concentrations yields an excess cancer risk of $7x10^{-5}$ in the southern area of the site. This value exceeds the MEDEP target cancer risk level and is below the USEPA's limit. The compounds detected in surface soils (primarily PAHs) evaluated in the Summers Model were not detected in the groundwater at this site. PAHs tend to sorb to soil particles and are not readily leached to groundwater, thus, the risk associated with the modeled values may be overestimated. The existing groundwater quality data is not conclusive because groundwater investigations are ongoing as part of OU 12. If data gathered during that investigation change the interpretation of the site conditions, the need for additional work at the site will be evaluated and work performed if necessary.

The non-carcinogenic HIs associated with exposure under all scenarios were well below 1.0. The greatest systemic hazards calculated for the site were predicted for the future residential child (HI = 0.02) using maximum soil concentrations and the hazard associated with adult residential ingestion of groundwater based on Summers modeled potential groundwater concentrations (HI = 0.03). These HIs indicate minimal non-carcinogenic hazards to human health from site soils.

Subsurface Soils

The risks associated with exposure to subsurface soils for a potential future resident were not quantitatively evaluated based on the assumption that the majority of residential exposure to soils would occur in the interval from 0 to 2 feet bgs. However, a qualitative evaluation was performed by comparing risk estimates calculated for surface soils with conditions in subsurface soils. A data review indicates that fewer chemicals were detected in subsurface soils (31 contaminants of concern in surface soils; nine contaminants of concern in subsurface soils), and those chemicals that were detected in the subsurface soils were at lower concentrations than in surface soils (all the maximum detects were less than or equal to 33 percent of the surface concentrations and some were as much as two orders of magnitude less than surface concentrations).

The estimated adult residential cancer risk for the average exposure scenario (average being more representative of actual risks) from dermal exposure, incidental ingestion, and inhalation of particulates from surface soils was $8x10^{-6}$, and the estimated child residential cancer risk for the average exposure scenario was $2x10^{-5}$. Based on the fact that exposures to subsurface soils would be expected to be less than exposures to surface soils and risks from exposure to surface soils are below MEDEP's target risk level of $1x10^{-5}$ for adults (and slightly greater than MEDEP's target risk level for children), it is unlikely that adverse health effects would be expected from potential future residential exposures to subsurface soils.

The risk to a potential future construction worker was evaluated using an excavation scenario. The total cancer risks associated with dermal, ingestion, and inhalation exposure to subsurface soils were $2x10^{-8}$ for an average exposure scenario and $3x10^{-8}$ for the RME scenario. These cancer risks are below both USEPA and MEDEP target risk levels.

The non-carcinogenic HIs associated with construction worker exposure to subsurface soils are well below 1.0, indicating minimal non-carcinogenic hazards to human health.

Uncertainty Evaluation

Quantitative estimates of risk are based on numerous assumptions, most of which are intended to be protective of human health (i.e., conservative). As such, risk estimates are not truly probabilistic estimates of risk but are conditional estimates given a series of conservative assumptions about exposure and toxicity. While it is true that there are some uncertainties inherent in the risk assessment methodology that might lead to an underestimation of true risks, most assumptions will bias an evaluation in the direction of overestimation of risk.

The possibility for underestimation of true risks is caused by the exclusion from quantitative evaluation of several pathways (i.e., residential exposures to potentially excavated subsurface soils spread aboveground and ingestion of homegrown produce from backyard garden plots). Under certain circumstances, these pathways may be significant and, therefore, may be quantitatively evaluated in those cases. As mentioned, the subsurface soils at the RRMS are less contaminated than surface soils, and therefore quantitative evaluation of residential risks from exposure to subsurface soils would be less than that evaluated for exposure to surface soils. The possibility for a backyard garden plot is considered slight at sites that are less than 1 acre. The RRMS is less than one-half acre.

As stated, the RI Report does not evaluate the risks associated with exposures to groundwater at the RRMS other than the evaluation of the leaching potential for contaminants in soils using the Summers Model. Groundwater at the site will be evaluated as a separate operable unit. This could cause underestimation of total risk from the site if the risk from groundwater proves significant. Should this occur, reevaluation of total site risks would be warranted.

Because benzo(a)pyrene and naphthalene are the most toxic representatives of carcinogenic and non-carcinogenic PAHs, respectively, the use of their toxicity values to estimate the adverse effects of exposure to PAHs lacking specific toxicity values will likely result in overestimation of risks. Other sources of uncertainty that could cause overestimation of risks include: the use of purposive (biased) sampling (targeting only the "hot spots"); the estimation of exposure concentrations by the use of maximum detections (while assuming no degradation, dilution, and so forth); the use of the 95 percent (or upper-bound 90 percent) exposure parameter values such as contact rate and exposure frequency and duration; and the use of conservatively derived toxicity values such as RfDs (incorporating multiple safety factors) and cancer slope factors (CSFs), which are based on experimental animal data used in a multistage model. The USEPA Risk Assessment Guidance states that the carcinogenic risk estimate will generally be an upper-bound estimate, and that USEPA is reasonably confident that the 'true risk' will not exceed the risk estimate derived through use of this model and is likely to be less than predicted (USEPA, 1989b). Therefore, the true risk is likely not much more than the estimated risk, but it could very well be considerably lower, even approaching zero.

A.6.2 Ecological Risk Assessment

The contaminants of concern to ecological receptors identified for the RRMS, listed in Table A.6-3, were selected for evaluation in the risk assessment and include 29 surface soil contaminants of concern. These contaminants constitute a representative subset of the contaminants identified at the site during the RI. The 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 Final RI/FFS (ABB-ES, 1993b).

TABLE A.6-3
CONTAMINANTS OF CONCERN TO ECOLOGICAL RECEPTORS
RAILROAD MAINTENANCE SITE

OU 6 ROD
LORING AIR FORCE BASE

COMPOUND	AVERAGE (mg/kg)	FREQUENCY OF DETECTION	MAXIMUM DETECTED CONCENTRATION (mg/kg)	BACKGROUND MAXIMUM (mg/kg)
2-Methylnaphthalene	0.150 [a]	1/15	0.150	NA
Acenaphthene	0.165	1/15	0.230	NA
Acenaphthylene	0.131	2/15	0.150	NA
Anthracene	0.139	2/15	0.260	NA
Benzo(a)anthracene	0.236	4/15	1.100	NA
Benzo(a)pyrene	0.238	3/15	1.100	NA
Benzo(b)fluoranthene	0.464	7/15	3.100 [b]	NA
Benzo(g,h,i)perylene	0.201	3/15	0.720	NA
Benzo(k)fluoranthene	0.104	6/15	3.100 [b]	NA
Benzoic acid	0.290 [a]	3/10	0.290	NA
Chrysene	0.353	5/15	2.200	NA
Di-n-butylphthalate	0.247	4/15	0.630	NA
Di-n-octylphthalate	0.300	2/15	0.770	NA
Dibenz(a,h)anthracene	0.150 [a]	1/15	0.150	NA
Dibenzofuran	0.168	1/15	0.270	NA
Diethylphthalate	0.290	3/15	0.820	NA
Fluoranthene	0.537	8/15	4.300	NA
Fluorene	0.176	1/15	0.400	NA
Indeno(1,2,3-c,d)pyrene	0.211	3/15	0.820	NA
Naphthalene	0.165	3/15	0.230	NA
Pentachlorophenol	0.081 [a]	1/15	0.081	NA
Phenanthrene	0.389	4/15	4.000	NA
Pyrene	0.484	6/15	3.800	NA
4,4'-DDD	0.008	1/11	0.022	NA
4,4'-DDE	0.009	1/11	0.038	NA
4,4'-DDT	0.017	4/11	0.062	NA
Endosulfan II	0.008	1/11	0.021	NA
Aroclor-1260	0.107	2/11	0.260	NA
Zinc	63	5/5	79	74

NOTES:
[a] When calculated average exceeded maximum value, maximum was used.
[b] Benzo(b)fluoranthene and benzo(kfluoranthene values were not speciated by the lab. Repoorted as summed total.
NA = no background data available.

22-Oct-93 \Table 8-10

The ecological risk assessment selected five terrestrial wildlife indicator species to represent exposure for terrestrial organisms through ingestion of food and soil:

- short-tailed shrew (*Blarina brevicauda*), small mammal, carnivore
- American woodcock (*Scolopax minor*), small bird, omnivore
- garter snake (*Thamnophis s. sirtalis*), reptile, carnivore
- fisher *(Martes pennanti)* predatory mammal, carnivore
- broad-winged hawk (*Buteo platypterus*), predatory bird, carnivore

Use of these species in estimating risk is conservative because the species are predominantly carnivorous, and therefore prone to exposure to chemicals through the food chain. Organisms with small home ranges, such as the shrew and garter snake, and/or that ingest a high proportion of earthworms and other terrestrial invertebrates, are particularly susceptible to food chain exposures.

These indicator species were chosen for the following reasons: (1) the species are all potential ecological receptors at the RRMS; (2) the various feeding habits (e.g., omnivore, carnivore) are representative of those typical of the terrestrial ecological community; and (3) these species were recommended for a conservative evaluation of ecological risk by USEPA and U.S. Fish and Wildlife Service (USFWS) (USEPA, 1991c). The fisher, a wide-ranging and wary animal, may occur at the RRMS because the site is relatively undisturbed and isolated from human activity. It is assumed that each of the indicator species chosen is the most sensitive representative of other species at a similar trophic position occurring at the RRMS. Modeling of chemical exposures for rare, threatened or endangered species was not performed as no such species have been identified at LAFB (see Subsection 8.3.2 of the RI Report [ABB-ES, 1993b]).

The HIs for the RRMS range from a low of 0.00081 (chronic exposure for the fisher) to a high of 99 (chronic exposure for shrews). Based on the HIs, indicator species may be adversely affected by chemicals in surface soils at the RRMS. Adverse effects related to short-term exposures to the surface soils are predicted for all indicator species at the RRMS. Adverse effects related to long-term exposures are possible for small mammals, small birds, and reptiles.

Benzo(a)pyrene is the greatest contributor to potential risks associated with acute exposures at the RRMS, based on the results of food-web modeling. Benzo(a)pyrene is also the major contributor to risks associated with chronic exposures at the RRMS.

This is due in part to the conservativism used in selecting the lowest Reference Toxicity Value (RTV) identified in the literature for benzo(a)pyrene. The chronic RTV for benzo(a)pyrene (0.002 mg/kgBW-day) was chosen because it results in the most conservative estimation of risk. The HQs for indicator species for benzo(a)pyrene in the chronic scenario are therefore higher than for any other chemical of potential concern (e.g., chronic HQ = 80 for shrew for RRMS, while the next closest HQ is that for dibenz(a,h)anthracene, HQ = 17). In the chronic exposure scenario, only two contaminants of concern have a HQ higher than 1 for any of the five indicator species. The benzo(a)pyrene HQ exceeds 1 only for the shrew (HQ = 80) and the woodcock (HQ = 1.2). The dibenz(a,h)anthracene chronic scenario HQ exceeds 1 only for the shrew (HQ = 17).

The acute RTVs for benzo(a)pyrene and dibenz(a,h)anthracene were derived by multiplying the very conservative chronic RTV by a factor of 10 because there are no data available for effects related to acute exposures. The acute RTV should not be interpreted as a lethal dose, but as a possible (although unlikely) sublethal effects dose level.

Adverse effects associated with acute exposure are probable for the shrew and the woodcock, and possible for the snake, the fisher, and the hawk. Three contaminants of concern have an HQ higher than 1.0 for any of the five indicator species. The benzo(a)pyrene HQ exceeds 1.0 for the shrew (HQ = 87), the woodcock (HQ = 50), the snake (HQ = 4.3), the fisher (HQ = 1.1), and the hawk (HQ = 2.3). The dibenz(a,h)anthracene acute scenario HQ exceeds 1.0 only for the shrew (HQ = 4.0), and the woodcock (HQ = 2.3). Aroclor-1260 contributes to risk associated with acute exposures predicted for the fisher (HQ = 2.9) at the RRMS.

Using the relative ranking scheme described above, HIs indicate that effects to individuals are probable although they do not necessarily provide an indication of population effects. In certain cases, acute and chronic effects to individuals may occur with little effect on population growth, stability or structure.

Despite the conservative nature of the benzo(a)pyrene RTV, adverse effects are predicted with significant hazard indices for short-term exposures to all indicator species, and an unacceptable risk is predicted for some species from other contaminants of concern. Unacceptable risk is also predicted through long-term exposures to a number of the indicator species. Because little is known about the additive effects of the contaminants on the indicator species, the multiple contaminants producing HIs greater than 1.0, the prediction of adverse effects on many of the indicator species through either exposure scenario, and the habitat present at the site creating an exposure pathway, actual or threatened releases of hazardous substances at this site, if not addressed by implementing the response action in this ROD, may present an imminent and substantial endangerment to the environment.

A.7 DEVELOPMENT AND SCREENING OF ALTERNATIVES

A.7.1 STATUTORY REQUIREMENTS/RESPONSE OBJECTIVES

Under its legal authority, the Air Force's primary responsibility at this NPL site is to undertake remedial actions that are protective of human health and the environment. Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that the Air Force's 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 the Air Force select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances is a principal element over remedies not involving such treatment. 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 action objectives were developed to aid in the development and screening of alternatives. These remedial action objectives were developed to mitigate existing and future potential threats to public health and the environment. For the RRMS, these response objectives were:

- Reduce human health risk associated with carcinogenic PAH-contaminated surface soil.
- Reduce the ecological risk associated with the contaminated surface soil.

Based on these objectives and the results of the RI, the estimated volume of soil requiring remedial action at this site is 200 cubic yards (cy).

A.7.2 TECHNOLOGY AND ALTERNATIVE DEVELOPMENT AND SCREENING

CERCLA and the NCP set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives were developed for the site.

With respect to source control, the RI/FFS developed a range of alternatives in which treatment that reduces the toxicity, mobility, or volume of the hazardous substances is a principal element. This range included an alternative that removes or destroys hazardous substances to the maximum extent feasible, eliminating or minimizing to the degree possible the need for long-term management. This range also included: alternatives that treat the principal threats posed by the site but vary in the degree of treatment employed and the quantities and characteristics of the treatment residuals and untreated waste that must be managed; alternative(s) that involve little or no treatment but provide protection through engineering or institutional controls; and a No Action Alternative.

The RI/FFS screened technologies based on implementability, effectiveness, and cost. These technologies were combined into remedial action alternatives. Subsection 13.4 of the RI/FFS presents the remedial alternatives developed by combining the technologies identified in the previous screening process in the categories identified in Section 300.430(e) (3) of the NCP. The purpose of the initial screening was to narrow the number of potential remedial actions for further detailed analysis while preserving a range of options. Each alternative was then evaluated and screened according to its implementability, effectiveness, and cost.

In summary, two of the remedial alternatives screened in Subsection 13.2 of the RI/FFS were retained for detailed analysis. Table A.7-1 identifies the seven general response alternatives that were retained through the screening process, including those that were eliminated from further consideration. In addition, a true No Action Alternative (i.e., involves no remedial actions and includes no costs) was developed and included as part of the detailed evaluation.

In-situ bioremediation and land treatment technologies will not be effective in remediating the soil to sufficient levels to meet risk requirements, and therefore, were eliminated. Administrative actions, monitoring, and passive remediation were also eliminated because they would not meet objectives for remediation. The containment option was eliminated because it would not reduce the toxicity or volume of the contaminants. Soil flushing was eliminated during screening because of the risk of spreading contamination to clean soils. High and low temperature thermal treatment were eliminated because of the higher cost associated with the same benefit.

TABLE A.7-1
GENERAL RESPONSE ACTIONS AND POTENTIAL REMEDIAL TECHNOLOGIES
RAILROAD MAINTENANCE SITE

OU 6 ROD
LORING AIR FORCE BASE

GENERAL RESPONSE ACTION	PROCESS/TECHNOLOGY	DESCRIPTION
No Action	None	No action
Prevent Exposure	Deed restrictions Fencing/signs	Prevent physical access to contaminated soil and use of groundwater.
Monitoring	Sampling, analysis, and evaluation	Monitor concentrations of soil contaminants. Monitor groundwater wells downgradient of the area.
Containment	Cover System	Construct a cover system (consisting of low permeability layers and drainage layers) over the site.
Passive Remediation	Relies on natural degradation process.	Monitor concentrations of soil contaminants. Monitor groundwater wells downgradient of the area.
In situ Remediation	In situ Bioremediation	Inject nutrients into soil to encourage development of a microbial population that degrades the contaminants.
	Soil Flushing (Leaching)	Flush a water/surfactant mixture through the soil to collect or react with the contaminant, and remove the leachate at or near the water table using recovery wells.
Removal and Treatment	Low Temperature Thermal Treatment	Excavate soil and place in a low temperature stripper which volatilizes the contaminants, but does not combust the soil matrix. May use off-site facility or a mobile unit.
	High Temperature Thermal Treatment (Incineration)	Excavate soil and place in a high temperature incinerator, such as an asphalt plant, rotating kiln, or fluidized bed incinerator, which causes the soil and contaminants to combust.

October 22, 1993\TabA.7-1

continued

TABLE A.7-1
GENERAL RESPONSE ACTIONS AND POTENTIAL REMEDIAL TECHNOLOGIES
RAILROAD MAINTENANCE SITE

OU 6 ROD
LORING AIR FORCE BASE

GENERAL RESPONSE ACTION	PROCESS/TECHNOLOGY	DESCRIPTION
Removal and Treatment (continued)	Land Treatment - Ex situ Bioremediation	Excavate soil, place it on a prepared pad to prevent contaminant migration, then till, water and fertilize it to promote biodegradation, and volatilization.
	Use as Sub-Grade Material in Landfill	Excavate soil and place it in a prepared area of an existing landfill to be used as sub-grade material beneath the landfill cap.
	Off-site Disposal/Treatment	Excavate soil and transport it by truck to an existing off-site licensed landfill or treatment facility.

The two alternatives, plus the no action alternative, which were retained for detailed analysis were soil excavation and off-site disposal/treatment, and soil excavation and use as subgrade material in landfill cover system. Both of these alternatives are readily implementable, are effective (meet the remedial objectives) and are cost-effective.

A.8 DESCRIPTION OF ALTERNATIVES

This section provides a narrative summary of each alternative evaluated. A detailed tabular assessment of each alternative can be found in Tables 13-4 through 13-9 of the RI/FFS (ABB-ES, 1993b).

ALTERNATIVE 1: NO ACTION

Evaluation of the No Action Alternative is required by the NCP, and provides a baseline against which other alternatives can be compared. The No Action Alternative for the RRMS would involve leaving the contaminated soil in place. Under CERCLA Section 121(c), at least one 5-year site review would be required. It was assumed one sampling event would occur five years after the ROD is signed.

Estimated Time for Design and Construction: Not Applicable
Estimated Time of Operation: 5 years until the first site review
Estimated Capital Cost: $0
Estimated Operation and Maintenance Costs (net present worth): $8,800
Estimated Total Cost (net present worth): $8,800

ALTERNATIVE 2: EXCAVATION AND OFF-SITE DISPOSAL/TREATMENT

This alternative for the RRMS would consist of excavating the contaminated soil and transporting it to a privately operated special waste landfill or treatment facility licensed by the State of Maine, located outside the base. Sampling would be performed to determine the extent of excavation. The excavated area would be backfilled with clean fill and seeded to promote growth of vegetation.

This alternative would consist of the following components:

- Mobilization
- Site Preparation
- Excavation
- Off-site Disposal
- Site Restoration
- Site Review

Estimated Time for Design and Construction: 3 months (following agency approval)
Estimated Time of Operation: Not Applicable
Estimated Capital Cost: $183,000
Estimated Operation and Maintenance Costs (net present worth): $0
Estimated Total Cost (net present worth): $183,000

ALTERNATIVE 3: EXCAVATION AND USE AS SUBGRADE MATERIAL FOR ON-BASE LANDFILL COVER SYSTEM CONSTRUCTION

This alternative would involve excavating PAH-contaminated soil exceeding soil target remediation levels from the site and disposing of it at LAFB Landfill No. 2. Landfill No. 2 is currently being evaluated as a site under the FFA and will be the subject of a separate Proposed Plan and ROD at a later date. Should a landfill cover system be implemented as part of the final remedial action for the landfill, the soil would be used as subgrade material. The soil would be placed and compacted according to design specifications for landfill covers. Ecological risks would be eliminated at the RRMS once the contaminated soil exceeding target remediation levels were excavated and the cover system installed. After excavation of the contaminated soil, the site would be backfilled with clean fill, graded, and seeded.

Estimated Time for Design and Construction: 3 months (following agency approval)
Estimated Time of Operation: Not Applicable
Estimated Capital Cost: $137,000
Estimated Operation and Maintenance Costs (net present worth): $0
Estimated Total Cost (net present worth): $137,000

A.9 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that, at a minimum, the Air Force 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.

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a site remedy. The following is a summary of the comparison of each alternative's strength and weakness with respect to the nine evaluation criteria. These criteria are summarized as follows:

<u>Threshold Criteria</u>

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

1. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with ARARS** describes how the alternative complies with action-specific ARARs, criteria, advisories, and guidance.

<u>Primary Balancing Criteria</u>

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

3. **Long-term effectiveness and permanence** addresses the criteria that are utilized to assess alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

4. **Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives employ recycling or treatment that

reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.

5. **Short-term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until remedial action objectives are achieved.

6. **Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. **Cost** evaluates the capital and operation and maintenance costs of each alternative, and provides an estimate of the total present-worth cost of each alternative.

Modifying Criteria

The modifying criteria are used on the final evaluation of remedial alternatives, generally after the Air Force has received public comment on the RI/FFS and Proposed Plan.

8. **State acceptance** addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the State's comments on ARARs or the proposed use of waivers.

   The State of Maine has provided comments on the Proposed Plan and has documented its concurrence with the remedial action in a letter of concurrence in Appendix C of this ROD.

9. **Community acceptance** addresses whether the public concurs with the Air Force's Proposed Plan. Community acceptance of the Proposed Plan was evaluated based on oral and written comments received at the public hearings and during the public comment period. This is documented in the transcript of the Public Meeting in Appendix A, and in the Responsiveness Summary in Appendix B of the ROD.

A detailed tabular assessment of each alternative according to seven of the nine criteria can be found in Tables 13-4, 13-6, and 13-8 of the RI/FFS (ABB-ES, 1993b).

The section below presents the nine criteria and a brief narrative summary of the alternatives and the strengths and weaknesses according to the comparative analysis.

A.9.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternatives 2 and 3 both involve excavating and disposing/treating of the contaminated surface soil and would eliminate the potential risk to ecological receptors at the site. Under Alternative 2, the soil would be disposed of at an appropriately designed and regulated special waste landfill or treatment facility located off-base. Under Alternative 3, the soil would be placed at an on-base landfill to be used as subgrade material placed under an appropriately designed landfill cover system. The No Action Alternative for the RRMS would not reduce risks to ecological receptors at the site.

A.9.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

No chemical-specific ARARs have been promulgated for soil contamination. Alternatives 2 and 3 would be designed and implemented so that location- and action-specific ARARs would be satisfied. Remedial activities conducted under Alternatives 2 and 3 would be required to preserve the scenic character of the site. Site restoration activities are included in each of these alternatives. Remedial activities performed under Alternatives 2 and 3 would need to comply with OSHA regulations and employ safe working practices. Air emissions would be monitored during excavation activities under Alternatives 2 and 3 to comply with action-specific ARARs.

A.9.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternatives 2 and 3 would excavate the contaminated surface soil from the site and would eliminate the site risks associated with the surface soil. Alternative 3 involves landfilling of the soil, which does not treat the soil but reduces the risk associated with the soil by restricting exposure. The landfill/treatment facility utilized in Alternative 2 should be designed, regulated, and operated to minimize the risk associated with the disposed/treated material. Placement of soil from the RRMS at

Landfill No. 2 could leave the soil exposed and would require controls until such time that the Landfill No. 2 cover were constructed. The No Action Alternative for the RRMS would not address the risk associated with surface soil.

A.9.4 Reduction of Mobility, Toxicity, or Volume through Treatment

Alternative 2 would effectively eliminate the mobility of the contaminants in the soil either by treatment or by placing the soil in a facility that would be covered in a manner that would limit infiltration of precipitation. Alternative 3 would also eliminate the mobility of the contaminants in the soil when the Landfill No. 2 cover system were constructed but not through treatment. The No Action Alternative for the RRMS would not reduce the mobility, toxicity, or volume of the contaminated soil.

A.9.5 Short-term Effectiveness

Alternatives 2 and 3 would involve excavation and transportation of contaminated soil. Potential short-term impacts would be minimized by utilizing safe working and transportation procedures. The generation of dust during excavation would be minimized by wetting the soil prior to excavation, should airborne particulate levels exceed applicable standards. The No Action Alternative for the RRMS would have no short-term impacts because no remedial action would occur.

A.9.6 Implementability

Excavation and disposal/treatment of the soil under Alternatives 2 and 3 are not anticipated to pose any problems, but will require coordination with LAFB to minimize the impact to base operations. Placement of the soil at Landfill No. 2 as described in Alternative 3 would be contingent upon and would need to be coordinated with any Landfill No. 2 remedial investigation or construction activities.

A.9.7 Cost

Among the alternatives that satisfy the remedial response objectives, Alternative 3 is the least expensive, with a net present worth (NPW) of $137,000. Alternative 2 has an NPW of $183,000 for disposal/treatment of the soil at a licensed treatment facility or a special waste landfill facility.

A.9.8 STATE ACCEPTANCE

As party to the FFA, the State of Maine has provided comments on the RI/FFS and the Proposed Plan and has documented its concurrence with the remedial action as stated in Section A.13 of this ROD. A copy of the State's letter of concurrence is presented in Appendix C of this ROD.

A.9.9 COMMUNITY ACCEPTANCE

Community acceptance of the Proposed Plan was evaluated based on oral and written comments received at public meetings and during the public comment period. This is documented in the Transcript of the Public Meeting in Appendix A, and in the Responsiveness Summary in Appendix B of this ROD.

A.10 THE SELECTED REMEDY

The selected remedial alternative is a source control remedy. This remedy for the RRMS consists of excavating the contaminated soil and transporting it to an off-base, privately operated, special waste landfill or treatment facility licensed by the State of Maine. Sampling would be performed to determine the extent of excavation. The excavated area would be backfilled with clean fill and seeded to promote growth of vegetation.

A.10.1 SOIL CLEANUP LEVELS

The Table below summarizes the clean-up levels for contaminants of concern in soils. The basis for this determination is set forth in Section 13.0 of the RI/FFS.

Contaminant	Cleanup Level* (mg/kg)	Basis
Benzo(a)pyrene	0.33	Risk
Dibenz(a,h)anthracene	0.33	Risk
Total Carcinogenic PAHs	1.3	Risk

* Cleanup level is based on detection limit for analytical method.

These clean-up levels must be met at the completion of the remedial action at the points of compliance. The preliminary area of excavation is approximately 36 feet by 70 feet, down to a depth of 2 feet bgs. Confirmation sampling will be conducted to ensure soil requiring remediation has been excavated. These clean-up levels attain USEPA's risk management goal for remedial actions and have been determined to be protective.

The site will be reviewed at the conclusion of the groundwater study for OU 12 to assure that the residual risk from the soil, when combined with the groundwater risks, is protective of human health and the environment.

A.11 STATUTORY DETERMINATIONS

The remedial action selected for implementation at the RRMS is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, attains state and federal ARARs and is cost-effective. The selected remedy also may satisfy the statutory preference for treatment which permanently and significantly reduces the mobility, toxicity or volume of hazardous substances as a principal element, depending on the method of treatment and/or disposal chosen during the design phase. Additionally, the selected remedy utilizes alternate treatment technologies or resource recovery technologies to the maximum extent practicable.

A.11.1 The Selected Remedy is Protective of Human Health and the Environment

The remedy at the RRMS will permanently reduce the risks posed to human health and the environment by eliminating, reducing or controlling exposures to human and environmental receptors through excavation and disposal of soil at a licensed facility. Removal of the contaminated soil will eliminate any exposures to human and environmental receptors on-site, and disposal at a licensed disposal/treatment facility will eliminate any exposures to the soil through its existing institutional controls or through treatment.

A.11.2 The Selected Remedy Attains ARARs

This remedy will attain all federal and state ARARs that apply to the RRMS. Environmental laws from which ARARs for the selected remedial action are derived, and the specific ARARs are presented in Table A.11-1. The selected remedy will attain all substantive, non-procedural requirements of federal and state ARARs for the selected remedial action at RRMS as set forth in Table A.11-1 which includes chemical-, location-, and action-specific requirements. The tables include the regulatory citation, a brief summary of the requirement, and the action to be taken to attain the requirement. In addition, policies, criteria, and guidelines which will also be considered during the implementation of the remedial action are set forth in the table. It is noted that although the requirements, standards, and regulations of the Occupational Safety and Health Act of 1970, United States Codes, Title 29, et seq., are not ARARs, they will be complied with and connected with the RRMS remedial activities where applicable (USEPA, 1990).

TABLE A.11-1
ARARs, CRITERIA, ADVISORIES, AND GUIDANCE
RAILROAD MAINTENANCE SITE

OU 6 RECORD OF DECISION
LORING AIR FORCE BASE

MEDIA	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
CHEMICAL-SPECIFIC REQUIREMENTS				
WASTE MATERIAL				
Federal	RCRA Identification and Listing of Hazardous Wastes (40 CFR 261)	Relevant and Appropriate	Defines those wastes that are subject to regulations as hazardous wastes under RCRA.	Analytical results were evaluated against the criteria and definitions of hazardous waste. No hazardous waste was identified at the site. These regulations may be referred to and utilized when developing remedial alternatives and during remedial actions.
LOCATION-SPECIFIC REQUIREMENTS				
State	Maine Site Location Development Law and Regulations (38 MRSA, Section 481-490; MEDEP Regulations, Chapter 375)	Applicable	This act and regulations govern development and include hazardous activities that consume, generate, or handle hazardous wastes and oil. Activities cannot adversely affect existing uses, scenic character, or natural resources in the municipality or neighboring municipality. The regulations provide that there will be no unreasonable adverse effects on specified items including air quality and runoff/infiltration relationships, no unreasonable alteration of climate or natural drainageways, and provisions for erosion, sedimentation, and noise control.	Remedial action will meet these regulations. A permit will not be required if the activity is on-site.
ACTION-SPECIFIC REQUIREMENTS				
Federal Guidance and Criteria to be Considered	CERCLA Off-Site Disposal Policy (OSWER Directive 9834.11; November 13, 1987)	To Be Considered	This policy requires the off-site receiving facility to be in compliance with all permits and applicable state federal and requirements.	The off-site receiving facility will need to be licensed and in compliance with permits and applicable state and federal requirements before the waste is taken to the facility.
State	Maine Ambient Air Quality Standards (38 MRSA, Section 584; MEDEP Regulations, Chapter 110)	Applicable	This Chapter establishes ambient air quality standards that are maximum levels of a particular pollutant permitted in the ambient air.	The standard for particulate matter is 150 $\mu g/m^3$, 24-hour average concentration. Air monitoring will be conducted during remedial actions.

Notes:

ARAR = Applicable or Relevant and Appropriate Requirement
CFR = Code of Federal Regulations
MEDEP = Maine Department of Environmental Protection
MRSA = Maine Revised Statues Annotated
OSWER = Office of Solid Waste and Emergency Response
RCRA = Resource Conservation and Recovery Act

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A.11.3 THE SELECTED REMEDIAL ACTION IS COST-EFFECTIVE

In the Air Force'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 Air Force identified alternatives that are protective of human health and the environment and that attain, or, as appropriate, waive ARARs, the Air Force evaluated the overall effectiveness of each alternative by assessing 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. The costs of this remedial alternative are:

Estimated Capital Cost: $183,000
Estimated Operation and Maintenance Costs (net present worth): $0
Estimated Total Cost (net present worth): $183,000

The No Action Alternative is clearly the least expensive alternative, estimated to cost nothing because it would not require any additional controls or monitoring. Alternative 3 is expected to cost approximately $137,000. The selected remedy is also relatively inexpensive at $183,000.

A.11.4 THE SELECTED REMEDY UTILIZES PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

Once the Air Force identified those alternatives that attain ARARs and that are protective of human health and the environment, the Air Force identified which alternative utilizes 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.

A.11.5 The Selected Remedy and the Preference for Treatment Which Permanently and Significantly reduces the Toxicity, Mobility or Volume of the Hazardous Substances as a Principal Element

The principal element of the selected remedy is the source control of contaminated soils. This element addresses the primary threat at the site which is contamination of surface and subsurface soils at the RRMS. The selected remedy may satisfy the statutory preference for treatment as a principal element by excavating and disposing of contaminated soil, depending on the method of treatment or disposal chosen during the design phase.

The method of disposal or treatment of the excavated soils will be determined during the remedial design phase. The determination will reflect the requirements of CERCLA 121(b)(1) that states remedial actions in which treatment which permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances, pollutants or contaminants as a principal element, are to be preferred over remedial alternatives not involving such treatment.

A.12 DOCUMENTATION OF NO SIGNIFICANT CHANGES

The Air Force presented a Proposed Plan (preferred alternative) for remediation of the RRMS on July 28, 1993. The preferred alternative for the RRMS consists of excavating the contaminated soil and transporting it to an off-base, privately operated, special waste landfill or treatment facility licensed by the State of Maine. Sampling would be performed to determine the extent of excavation. The excavated area would be backfilled with clean fill and seeded to promote growth of vegetation.

This alternative would consist of the following components:

- Mobilization
- Site Preparation
- Excavation
- Off-site Disposal or Treatment
- Site Restoration
- Site Review

There have been no significant changes made to the alternative as stated in the Proposed Plan.

A.13 STATE ROLE

The Maine Department of Environmental Protection has reviewed the various alternatives and has indicated its support for the selected remedy. The State has also reviewed the RI, Risk Assessment and FFS to determine if the selected remedy is in compliance with applicable or relevant and appropriate state environmental laws and regulations. The MEDEP concurs with the selected remedy for the Loring AFB Railroad Maintenance Site. A copy of the declaration of concurrence is attached as Appendix C.

PART B EAST GATE WASTE STORAGE TANK AND FUEL DROP SITES

B.1 SITE NAME, LOCATION, AND DESCRIPTION

LAFB is an NPL site. There are currently several areas of concern within LAFB that are under investigation. The areas of concern at LAFB have been organized into 21 OUs for remediation purposes. This ROD relates to the Source Control Remedial Action for OU 6, which is comprised of the following sites: the RRMS; the EGWST; and FDSs North 1 and 2 (FDS-N1 and FDS-N2, respectively), South-Active (FDS-SA) and South-Former (FDS-SF) (Figure A.1-1).

LAFB, in northeastern Maine, is bordered on the south and east by the Town of Limestone, on the north by the towns of Caswell and Connor, and on the west by the City of Caribou. The base is approximately three miles west of the United States/Canadian border and covers approximately 9,000 acres. Base operations are expected to gradually decrease until base closure in September 1994.

Part B of this ROD relates to EGWST, FDS-N1, FDS-N2, FDS-SA, and FDS-SF. The EGWST is located in the southeast portion of the base along Maine Road approximately 300 feet north of the East Gate entrance. Of the four fuel drop sites, two are located on the northern end of the runway (i.e., FDS-N1 and FDS-N2) and two are located on the southern end of the runway (FDS-S [active] and [former]).

B.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

This section summarizes the uses, response history and enforcement activities at the EGWST and the FDS.

B.2.1 LAND USE AND RESPONSE HISTORY

A more detailed description of the site history can be found in the RI/FFS.

Until 1968, the EGWST site was a motor gasoline (MOGAS) pumping station for base personnel. Two 5,000-gallon underground storage tanks (USTs) were used for gasoline storage. After closure of the facility as a gasoline pumping station, the USTs were used as holding tanks for liquid hazardous waste. Wastes, including waste fuels, crankcase oils, gear oils, brake fluid, hydraulic fluids, solvents, and paint strippers, were stored in the USTs awaiting periodic off-base disposal by a private contractor. Use of the tanks was discontinued in 1980.

Because no evidence suggested the tanks were leaking, the site was not recommended for inclusion in the IRP in the 1984 PA. However, the PA recommended evaluating the status of the USTs with regard to UST regulations requiring contents removal, and securing the tanks.

A magnetometer survey, test pitting, and soil and tank sampling were performed in 1985. Based on analytical results, a removal action was planned and the site was added to the IRP. The interim removal action implemented in 1989 included removal of the two USTs, their contents, and soil adjacent to the tank pit. The materials were properly disposed of off-base. Although no signs of leakage from the tanks were observed during excavation, soil samples from the excavation side walls indicated that soil around the tank was contaminated and that additional characterization was recommended.

The excavations were lined with polyethylene sheeting and backfilled with clean fill. The purpose of the lining was to segregate the clean fill from the contaminated soil. If additional contaminated soil needed to be removed, the clean fill could be easily identified, removed, and reused.

The FDSs are located at the north and south ends of the runway. Because of the large payloads that B-52s carry, fully-laden aircraft must take off into the wind.

However, in the event of a "strip alert", aircraft must be launched immediately regardless of wind conditions. If optimum wind conditions do not exist during a strip alert, aircraft may have to dump some fuel to lighten their payload and enable them to takeoff.

If fuel were dumped, it would spill onto the paved area and the fire department would flush the fuel into the adjacent grassy area. Interviews indicated that FDS-N1 may have been used on old FDS-N2 three times, both areas are located on the north ends of the runway. Information indicated that both the former and active FSD located south of the runway, were not used.

Surface drainage from both northern areas eventually discharges to East Loring Lake through a series of storm drains. Surface drainage from the southern areas goes to separate locations. The former drop location has subdrains that empty into an unnamed tributary of the east branch of Greenlaw Brook. The active drop area has subdrains that converge into the Bomber Alert area. Visual observations during the RI site visit did not indicate that discharge had drained into the Bomber Alert area.

B.2.2 Enforcement History

The enforcement history of OU 6 is summarized as follows:

- In 1984, a PA was completed by CH_2M Hill detailing historical hazardous material usage and waste disposal practices at LAFB.
- Initial SI field work to determine if contaminants were present at the OU 6 sites was conducted in 1985 by R.F. Weston, Inc.
- An RI process by ABB-ES commenced in 1988 and continued into 1993.
- LAFB was added to the NPL in February of 1990.
- The Air Force entered into an FFA in 1991 with the USEPA and MEDEP regarding the cleanup of environmental contamination at LAFB.

- An FFS was conducted in 1993 for the RRMS, EGWST, and the FDS-SF to determine alternatives for remediation of contamination based on information presented in the RI.

B.3 COMMUNITY PARTICIPATION

Throughout LAFB's history, the community has been active and involved to a high level in base activities. The Air Force and USEPA have kept the community and other interested parties apprised of LAFB activities through informational meetings, fact sheets, press releases, public meetings, site tours and open houses, and TRC meetings. Membership of the TRC is comprised of Air Force, MEDEP, and local officials and community representatives.

During August of 1991, the LAFB community relations plan (CRP) was released. The CRP outlined a program to address community concerns and keep citizens informed about and involved during remedial activities.

On June 24, 1993, the Air Force made the administrative record available for public review at the Robert A. Frost Memorial Library, 238 Main Street, Limestone, Maine and at the Office of Public Affairs, 42 CES/CEVR, 7300 Pennsylvania Road, Loring AFB, Maine. USEPA published a notice and brief analysis of the Proposed Plan in Bangor Daily News and the Aroostook Republican on July 28, 1993 and made the plan available to the public at the Robert A. Frost Memorial Library.

LAFB held informational meetings on February 23, 1993 in Limestone, March 24, 1993 in Caribou, and April 29, 1993 in Fort Fairfield, Maine to discuss the results of the RI and the clean-up alternatives presented in the FFS, and to present the Air Force's Proposed Plan. Also during this meeting, the Air Force answered questions from the public. From July 28 through August 27, 1993, the Agency held a 30-day public comment period to accept public input on the alternatives presented in the RI/FFS and the Proposed Plan and on any other documents previously released to the public. On August 23, 1993, LAFB personnel and regulatory representatives held a public meeting to discuss the Proposed Plan and to accept any oral comments. A transcript of this meeting is included in Appendix A, and the comments received during the comment period and the Air Force's response to these comments are included in the Responsiveness Summary in Appendix B.

B.4 SCOPE AND ROLE OF NO ACTION REMEDY

The Air Force has determined that no further CERCLA action is required at the EGWST, FDS-N1, FDS-N2, FDS-SA, and FDS-SF sites. The levels of organic and inorganic compounds in the soils at these sites do not pose an unacceptable risk to human health or the environment under CERCLA.

No five year review will be undertaken, but the Air Force and USEPA will continue to monitor the soil and sediments to assess that no unacceptable exposures occur in the future.

The decision by the Air Force not to pursue further CERCLA action at these sites is not a determination that no action is warranted under other regulations or statutes. The State of Maine has requirements that apply to these sites even though CERCLA action is not warranted.

In separate actions which are not part of this ROD, the Air Force is taking non-CERCLA remedial actions at EGWST and FDS-SF pursuant to state requirements under an Air Force/State Two-Party Supplement to the FFA being signed simultaneously with this ROD.

The USAF and the USEPA have the authority to revisit this No Action decision under CERCLA if future conditions indicate an unacceptable risk to human health or the environment would result from exposure to contaminants at the sites.

B.5 SUMMARY OF SITE CHARACTERISTICS

Sections 6.0 of the RI/FFS contains an overview of the RI field activities at OU 6 through 1991, and Section 11.0 presents the results of a supplemental soil boring and sampling program conducted in 1993 to address data gaps (ABB-ES, 1993b). The significant findings of these investigation are summarized below.

The nature and distribution of contaminants in both surface and subsurface soils at the EGWST and FDS sites are described in the following subsections. Groundwater sampling results are discussed briefly because they provide possible indicators of the impact that contaminants detected in soil may have on groundwater quality. However, the nature and distribution of contaminants in groundwater will evaluated as part of OU 12 investigations.

B.5.1 East Gate Waste Storage Tank Site

Surface Soil

The initial investigation to confirm the presence of contamination was conducted in 1985, and included a geophysical survey, test pits, analysis of soil samples, and Resource Conservation and Recovery Act (RCRA) hazardous waste characteristic analysis of one tank's contents (the other tank was empty). Subsequent investigations conducted between 1988 and 1991 included test pits, subsurface soil sampling, overburden/bedrock monitoring well pairs, and field and laboratory analysis of soil and groundwater samples.

Laboratory samples were analyzed for TCL VOCs, SVOCs, pesticides and PCBs, and TAL inorganics. Explorations were located both within and outside the suspected area of contamination to confirm the presence of contaminants. Explorations were also completed throughout the paved area of the site to evaluate if contaminants may have been released from underground piping associated with the former pump island. Samples of the tank contents were also collected and analyzed.

The only organic contaminants detected by CLP analyses were carcinogenic and non-carcinogenic PAHs, and were detected in two surface soil samples, JSS-1461 from the 1991 investigation (1.17JJ mg/kg and 1.32 mg/kg respectively), and JSS-1482 from 1993. The concentrations of all the carcinogenic compounds were estimated because they were below CRQLs. Phenol was also detected below CRQL in JSS-1482 at 0.06

mg/kg, but had not been detected during previous investigations at the site. No inorganic compounds were detected at concentrations above background (Figure B.5-1).

Analytical results indicate that there is no wide-spread distribution of contaminants in surface soil (i.e., 0 to 2 feet bgs) at the EGWST site.

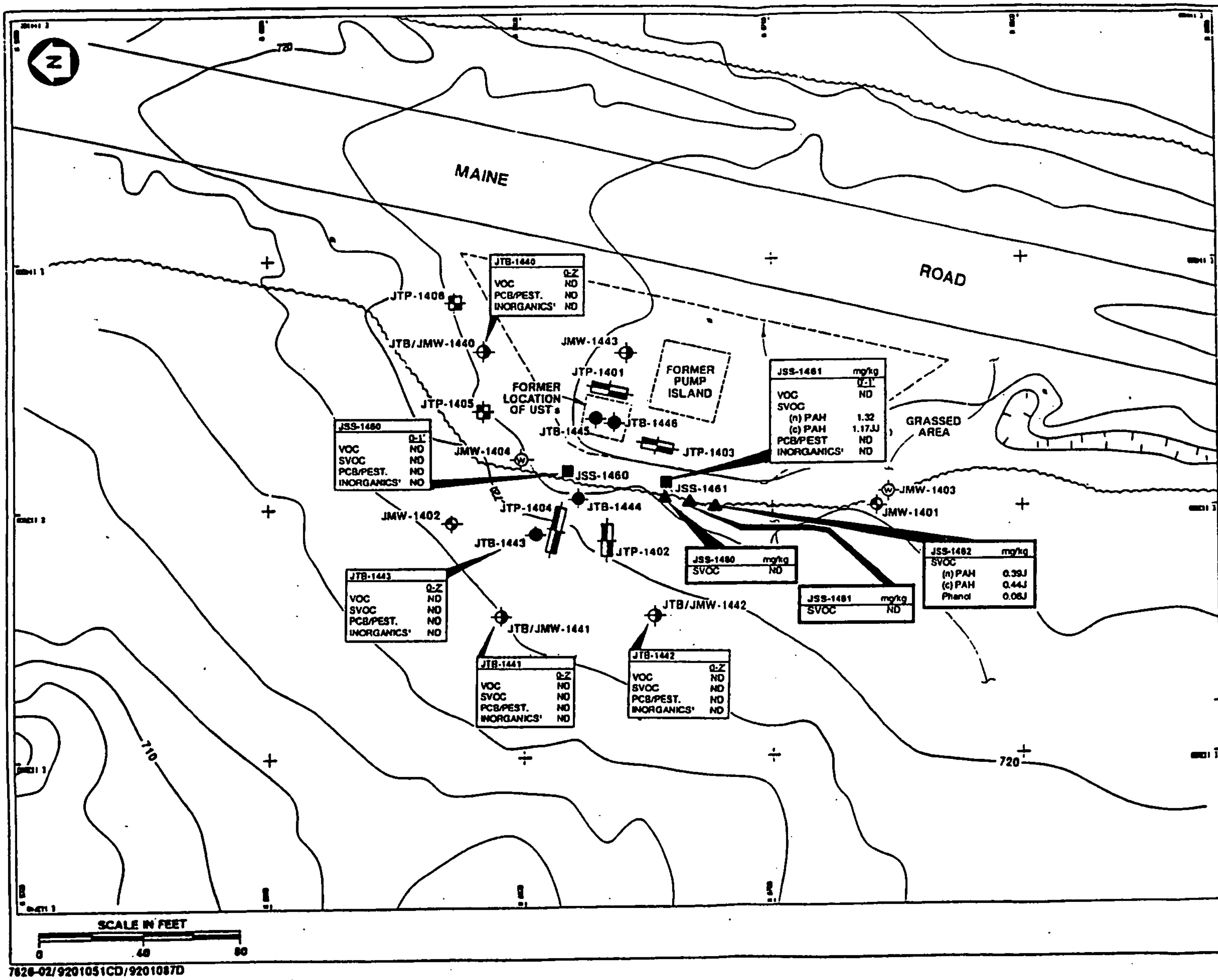
Subsurface Soil

Ethylbenzene (ranging from 0.001J mg/kg to 0.24 mg/kg), xylenes (0.072 mg/kg to 590 mg/kg), and PHCs (70 mg/kg to 8,700 mg/kg), were detected above CRQLs in several samples. Toluene, 2-methylnaphthalene, and naphthalene were each detected once at concentrations above the CRQL, with naphthalene and 2-methylnaphthalene detected in the 8- to 10-foot sample from JTB-1443 at concentrations of 1.3 mg/kg and 2.6 mg/kg respectively. Chlorobenzene was detected below the CRQL in 1993, but had not been detected previously. The presence of these fuel-related contaminants is consistent with the history of this site (Figure B.5-2).

Methylene chloride was detected at a concentration above the CRQL in one sample collected when the south storage tank was removed. Although this compound is a common laboratory contaminant, the detected concentration (19 mg/kg) and the use of the tanks to store solvents indicate that it is a site-related contaminant. No inorganic compounds were detected at concentrations above background.

CLP analyses detected the highest concentrations of fuel-related contaminants in subsurface soil (i.e., greater than 2 feet bgs) samples collected from within the southern portion of the footprint of the former storage tanks (Figure B.5-2). Methylene chloride was only detected in samples from southern portion of the tank footprint. These detections indicate that the southern storage tank, and possibly the northern tank, leaked.

This site was a gasoline station and likely sources of contaminants include: gasoline spilled while filling vehicles; lubricant that leaked from vehicles or was spilled; and spills that may have occurred while filling storage tanks. Because the former pump area is located at the highest part of the site, storm runoff would have washed contaminants that accumulated on the paved surface towards the northeast and southeast, or to the west.



LEGEND

- SOIL BORING (JTB)
- OVERBURDEN MONITORING WELL (JMW)
- BEDROCK MONITORING WELL (JMW)
- MULTI-PORT BEDROCK MONITORING WELL (JMW)
- TEST PIT (JTP)
- SURFACE SOIL (JSS)
- 1993 SURFACE SOIL SAMPLE

NOTES:

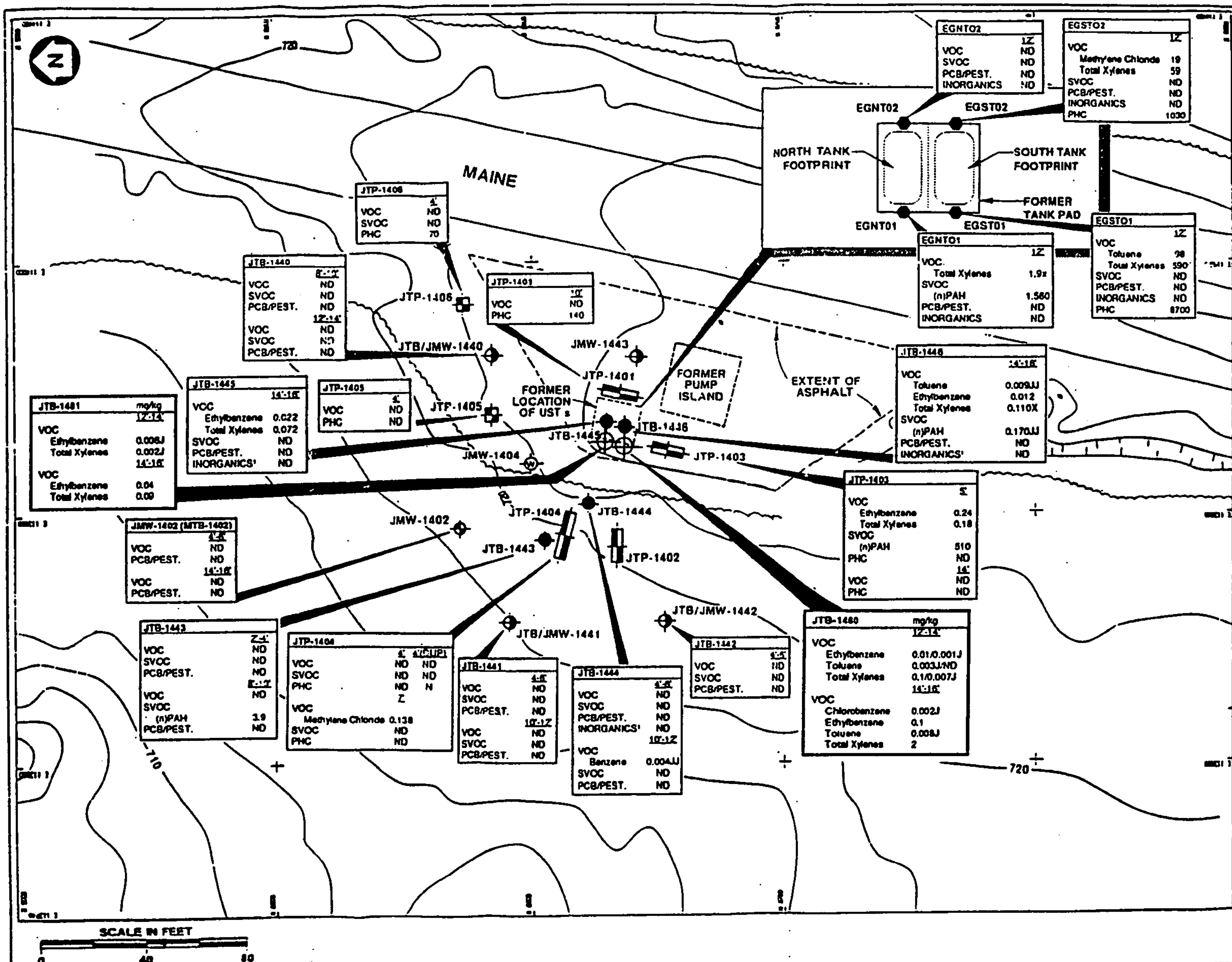
1. CONTOUR INTERVAL IS 2 FEET. DATUM IS MEAN SEA LEVEL 1929. L A F B COORDINATE SYSTEM. NORTH IS BASED ON L A F B GRID COORDINATE SYSTEM.
2. COMPILED AND CONTROLLED USING STANDARD MAPPING PROCEDURES.
3. CHEMICAL CONCENTRATIONS IN mg/kg UNLESS OTHERWISE NOTED.

FIGURE B.5-1

DISTRIBUTION OF CONTAMINANTS IN SURFACE SOIL
EAST GATE WASTE STORAGE TANKS

OU 6 ROD

LORING AIR FORCE BASE
LIMESTONE, MAINE



LEGEND

- SOIL BORING
- OVERBURDEN MONITORING WELL
- BEDROCK MONITORING WELL
- MULTI-PORT BEDROCK MONITORING WELL
- TEST PIT
- GRAB SOIL SAMPLE
- 1993 SOIL BORING

NOTES:

1. CONTOUR INTERVAL IS 2 FEET. DATUM IS MEAN SEA LEVEL 1929. L.A.F.B. COORDINATE SYSTEM. NORTH IS BASED ON L.A.F.B. GRID COORDINATE SYSTEM.
2. COMPILED AND CONTROLLED USING STANDARD MAPPING PROCEDURES.
3. CHEMICAL CONCENTRATIONS IN mg/kg UNLESS OTHERWISE NOTED.

FIGURE B.5-2

DISTRIBUTION OF CONTAMINANTS IN INTERMEDIATE SOIL (2'-15' BGS) EAST GATE WASTE STORAGE TANKS

OU 6 ROD

LORING AIR FORCE BASE
LIMESTONE, MAINE

7626-02/9201051CD

Groundwater

Other than laboratory contaminants, no compounds were detected in groundwater samples collected before 1991. However, benzene, xylenes, and PAHs detected in 1991 samples indicate that fuel-related contamination in soil may be impacting groundwater quality.

B.5.2 FUEL DROP SITES

Investigations initiated in 1985 at FDS-N1, and in 1991 at FDS-N2, FDS-SA, and FDS-SF have included test pits, installation of overburden and bedrock monitoring wells, sampling and laboratory analyses of soil, sediment, groundwater, and surface water samples for TCL VOCs, SVOCs, pesticides and PCBs, TAL inorganics, PHCs, and/or total organic carbon.

The site history for the FDSs indicates that these sites were designated areas for discharging fuel in the event of a strip alert. It is believed that FDS-N1 was used once for this purpose, and FDS-N2 three times. It is believed that the FDS-S locations were never used. The potential source of contamination would primarily be jet fuel (i.e., JP-4). In addition to organic compounds, JP-4 may contain inorganic elements. Although many metals have been detected in petroleum, the most common are nickel and vanadium. However, the inorganic content of fuel varies from one source of petroleum to another (Arthur D. Little, Inc., 1985).

Surface Soil

The only site-related contaminants detected in FDS-N1 surface soil (0 to 2 feet bgs) were PHCs. Off-site analyses detected PHCs in only one sample, JSS-2760, at a concentration of 19.1 mg/kg. This sample is located in the drainage ditch approximately 50 feet west of a catch basin. There are no indications that large quantities of jet fuel have been spilled at FDS-N1.

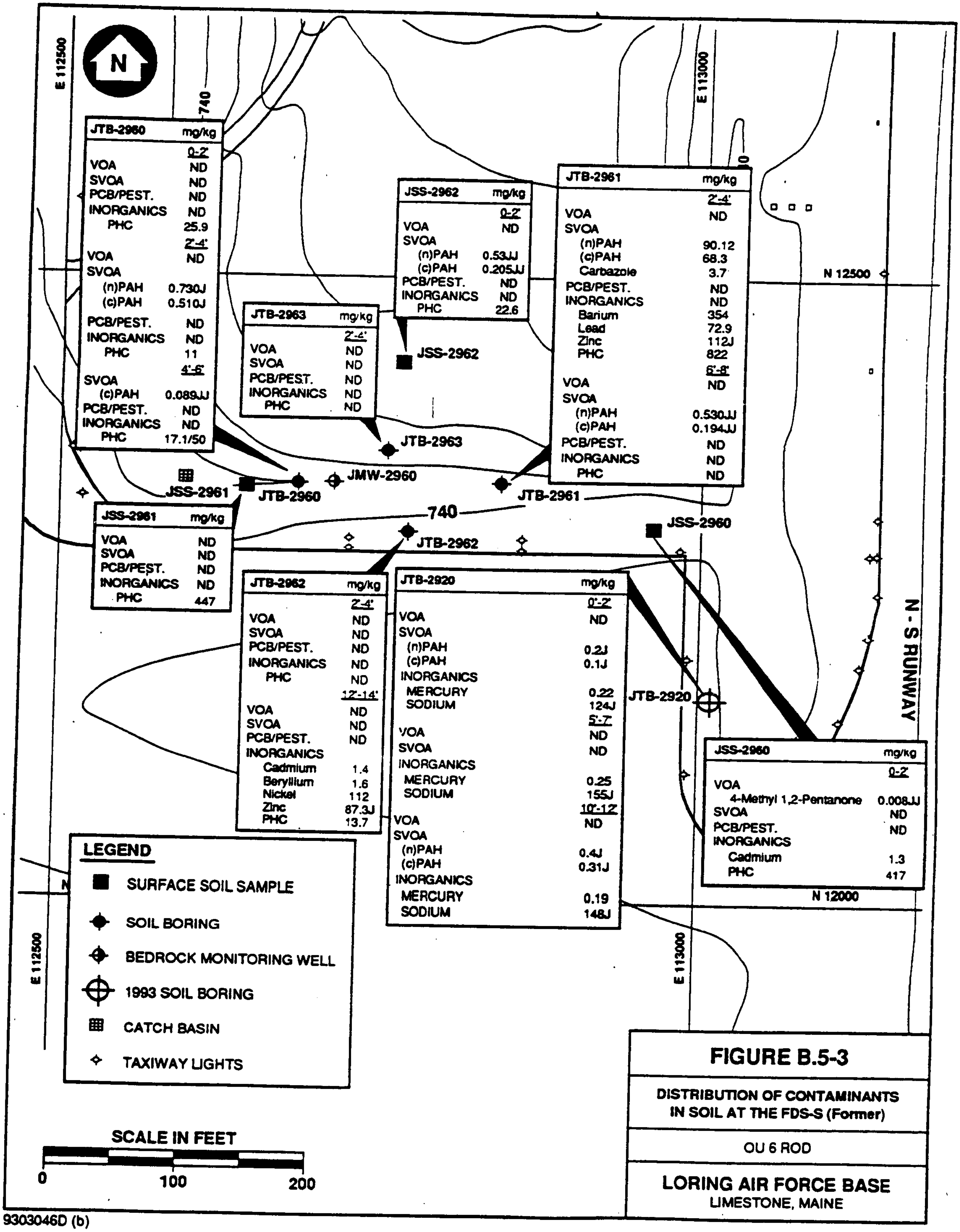
The only site-related contaminants detected in FDS-N2 surface soil were PHCs. Although PHCs were detected in five samples from FDS-N2, the concentrations in three samples were equal to or less than 50 mg/kg. The two highest concentrations, 115 and 118 mg/kg, were detected in samples from JSS-2865 and JTB-2864, respectively. JSS-2865 is in the drainage ditch and JTB-2864 is next to the runway. These two PHC concentrations may be from fuel and oil that was washed off the runway by storm runoff or may be interference from ubiquitous PHCs. There are no indications that large quantities of jet fuel have been spilled at FDS-N2.

PHCs were detected by off-site analyses in four samples from FDS-SF (Figure B.5-3). Two of these samples had concentrations less than 26 mg/kg. PHCs were detected in the other two samples, JSS-2960 and JSS-2961, at concentrations of 417 and 447 mg/kg, respectively. JSS-2960 is within 40 feet of the aircraft warmup area. JSS-2961 is in the drainage ditch and is approximately 75 feet from the aircraft warmup area. The most like sources of the PHCs detected in these two samples are motor vehicle and aircraft exhaust, and fuel and oil that were washed off the warmup area by storm water runoff. CLP analyses detected PAHs in JSS-2962 at concentrations below the CRQL. JSS-2962 is located approximately 150 feet north of the aircraft warmup area and on the far side of the drainage ditch. Given the location of the sample, it is not likely that these compounds are the result of a jet fuel spill. They may be attributed to aircraft exhaust. There are no indications that large quantities of jet fuel have been spilled at FDS-SF.

Off-site analyses detected PHCs in one sample from FDS-SA (JSS-2965) at 80.3 mg/kg (Figure B.5-4). JSS-2965 is next to the taxiway. There are no indications that large quantities of fuel were spilled at FDS-SA.

Inorganics were detected above background concentrations in surface and subsurface samples at these four fuel drop sites. Based on the nature and distribution of the contaminants at the FDSs, there are no indications that large quantities of jet fuel have been spilled.

Four inorganics, cyanide, cobalt, mercury, and sodium, were detected above background concentrations in FDS-N2 soil in 1993. Cobalt was detected in JTB-2821 at a concentration of 12.6 mg/kg. Mercury was detected above background ranges in surface soil at concentrations 0.12 and 0.14 mg/kg from JTB-2821 and JTB-2820, respectively. Sodium was detected above background ranges in surface soil samples at estimated concentrations ranging from 120 to 134 mg/kg. Sodium concentrations were estimated because of blank contamination. Although concentrations for cobalt, mercury and sodium are greater than LAFB soil background concentrations, they are within the range identified in literature (Shacklette and Boerngen, 1984).


JTB-2960 mg/kg
0-2'
VOA ND
SVOA ND
PCB/PEST. ND
INORGANICS ND
PHC 25.9
2'-4'
VOA ND
SVOA
(n)PAH 0.730J
(c)PAH 0.510J
PCB/PEST. ND
INORGANICS ND
PHC 11
4'-6'
SVOA
(c)PAH 0.089JJ
PCB/PEST. ND
INORGANICS ND
PHC 17.1/50
JSS-2962 mg/kg
0-2'
VOA ND
SVOA
(n)PAH 0.53JJ
(c)PAH 0.205JJ
PCB/PEST. ND
INORGANICS ND
PHC 22.6
JTB-2963 mg/kg
2'-4'
VOA ND
SVOA ND
PCB/PEST. ND
INORGANICS ND
PHC ND
JTB-2961 mg/kg
2'-4'
VOA ND
SVOA
(n)PAH 90.12
(c)PAH 68.3
Carbazole 3.7
PCB/PEST. ND
INORGANICS ND
Barium 354
Lead 72.9
Zinc 112J
PHC 822
6'-8'
VOA ND
SVOA
(n)PAH 0.530JJ
(c)PAH 0.194JJ
PCB/PEST. ND
INORGANICS ND
PHC ND
JSS-2961 mg/kg
VOA ND
SVOA ND
PCB/PEST. ND
INORGANICS ND
PHC 447
JTB-2962 mg/kg
2'-4'
VOA ND
SVOA ND
PCB/PEST. ND
INORGANICS ND
PHC ND
12'-14'
VOA ND
SVOA ND
PCB/PEST. ND
INORGANICS
Cadmium 1.4
Beryllium 1.6
Nickel 112
Zinc 87.3J
PHC 13.7
JTB-2920 mg/kg
0'-2'
VOA ND
SVOA
(n)PAH 0.2J
(c)PAH 0.1J
INORGANICS
MERCURY 0.22
SODIUM 124J
5'-7'
VOA ND
SVOA ND
INORGANICS
MERCURY 0.25
SODIUM 155J
10'-12'
VOA ND
SVOA
(n)PAH 0.4J
(c)PAH 0.31J
INORGANICS
MERCURY 0.19
SODIUM 148J
JSS-2960 mg/kg
0-2'
VOA
4-Methyl 1,2-Pentanone 0.008JJ
SVOA ND
PCB/PEST. ND
INORGANICS
Cadmium 1.3
PHC 417
JSS-2962
JTB-2963
JMW-2960
JSS-2961
JTB-2960
JTB-2961
JTB-2962
JSS-2960
JTB-2920
740
N 12500
N 12000
E 112500
E 113000
N - S RUNWAY
LEGEND
SURFACE SOIL SAMPLE
SOIL BORING
BEDROCK MONITORING WELL
1993 SOIL BORING
CATCH BASIN
TAXIWAY LIGHTS
SCALE IN FEET
0
100
200
FIGURE B.5-3
DISTRIBUTION OF CONTAMINANTS IN SOIL AT THE FDS-S (Former)
OU 6 ROD
LORING AIR FORCE BASE
LIMESTONE, MAINE
9303046D (b)

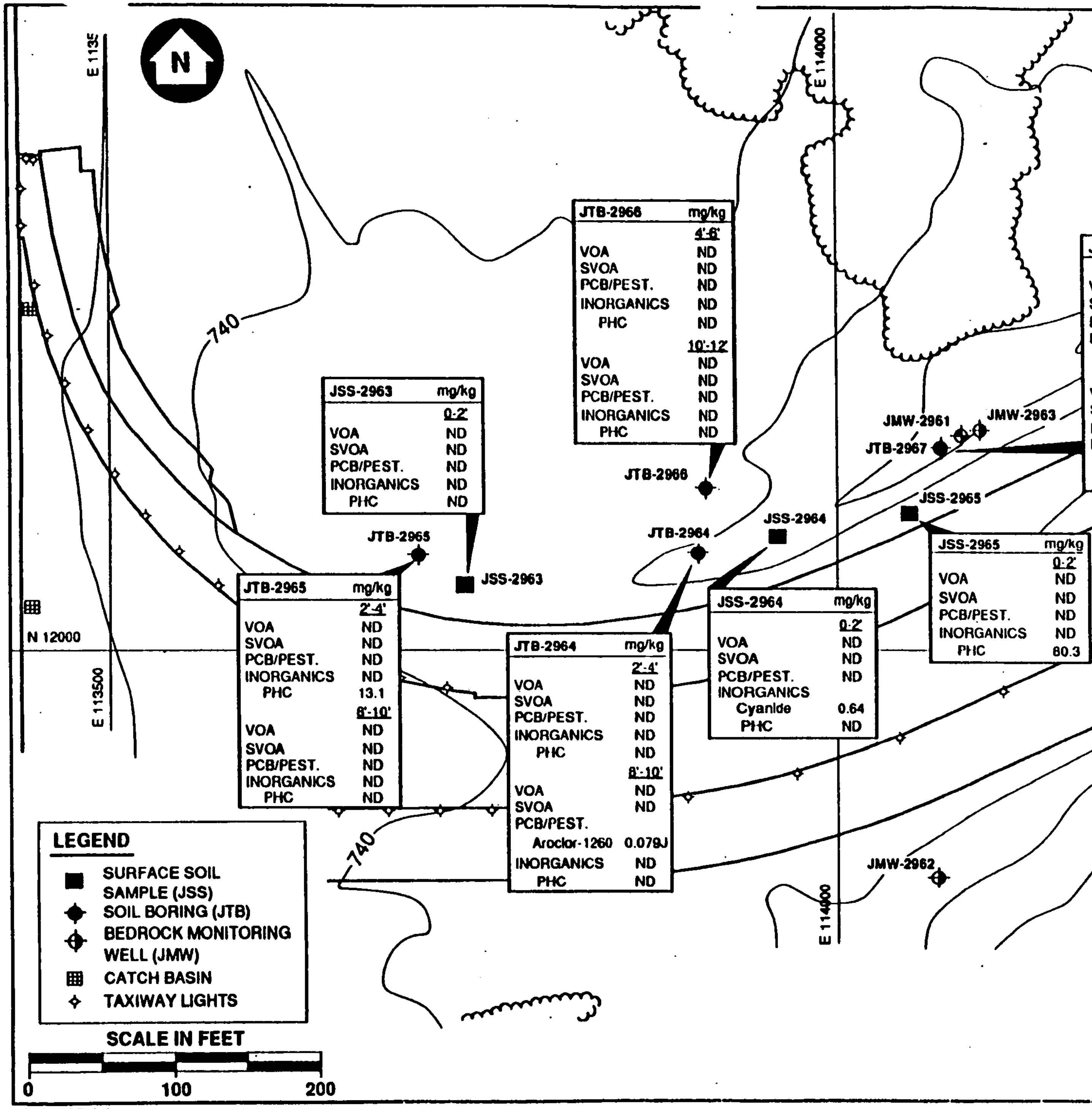


FIGURE B.5-4

DISTRIBUTION OF CONTAMINANTS IN SOIL AT THE FDS-S (ACTIVE)

OU 6 ROD

LORING AIR FORCE BASE
LIMESTONE, MAINE

9303046D (a)

Cyanide was detected in one surface sample soil from FDS-SA at an estimated concentration of 0.64 mg/kg, which is below the CRQL; cyanide was not detected in the associated duplicate sample.

Cadmium was detected in one surface soil sample from FDS-SF at a concentration of 1.3 mg/kg. Cadmium is a common additive in the formulation of tire rubber compounds, therefore, the cadmium detected in JSS-2960 may be from tire particles that were washed off the paved areas by storm runoff. Mercury and sodium were detected at concentrations above LAFB background ranges in surface soils in 1993 at FDS-SF (Figure B.5-3). Although the mercury concentration is greater than the LAFB soil background concentration, it is within the range identified in literature (Shacklette and Boerngen, 1984). Sodium concentrations were estimated because of blank contamination. These inorganics were not detected above background ranges during previous investigations.

Subsurface Soil

The only potentially site-related contaminants detected at FDS-N1 were PHCs, which were detected in two samples at low concentrations. There are no indications that large quantities of jet fuel were spilled at the site.

The only potentially site-related contaminants detected at FDS-N2 were PHCs. Laboratory results were all less than 18 mg/kg. These PHC concentrations may be from fuel and oil that collected on the runways and taxiways and was washed off the runway by storm runoff, or may be interference from ubiquitous PHCs. There are no indications that large quantities of jet fuel have been spilled at FDS-N2.

The primary site contaminants detected at FDS-SF were PHCs, carcinogenic and non-carcinogenic PAHs, and carbazole, which were detected in samples from JTB-2960 and JTB-2961 (see Figure B.5-3). The highest concentrations of PAHs and the only detection of carbazole were found in the 2- to 4-foot sample from JTB-2961. This sample also had the highest PHC concentration detected by the laboratory, 822 mg/kg. PAHs were detected below the CRQLs in the sample collected from the 6-to-8 foot depth interval in this boring. Additionally, the laboratory detected low concentrations of PAHs and PHCs in the 2- to 4-foot and 4- to 6-foot depth interval samples collected from JTB-2960. The contaminants detected in JTB-2960 may be attributed to normal operations; however, the source of the relatively high concentrations of contaminants detected in JTB-2961 are unknown. Analytical results for subsurface soil samples from FDS-SF (with the exception of JTB-2961) do not indicate that large quantities of jet fuel have been spilled at the site.

The only potentially site-related contaminants detected at FDS-SA were PHCs, which were detected in sample JSS-2965 at 80.3 mg/kg (see Figure B.5-4). There are no indications that large quantities of jet fuel have been spilled at the site.

No inorganics were detected at concentrations above background in samples from FDS-N1. Inorganics were detected in subsurface soil samples from FDS-N2 and FDS-SF at concentrations above LAFB background ranges.

Beryllium was detected in four subsurface soil samples from FDS-N2 at concentrations above background soil concentrations. Calcium was also detected above background. Calcium, cadmium, barium, beryllium, lead, nickel and zinc were detected in FDS-SF subsurface soil samples at concentrations above background. Barium (354 mg/kg), lead (72.9 mg/kg) and zinc were (127 J mg/kg) were detected above background in the sample collected from 2- to 4-feet bgs in JTB-2961. Cadmium (1.4 mg/kg), beryllium (1.6 mg/kg), nickel (112 mg/kg), and zinc (87.3 J mg/kg) were detected above background ranges in a sample collected from 12- to 14-feet bgs in JTB-2962. The inductively coupled plasma (ICP) serial dilution analysis result for zinc had a percent difference between the sample result and serial dilution of greater than 15 percent and associated samples were qualified as estimated with a "J".

At FDS-SA, zinc was detected above background in a sample collected from 10- to 12-feet bgs in JTB-2967.

The sources of the inorganics detected at FDS-N2, FDS-SF, and FDS-SA are unknown. The presence of these compounds is not consistent with the FDSs' history.

Groundwater

No contaminants were detected in groundwater samples collected from the FDSs.

Sediments/Surface Water

Only the northern FDSs have an associated surface drainage system. Four sediment samples collected from this system were analyzed in an off-site laboratory by CLP methodologies for TCL VOCs, SVOCs, Pesticides/PCBs, and TAL inorganics. In addition to the CLP analyses, sediment samples were also analyzed for PHCs, and TOC. The inductively coupled plasma (ICP) serial dilution analysis results for zinc has a percent difference between the sample result and serial dilution of greater than 15 percent and associated samples were qualified as estimated with a "J". The laboratory also analyzed two surface water samples for TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics, total suspended solids, and hardness.

4,4'-DDT was reported in one sediment sample (JSD-2761) at a concentration of 0.028 J mg/kg; this is below the 0.94 mg/kg background concentration established for LAFB soil. The compound was not detected in any of the other samples analyzed. The presence of 4,4'-DDT may be attributed to pesticide application.

Arsenic was detected in a surface water sample (JSW-2862) at 4.2 μg/L, which is below the CRQL. Arsenic was not identified above background concentrations in the soils at the site. The detection of arsenic is inconsistent with reported possible fuel releases at the site.

Lead was detected in one of two surface water samples at an estimated concentration of 2.4 μg/L, a concentration that is below the CRQL. Although lead was not identified above background in the soils at the site, lead was reported in one sediment sample (JSD-2862) at 163 mg/kg. This is above the background soil concentrations of 70 mg/kg estimated for LAFB soils. Zinc was detected at 139 mg/kg and 198 mg/kg in two sediment samples (JSD-2861 and JSD-2862, respectively). This is above the estimated background concentration for LAFB soil. Zinc has been identified as a site contaminant in sediment at the site.

Sediment sample JSD-2861 contained five fuel-related PAH compounds, with a total PAH concentration of 0.899 mg/kg.

PHCs were detected in all four sediment samples. Samples collected at FDS-N1 had concentrations of 56.0 mg/kg (JSD-2760) and 55.9 mg/kg (JSD-2761). FDS-N2 concentrations were 1,080 mg/kg (JSD-2861) and 311 mg/kg (JSD-2862).

B.5.3 MIGRATION PATHWAYS

The media into which chemicals migrate can affect the types of exposures that could occur. Mechanisms of chemical migration are discussed below to help identify potential exposure pathways.

East Gate Waste Storage Tanks

Potential contaminant migration pathways at EGWST are by wind (advection of volatiles or erosion of contaminated particles), groundwater movement, and the leaching of contaminants through soils by water percolation. The distribution of the fuel-related VOCs, chlorinated VOCs, and PAHs indicates that most contaminants were released to the environment in the subsurface through leaks from the USTs or associated piping. Once in the subsurface soils, contaminants appear to be migrating horizontally through the movement of perched water observed in the overburden at the site. This is evidenced by the presence of contaminants in soil west of the tank locations. VOCs and light SVOCs move in water after being solubilized; heavier SVOCs, such as phenanthrene, possibly move with soil colloids through water movement. The data obtained to date indicates that there has been minimal migration of the contaminants.

The perched water at the EGWST site is the result of a "bathtub effect" created when tight soils around the tank were excavated during installation of the underground storage tanks. The soil that was backfilled in the excavation was disturbed and, as a result, less dense and likely more permeable. During precipitation events, the rain infiltrates more readily through the disturbed soil than the undisturbed till. Ponding occurs when the infiltrating rainwater encounters the native till. The perched water is likely a temporary condition that only occurs during prolonged rain events. The extent of ponding is probably limited to the area of the excavation. The presence of perched water facilitates the lateral dispersion of fuel-related contaminants. As the ponded (contaminated) water spreads within the excavation, vertical infiltration begins to occur through unconsolidated materials at the site. At this point, the infiltrating rainwater would likely migrate downslope to the west along the less permeable bedrock surface until it gradually infiltrated into the bedrock and groundwater. Upon contact with the water table, potential contaminants that migrated with the infiltrating rain water would flow northeast with groundwater.

A complete discussion of site characteristics can be found in the RI/FFS in Sections 6.0 and 11.0 (ABB-ES, 199b).

Fuel Drop Sites

There are no indications that repeated large quantities of fuel were discharged at these sites. It is believed that FDS-N1 was used once for fuel discharge and FDS-N2 was used three times. No site-related analytes have been identified in the soils at FDS-N1 or FDS-N2.

The SVOCs detected in soils at FDS-S may be attributed to aircraft exhaust or fuel and oil that accumulated on pavement and was washed off by the storm runoff. Further migration of site contaminants appears not to have occurred. The available data does not indicate the presence of fuel-related compounds in groundwater at the site, however, a comprehensive groundwater study has not been completed. This groundwater study will be completed under OU 12. If the data gathered during that investigation changes the interpretation of site conditions, the need for additional work at the site will be evaluated and work performed if necessary.

Metals in the surface soils and sediments are expected to undergo migration by surface water. Downward migration in the soil column is not expected to be a major migration pathway; still, this may occur in the near-surface soils with rainwater infiltration. Some metals are present in groundwater, but cadmium, which has been detected in soil, is not one of them.

The groundwater data indicate that SVOCs and metals detected in soil have not impacted groundwater quality. However, groundwater will be evaluated further as a separate operable unit.

A complete discussion of site characteristics can be found in the RI/FFS in Sections 6.0 and 11.0 (ABB-ES, 1993b).

B.6 SUMMARY OF SITE RISKS

B.6.1 East Gate Waste Storage Tank

A risk assessment was performed to estimate the potential risks to human health and the environment from exposure to contaminants associated with the EGWST. 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. The results of the human health and ecological risk assessment for the EGWST site are discussed below. Since the cumulative carcinogenic health risk is less than $1x10^{-4}$ and the hazard index (HI) is less than 1.0, remedial acton due to human health risks is not necessary at the EGWST site under CERCLA.

Human Health Risk Assessment

The contaminants of concern identified for the EGWST, listed in Table B.6-1, were selected for evaluation in the risk assessment and include 12 for surface soil, 10 for subsurface soil, and 10 for the area below the removed tank. These contaminants constitute a representative subset of all the contaminants identified at the site during the RI. The compounds 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 Subsection 9.2.3 of the RI/FFS (ABB-ES, 1993b).

Human health risks associated with exposure to the contaminants of concern were quantitatively evaluated under both current (groundskeeper and child trespasser) and future (residential and construction worker) land-use scenarios. Several hypothetical

TABLE B.6-1
CONTAMINANTS OF CONCERN TO HUMAN HEALTH
EAST GATE WASTE STORAGE TANK SITE

OU 6 ROD
LORING AIR FORCE BASE

COMPOUND	RANGE OF SQLs* (mg/kg)	FREQUENCY OF DETECTION	MAXIMUM DETECTED CONCENTRATION (mg/kg)	MINUMUM DETECTED CONCENTRATION (mg/kg)	MEAN (mg/kg)	BACKGROUND RANGE (mg/kg)
Surface Soil						
Benzo(a)anthracene	0.37 - 0.4	1/6	0.27	0.27	0.045	NA
Benzo(a)pyrene	0.37 - 0.4	1/6	0.22	0.22	0.0367	NA
Benzo(b)fluoranthene**	0.37 - 0.4	1/6	0.23	0.23	0.0383	NA
Benzo(k)fluoranthene**	0.37 - 0.4	1/6	0.23	0.23	0.0383	NA
Chrysene	0.37 - 0.4	1/6	0.3	0.3	0.05	NA
Fluoranthene	0.37 - 0.4	1/6	0.55	0.55	0.0917	NA
Indeno(1,2,3-c,d)pyrene	0.37 - 0.4	1/6	0.15	0.15	0.025	NA
Phenanthrene	0.37 - 0.4	1/6	0.37	0.37	0.0617	NA
Pyrene	0.37 - 0.4	1/6	0.4	0.4	0.0667	NA
Bis(2-ethylhexyl)phthalate	0.36 - 0.4	1/6	0.45	0.45	0.233	NA
Total Carcinogenic PAHs			1.4		0.23	NA
Total PAHs without RfDs			1.77		0.295	NA
Subsurface Soil (> 2 ft bgs)						
2-Methylnaphthalene	0.36 - 0.42	1/12	2.6	2.6	0.217	NA
Butylbenzylphthalate	0.36 - 0.42	1/12	0.05	0.05	0.176	NA
Di-n-octylphthalate	0.36 - 0.42	2/12	0.31	0.25	0.203	NA
Naphthalene	0.36 - 0.42	1/12	1.3	1.3	0.108	NA
Bis(2-ethylhexyl)phthalate	0.36 - 0.37	5/12	0.28	0.05	0.177	NA
Benzene	0.006 - 1.4	1/18	0.004	0.004	0.001	NA
Ethylbenzene	0.006 - 1.4	1/18	0.24	0.24	0.0136	NA
Methylene Chloride	0.006 - 1.4	3/18	0.14	0.014	0.0532	NA
Total Xylenes	0.006 - 1.4	1/18	0.18	0.18	0.0103	NA
Total PAHs without RfDs			3.9		0.325	NA
Soil Below Removed Tank (> 12 ft bgs)						
Antimony	3.7 - 6.3	1/8	6.7	6.7	2.73	<1.0
2-Methylnaphthalene	0.37 - 21	3/7	12	0.17	1.873	NA
Naphthalene	0.37 - 21	2/7	8.7	0.62	1.359	NA
Bis(2-ethylhexyl)phthalate	0.37 - 24	1/7	0.2	0.2	3.354	NA
Benzene	0.011 - 31	1/8	0.01	0.01	3.084	NA
Ethylbenzene	0.028 - 31	4/8	1.2	0.012	3.154	NA
Methylene Chloride	0.011 - 4.3	3/8	21	0.56	5.343	NA
Toluene	0.011 - 14	3/8	98	0.008	13.397	NA
Total Xylenes	0.028	7/8	590	0.072	82.507	NA
Total PAHs without RfDs			20.7		3.232	NA

NOTES:
*Range of Sample Quantitation Limits for parameters reported as "not detected" in a sample.
**Benzo(b)fluoranthene and benzo(k)fluoranthene results were not speciated: reported as combined value.
NA = No background data available.

22-Oct-93 \TabB.6-1

exposure pathways were developed to reflect the potential for exposure to surface and subsurface soils. The following is a brief summary of the exposure pathways evaluated. A more thorough description can be found in Subsection 9.2 of the RI/FFS (ABB-ES, 1993b).

Current exposure scenarios include occupational (adult-groundskeeper) and recreational (child-trespasser). Future scenarios include adult and child resident and occupational adult (i.e., construction worker for subsurface soils). Soil exposure includes incidental ingestion, dermal absorption, and inhalation of particulates for both current and future land use scenarios. Exposure to groundwater was not considered as an exposure pathway, because groundwater will be considered in a separate operable unit. The potential future land use by a farm family (referred to as the resident farmer scenario) was considered and eliminated from further evaluation based on soil limitations that make soils generally unsuitable for cultivated crops, pasture, or hayland (e.g., surface stoniness) (USDA-SCS, 1986).

Different exposure levels were evaluated for the exposure pathways in the risk assessment. The parameters and assumptions used to determine the exposure levels for each pathway are described in Tables A through J in Appendix J of the RI/FFS (ABB-ES, 1993b). For dermal contact and ingestion of soils in the residential scenario, a child was evaluated based on the assumed exposure of 182 days per year (it is assumed that the soil is frozen or snow-covered 26 weeks of the year) for six years, with 24 years for an adult (USEPA, 1991a). For the current groundskeeper scenario, dermal contact and ingestion was of soils was based on an assumed exposure of 26 days per year (1 day per week for 26 weeks) for 25 years (USEPA, 1991a). For the future construction worker, dermal contact and ingestion exposure was assumed to be for 130 days per year for 1 year. For the residential inhalation pathway, an exposure time of 16 hours per day was assumed for a period of 70 years for both the child and adult (USEPA, 1991a). This exposure time was utilized in all OU 6 RI calculations for residential scenarios. For the groundskeeper, the inhalation exposure was assumed to be 8 hours per day, 26 days per year, and for the construction worker, the inhalation exposure was assumed to be 8 hours per day, 130 days per year. For each pathway evaluated, an average and an RME estimate was generated corresponding to exposure to the average and the maximum concentration detected in that particular medium.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying the exposure level with the chemical-specific cancer factor. Cancer potency 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., 1×10^{-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 as defined 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 USEPA's measure of the potential for non-carcinogenic health effects. A hazard quotient is calculated by dividing the exposure level by the RfD or other suitable benchmark for non-carcinogenic health effects for an individual compound. Reference doses 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 to the reference dose 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 HI. The target risk level for noncarcinogenic effects is an HI of 1.0 (USEPA, 1989b). If the ratio is less than 1.0, no adverse health effect is anticipated. If the ratio exceeds 1.0, there may be a concern for noncancer effects. (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).

Table B.6-2 depicts the risk summary for the contaminants of concern in surface soil and subsurface soil evaluated to reflect present and potential future incidental ingestion, dermal contact, and inhalation exposure pathways corresponding to the average and the RME scenarios.

Quantitative estimates of both carcinogenic and non-carcinogenic risks were calculated for each contaminant of concern identified and each complete exposure scenario selected for evaluation in the exposure assessment. The equations for

TABLE B.6-2
RISK SUMMARIES
EAST GATE WASTE STORAGE TANK SITE

OU 6 ROD
LORING AIR FORCE BASE

	AVERAGE		MAXIMUM	
	Total Cancer Risk	Total Hazard Index	Total Cancer Risk	Total Hazard Index
CURRENT USE				
Incidental Ingestion of Surface Soil: Groundskeeper	3E-08	0.000001	2E-07	0.000005
Dermal Contact with Surface Soil: Groundskeeper	9E-08	0.000004	6E-07	0.00001
Inhalation Exposure to Particulates: Groundskeeper	4E-10	NA	2E-09	NA
TOTAL: GROUNDSKEEPER	**1E-07**	**0.000005**	**8E-07**	**0.00002**
Incidental Ingestion of Surface Soil: Older Child Exploring	4E-08	0.000004	2E-07	0.00002
Dermal Contact with Surface Soil: Older Child Exploring	2E-07	0.00002	1E-06	0.00007
TOTAL: OLDER CHILD	**2E-07**	**0.00002**	**1E-06**	**0.00008**
FUTURE USE				
Incidental Ingestion of Surface Soil: Residential Adult	4E-07	0.00002	2E-06	0.0002
Dermal Contact with Surface Soil: Residential Adult	6E-07	0.00003	4E-06	0.0002
Inhalation Exposure to Particulates: Residential Adult	3E-09	NA	2E-08	NA
TOTAL: RESIDENTIAL ADULT	**1E-06**	**0.00004**	**6E-06**	**0.0004**
Incidental Ingestion of Surface Soil: Residential Child	1E-06	0.0002	6E-06	0.0006
Dermal Contact with Surface Soil: Residential Child	1E-06	0.0002	8E-06	0.0008
Inhalation Exposure to Particulates: Residential Child	4E-09	NA	2E-08	NA
TOTAL: RESIDENTIAL CHILD	**2E-06**	**0.0004**	**1E-05**	**0.001**
Incidental Ingestion of Subsurface Soil: Construction Worker	1E-10	0.00007	2E-10	0.0003
Dermal Contact with Subsurface Soil: Construction Worker	7E-11	0.00003	2E-10	0.0001
Inhalation Exposure to Particulates: Construction Worker	3E-14	0.000000002	8E-14	0.00000002
TOTAL: CONSTRUCTION WORKER	**2E-10**	**0.0001**	**3E-10**	**0.0004**
Incidental Ingestion of Tank Area Subsurface Soil: Construction Worker	2E-09	0.02	6E-09	0.04
Dermal Contact with Tank Area Subsurface Soil: Construction Worker	4E-09	0.001	2E-08	0.005
Inhalation Exposure to Particulates: Construction Worker	2E-12	0.000002	8E-12	0.00001
TOTAL: CONSTRUCTION WORKER	**6E-09**	**0.02**	**3E-08**	**0.05**
Ingestion of Groundwater: Residential Adult (Summers Model) (due to the presense of VOCs, the ingestion intake was multiplied by 2.3 [MEDEP, 1992])			**2E-02**	**101.20**

NOTES:
NA - Toxicity information not available to evaluate risk.

22-Oct-93 \TabB.6-2

calculating chemical-specific and pathway-specific cancer risks and HQs are presented in Appendix J, Section 2.0 of the RI/FFS (ABB-ES, 1993b).

Surface Soils

The highest cancer risk associated with exposure to surface soils under current land use is the recreational (older child/trespassing) exposure with a cancer risk = $2x10^{-7}$ for the average exposure scenario and a cancer risk = $1x10^{-6}$ for the RME scenario (see Table B.6-2). These values are below regulatory risk criteria. Carcinogenic PAHs are responsible for most of the risk associated with exposure to surface soils (carcinogenic risk from PAHs = $1x10^{-6}$ for the RME scenario).

The potential future residential land-use scenario presents the greatest potential risk to human health (see Table B.6-2) because of the potential for long-term, repetitive exposure to soil contaminants and the conservative assumptions involving soil ingestion rates. The highest carcinogenic risks are associated with future residential exposure to children ($2x10^{-6}$ for the average exposure scenario and $1x10^{-5}$ for the RME scenario) and adults ($1x10^{-6}$ for the average exposure scenario and $6x10^{-6}$ for the RME scenario). The total 30-year residential risk is $2x10^{-5}$ (for the RME scenario) and $3x10^{-6}$ (for the average exposure scenario). These risks represent the sum of ingestion, dermal, and inhalation pathways. The cancer risk for a child in the RME scenario is equal to the MEDEP's target cancer risk level of $1x10^{-5}$. The average exposure risk scenario to residential children and both the average and RME risks to adults are below MEDEP's target risk level. The total 30-year residential cancer risk associated with the RME scenario slightly exceeds MEDEP's target criteria. Average total residential risks are within MEDEP's criteria. No risk estimates exceed the USEPA's risk limit of $1x10^{-4}$. Exposure to carcinogenic PAHs accounts for the majority of the risk involving contaminated surface soils (i.e., future residential exposure to children: $1x10^{-5}$ for the RME scenario; future residential exposure to adults: $6x10^{-6}$ for the RME scenario).

The non-carcinogenic HIs associated with exposure under all scenarios were well below 1.0. Non-carcinogenic health risks are not of concern.

Subsurface Soils

The carcinogenic risks to the theoretical future construction worker are well below all target risk criteria in the range of 10^{-10} to 10^{-8} for the RME scenario in both subsurface and "hot spot" subsurface soils. The non-carcinogenic HIs associated with all subsurface soil pathways are well below 1.0. The greatest systemic hazards calculated for the site are to the future construction worker using the RME scenario (tank area) soils (HI = 0.05). This indicates minimal non-carcinogenic effects are expected from site soils.

The concentrations of contaminants potentially leached from the soil were derived using the Summers Model (Appendix L of the RI/FFS). Modeled concentrations of VOCs (i.e., methylene chloride, toluene, and xylene) exceeded state and federal standards. Because many of the modeled compounds (e.g., PAHs) do not have groundwater standards, the modeled concentrations were used to evaluate potential future risk from domestic use of groundwater. Following MEDEP guidance for evaluating VOCs in groundwater, the ingestion intake was multiplied by 2.3 to provide estimates of inhalation and dermal absorption for the residential adult groundwater-use scenario (ABB-ES, 1992a). Maximum contaminant concentrations (i.e., "hot spots") were used in the Summers Model. The potential risks associated with the contaminants leached to groundwater are high (cancer risk = 2×10^{-2}, HI = 101.2) because of the use of analytical data collected from the "hot spot" area. Both values exceed appropriate regulatory criteria. The calculated risks from the modeled concentrations in groundwater are primarily due to methylene chloride (cancer risk = 1.8×10^{-2}, HI = 94.7).

Uncertainty Evaluation

Quantitative estimates of risk are based on numerous assumptions, most of which are intended to be protective of human health (i.e., conservative). As such, risk estimates are not truly probabilistic estimates of risk but are conditional estimates given a series of conservative assumptions about exposure and toxicity. While it is true that there are some uncertainties inherent in the risk assessment methodology that might lead to an underestimation of true risks, most assumptions will bias an evaluation in the direction of overestimation of risk.

The possibility for underestimation of true risks is caused by the exclusion from quantitative evaluation of several pathways (i.e., residential exposures to potentially excavated subsurface soils spread aboveground and ingestion of homegrown produce from backyard garden plots). Under certain circumstances these pathways may be significant and therefore may be quantitatively evaluated in those cases. As mentioned before, "hot spot" soils at the EGWST were below 15 feet bgs and therefore not appropriate for a residential evaluation. The possibility of a backyard garden plot is considered slight at sites that are less than 1 acre. The EGWST site is less than one-half acre.

As stated, risks associated with exposures to groundwater at the EGWST were not assessed other than the evaluation of the leaching potential for contaminants in soils using the Summers Model. These results are inconclusive because a comprehensive groundwater study has not been completed. Groundwater at the site will be evaluated as a separate operable unit (OU 12). If data gathered during that investigation changes the interpretation of site conditions, the need for additional work at the site will be evaluated and work performed if necessary.

Because benzo(a)pyrene and naphthalene are the most toxic representatives of carcinogenic and non-carcinogenic PAHs, respectively, the use of their toxicity values to estimate the adverse effects of exposure to PAHs lacking specific toxicity values will likely result in an overestimation of risks. Other sources of uncertainty that could cause overestimation of risks include: the use of purposive (biased) sampling (targeting only the "hot spots"); the estimation of exposure concentrations by the use of maximum detections (while assuming no degradation, dilution, and so forth); the use of the 95 percent (or upper bound 90 percent) exposure parameter values such as contact rate and exposure frequency and duration; and the use of conservatively derived toxicity values such as RfDs (incorporating multiple safety factors) and CSFs, which are based on experimental animal data used in a multistage model. The USEPA Risk Assessment Guidance states that the carcinogenic risk estimate will generally be an upper-bound estimate, and that USEPA is reasonably confident that the 'true risk' will not exceed the risk estimate derived through use of this model and is likely to be less than predicted (USEPA, 1989b). Therefore, the true risk is likely not much more than the estimated risk, but it could very well be considerably lower, even approaching zero.

ECOLOGICAL RISK ASSESSMENT

The ecological risk assessment chose five terrestrial wildlife indicator species were selected to represent exposures for terrestrial organisms through ingestion of food and soil. The five indicator species are:

- short-tailed shrew (*Blarina brevicauda*), small mammal, carnivore
- American woodcock (*Scolopax minor*), small bird, omnivore

- garter snake (*Thamnophis s. sirtalis*), reptile, carnivore
- fisher (*Martes pennanti*) predatory mammal, carnivore
- broad-winged hawk (*Buteo platypterus*), predatory bird, carnivore

Use of these species in estimating risk is conservative because the species are predominantly carnivorous, and therefore highly prone to exposure to chemicals through the food chain. Organisms with small home ranges, such as the shrew and garter snake, and/or that ingest a high proportion of earthworms and other terrestrial invertebrates, are particularly susceptible to food chain exposures.

These organisms were chosen for the following reasons: (1) these species are all potential ecological receptors at the EGWST; (2) the various feeding habits (e.g., omnivore, carnivore) are representative of those typical of an ecological community; and (3) these species were recommended for a conservative evaluation of ecological risk by USEPA and USFWS (USEPA, 1991c). It is assumed that each species chosen is the most sensitive representative of other species at a similar trophic position occurring at the EGWST. Modeling of exposures to rare species was not performed because no rare, threatened, or endangered species have been identified at LAFB (see Subsection 9.3.2 of the RI/FFS) (ABB-ES, 1993b).

Adverse effects related to short-term exposures to contaminants of concern in surface soils are predicted for the short-tailed shrew and the American woodcock. HIs exceed 1.0 for the shrew (HI = 17), and the woodcock (HI = 9.9), and are solely attributable to benzo(a)pyrene (HQ = 17 for the shrew, and 9.9 for the woodcock). Adverse effects related to acute exposures are not predicted for the snake, fisher, or hawk.

Adverse effects related to long-term exposures are probable for small mammals, and possible for small birds, and herptiles; HI = 80 for the shrew, HI = 1.2 for the woodcock, and HI = 1.0 for the snake. Benzo(a)pyrene is the greatest contributor to risks related to acute exposures at the EGWST. The benzo(a)pyrene HQs equal 79 for the shrew, 1.2 for the woodcock, and 1.0 for the snake.

Benzo(a)pyrene is also the major contributor to risks at the EGWST because of the conservativism used in selecting the lowest RTV identified in the literature for benzo(a)pyrene. The chronic RTV for benzo(a)pyrene (0.002 mg/kgbw-day) was chosen because it results in the most conservative estimation of risk. The HQs for indicator species for benzo(a)pyrene in the chronic scenario are therefore higher than for any other chemical of potential concern.

Using the relative ranking scheme described above, HIs indicate that effects to individuals are probable although they do not necessarily provide an indication of population effects. In certain cases, acute and chronic effects to individuals may occur with little effect on population growth, stability or structure.

Because of the infrequent detection of contaminants in surface soils, and because the single contaminant of concern (i.e., benzo(a)pyrene) contributed virtually the entire HI values outside the risk range, it is unnecessary to perform a CERCLA remedial action at the EGWST to protect the environment.

B.6.2 Fuel Drop Sites

A risk assessment was performed to estimate the potential risks to human health and the environment from exposure to contaminants associated with the FDSs. 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. The results of the human health and ecological risk assessment for the fuel drop sites are discussed below. Since the cumulative carcinogenic health risk is less than $1x10^{-4}$ and the HI is less than 1, remedial action due to human health risks is not necessary under CERCLA at the fuel drop sites.

Human Health Risk Assessment

The contaminants of concern identified for the FDS, listed in Tables B.6-3, B.6-4, B.6-5, were selected for evaluation in the risk assessment. For FDS-N1, (Table B.6-3) these include two for surface soil and one for subsurface soil. For FDS-N2 (Table B.6-4), these include one for surface soil and two for subsurface soil for subsurface soil. For FDS-SA and FDS-SF (Table B.6-5), these include 11 for surface

TABLE B.6–3
CONTAMINANTS OF CONCERN TO HUMAN HEALTH
FUEL DROP SITE – NORTH 1

OU 6 ROD
LORING AIR FORCE BASE

COMPOUND	RANGE OF SQLs* (mg/kg)	FREQUENCY OF DETECTION	MAXIMUM DETECTED CONCENTRATION (mg/kg)	MINIMUM DETECTED CONCENTRATION (mg/kg)	MEAN (mg/kg)	BACKGROUND RANGE (mg/kg)
Surface Soil						
Bis(2–ethylhexyl)phthalate	0.35 – 0.36	2/4	0.52	0.31	0.296	NA
Cyanide	0.53 – 0.54	1/4	0.54	0.54	0.336	NA
Sub–surface Soil						
Bis(2–ethylhexyl)phthalate	0.35 – 0.4	4/8	0.3	0.14	0.196	NA

NOTES:
*Range of Sample Quantitation Limits for parameters reported as "not detected" in a sample.
NA = No background data available.

22–Oct–93 \TabB.6–3

TABLE B.6-4
CONTAMINANTS OF CONCERN TO HUMAN HEALTH
FUEL DROP SITE – NORTH 2

OU 6 ROD
LORING AIR FORCE BASE

COMPOUND	RANGE OF SQLs* (mg/kg)	FREQUENCY OF DETECTION	MAXIMUM DETECTED CONCENTRATION (mg/kg)	MINIMUM DETECTED CONCENTRATION (mg/kg)	MEAN (mg/kg)	BACKGROUND RANGE (mg/kg)
Surface Soil						
Bis(2-ethylhexyl)phthalate	0.34 – 0.36	1/5	0.27	0.27	0.194	NA
Sub-surface Soil						
Bis(2-ethylhexyl)phthalate	0.35 – 0.36	2/11	0.46	0.26	0.205	NA
Beryllium	0.43	7/11	2	0.47	0.935	<1.0-1.5

NOTES:
*Range of Sample Quantitation Limits for parameters reported "not detected" in a sample.
NA = No background data available.

22-Oct-93 \TabB.6-4

TABLE B.6-5
CONTAMINANTS OF CONCERN TO HUMAN HEALTH
FUEL DROP SITE SOUTH

OU 6 ROD
LORING AIR FORCE BASE

COMPOUND	RANGE OF SQLs* (mg/kg)	FREQUENCY OF DETECTION	MAXIMUM DETECTED CONCENTRATION (mg/kg)	MINIMUM DETECTED CONCENTRATION (mg/kg)	MEAN (mg/kg)	BACKGROUND RANGE (mg/kg)
Surface Soil						
4-Methyl-2-pentanone	0.011 - 0.012	1/9	0.008	0.008	0.00589	NA
Bis(2-ethylhexyl)phthalate	0.35 - 0.47	1/9	0.26	0.26	0.198	NA
Benzo(b)fluoranthene	0.35 - 0.47	1/9	0.095	0.095	0.0106	NA
Benzo(k)fluoranthene	0.35 - 0.47	1/9	0.11	0.11	0.0122	NA
Fluoranthene	0.35 - 0.47	1/9	0.19	0.19	0.0211	NA
Phenanthrene	0.35 - 0.47	1/9	.16	0.16	0.0178	NA
Pyrene	0.35 - 0.47	1/9	0.18	0.18	0.02	NA
Cadmium	1.1 - 1.2	1/9	1.3	1.3	0.644	<1.0
Cyanide**	0.57 - 0.48	1/9	0.64	0.64	0.307	NA
Total Carcinogenic PAHs			0.205		0.0228	NA
Total PAHs without RfDs			0.365		0.0406	NA
Sub-surface Soil						
2-Methylnaphthalene	0.36 - 0.47	1/16	0.32	0.32	0.0653	NA
Acenaphthene	0.36 - 0.47	1/16	2.3	2.3	0.189	NA
Benzo(a)anthracene	0.36 - 0.47	2/16	13	.17	0.857	NA
Benzo(a)pyrene	0.36 - 0.47	1/16	12	12	0.795	NA
Benzo(b)fluoranthene	0.36 - 0.47	5/16	14	0.047	0.899	NA
Benzo(g,h,i)perylene	0.36 - 0.47	1/16	2.6	1.4	0.133	NA
Benzo(k)fluoranthene	0.36 - 0.47	5/16	10	0.042	0.647	NA
Bis(2-ethylhexyl)phthalate	0.36 - 0.43	5/16	0.71	0.13	0.223	NA
Carbazole	0.36 - 0.47	1/16	3.7	3.7	0.409	NA
Chrysene	0.36 - 0.47	2/16	14	0.18	0.92	NA
Dibenzofuran	0.36 - 0.47	1/16	1.5	1.5	0.139	NA
Fluoranthene	0.36 - 0.47	4/16	31	0.18	1.994	NA
Fluorene	0.36 - 0.47	1/16	2.6	2.6	0.208	NA
Indeno(1,2,3-c,d)pyrene	0.36 - 0.47	1/16	5.3	5.3	0.377	NA
Phenanthrene	0.36 - 0.47	4/16	27	0.16	1.737	NA
Pyrene	0.36 - 0.47	4/16	24	0.15	1.55	NA
Barium	*	16/16	354	34.7	65.1	10-300
Beryllium	0.41 - 0.52	7/16	1.6	0.5	0.445	<1.0-1.5
Cadmium	1 - 1.3	1/16	1.4	1.4	0.6	<1.0
Lead	*	16/16	72.9	7.1	16.3	11.5-70
Nickel	*	16/16	112	42.2	53.2	29.5-70
Zinc	*	16/16	127	46.5	66.2	45-74
4,4'-DDT**	0.0072 - 0.0086	1/15	0.012	0.012	0.00433	<0.0076 - 0.94
Aroclor-1260**	0.072 - 0.086	1/15	0.079	0.079	0.0405	NA
Total Carcinogenic PAHs			68.3		4.844	NA
Total PAHs without RfDs			101.12		6.78	NA

NOTES:
**These compounds were only detected at FDS-S (active)
*Range of Sample Quantitation Limits for parameters reported "not detected" in a sample.
NA = No background data available

soil and 26 for subsurface soil. These contaminants constitute a representative subset of the contaminants identified at the Site during the RI. The compounds 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 Subsection 10.2.3 of the RI/FFS (ABB-ES, 1993b).

Human health risks associated with exposure to the contaminants of concern were estimated quantitatively evaluated under both current (groundskeeper) and future (residential and construction worker) land-use scenarios. Several hypothetical exposure pathways were developed to reflect the potential for exposure to surface and subsurface soils. The following is a brief summary of the exposure pathways evaluated. A more thorough description can be found in Subsection 10.2 of the Final RI/FFS (ABB-ES, 1993b).

Current exposure scenarios include occupational (adult-groundskeeper). Future scenarios include adult and child resident and occupational adult (i.e., construction worker for subsurface soils). Soil exposure includes incidental ingestion, dermal absorption, and inhalation of particulates for both current and future land-use scenarios. Exposure to groundwater was not considered as an exposure pathway, because groundwater will be considered in a separate operable unit. The potential future land use by a farm family (referred to as the resident farmer scenario) was considered and eliminated from further evaluation based on soil limitations that make soils generally unsuitable for cultivated crops, pasture, or hayland (e.g., surface stoniness) (USDA-SCS, 1986).

Different exposure levels were evaluated for the exposure pathways in the risk assessment. The parameters and assumptions used to determine the exposure levels for each pathway are described in Tables A through J in Appendix J of the RI/FFS (ABB-ES, 1993b). For dermal contact and ingestion of soils in the residential scenario, a child was evaluated based on the assumed exposure of 182 days per year (it is assumed that the soil is frozen or snow-covered 26 weeks of the year) for six years, with 24 years for an adult (USEPA, 1991a). For the current groundskeeper scenario, dermal contact and ingestion was of soils was based on an assumed exposure of 26 days per year (1 day per week for 26 weeks) for 25 years (USEPA, 1991a). For the future construction worker, dermal contact and ingestion exposure was assumed to be for 130 days per year for 1 year. For the residential inhalation pathway, an exposure time of 16 hours per day was assumed for a period of 70 years for both the child and adult (USEPA, 1991a). This exposure time was utilized in all OU 6 RI calculations for residential scenarios. For the groundskeeper, the inhalation exposure was assumed to be 8 hours per day, 26 days per year, and for the construction worker, the inhalation exposure was assumed to be 8 hours per day, 130 days per year. For each pathway evaluated, an average and a reasonable maximum exposure estimate was generated corresponding to exposure to the average and the RME detected in that particular medium.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying the exposure level with the chemical-specific cancer potency factor. Cancer potency 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., 1×10^{-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 as defined 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 HI was also calculated for each pathway as USEPA's measure of the potential for non-carcinogenic health effects. A hazard quotient (HQ) is calculated by dividing the exposure level by the RfD or other suitable benchmark for non-carcinogenic health effects for an individual compound. Reference doses 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 to the reference dose value (in this example), the exposure as characterized is approximately one-third of an acceptable exposure level for the given compound. The HQ is only considered additive for compounds that have the same or similar toxic endpoint and the sum is referred to as the 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).

Tables B.6-6 through B.6-9 depict the risk summaries for the contaminants of concern in surface soil and subsurface soil at FDS-N1, FDS-N2, FDS-SA, and FDS-SF respectively. They were evaluated to reflect present and potential future incidental ingestion, dermal contact, and inhalation exposure pathways corresponding to the average and the RME scenarios. The equations for calculating chemical-specific and pathway-specific cancer risks and HQs are presented in Appendix J, Section 2.0 of the RI/FFS (ABB-ES, 1993b). The quantitative risk estimate tables for the FDSs are presented in Appendix J of the RI/FFS.

Risk Characterization for FDS-N1

Surface Soils

The potential cancer risk associated with exposure to surface soils under current land use for the groundskeeper is 5×10^{-10} for the RME scenario (see Table B.6-6).

The highest carcinogenic risks are associated with theoretical future residential exposure to children (1×10^{-8}) and adults (4×10^{-9}) using the RME scenario for surface soil. Therefore, the total 30-year residential cancer risks associated with the RME scenario are equal to the sum, or 1×10^{-8}. These cancer risk estimates represent the sum of the ingestion, dermal, and inhalation pathways. In calculating future residential exposure, the use of the RME scenario yields a cancer risk level well below both the MEDEP cancer risk target level of 1×10^{-5} and USEPA's risk limit of 1×10^{-4}.

Subsurface Soils

The carcinogenic risk associated with the theoretical future construction worker's RME to subsurface soils is 2×10^{-10}.

The non-carcinogenic HIs associated with exposure under all scenarios (for both subsurface and surface soils) are well below 1.0. These HIs indicate minimal non-carcinogenic hazards to human health. Based on the results of the baseline risk assessment, remedial action objectives are not considered necessary to protect against dermal contact, incidental ingestion, and inhalation of particulates exposure to soil contaminants at the FDS-N1.

TABLE B.6-6
RISK SUMMARIES
FUEL DROP SITE NORTH 1

OU 6 ROD
LORING AIR FORCE BASE

	AVERAGE		MAXIMUM	
	Total Cancer Risk	Total Hazard Index	Total Cancer Risk	Total Hazard Index
CURRENT USE				
Incidental Ingestion of Surface Soil: Groundskeeper	8E-11	0.000002	1E-10	0.000003
Dermal Contact with Surface Soil: Groundskeeper	2E-10	0.000005	4E-10	0.000008
Inhalation Exposure to Particulates: Groundskeeper	NA	NA	NA	NA
TOTAL: GROUNDSKEEPER	3E-10	0.000007	5E-10	0.00001
FUTURE USE				
Incidental Ingestion of Surface Soil: Residential Adult	1E-09	0.00002	2E-09	0.00004
Dermal Contact with Surface Soil: Residential Adult	2E-09	0.00002	3E-09	0.00003
Inhalation Exposure to Particulates: Residential Adult	NA	NA	NA	NA
TOTAL: RESIDENTIAL ADULT	3E-09	0.00004	4E-09	0.00007
Incidental Ingestion of Surface Soil: Residential Child	2E-09	0.0002	4E-09	0.0004
Dermal Contact with Surface Soil: Residential Child	3E-09	0.0001	6E-09	0.0002
Inhalation Exposure to Particulates: Residential Child	NA	NA	NA	NA
TOTAL: RESIDENTIAL CHILD	6E-09	0.0003	1E-08	0.0006
Incidental Ingestion of Subsurface Soil: Construction Worker	1E-10	0.00002	1E-10	0.00004
Dermal Contact with Subsurface Soil: Construction Worker	3E-11	0.000008	5E-11	0.00001
Inhalation Exposure to Particulates: Construction Worker	NA	NA	NA	NA
TOTAL: CONSTRUCTION WORKER	1E-10	0.00003	2E-10	0.00005
Ingestion of Groundwater: Residential Adult (Summers Model)			9E-07	0.007
Dermal Contact with Groundwater: Residential Adult			5E-08	0.00044
TOTAL: RESIDENTIAL ADULT			9E-07	0.008

NOTES:
NA - Toxicity values not available to evaluate risks

22-Oct-93 \Table B.6-6

TABLE B.6-7
RISK SUMMARIES
FUEL DROP SITE NORTH 2

OU 6 ROD
LORING AIR FORCE BASE

	AVERAGE		MAXIMUM	
	Total Cancer Risk	Total Hazard Index	Total Cancer Risk	Total Hazard Index
CURRENT USE				
Incidental Ingestion of Surface Soil: Groundskeeper	5E-11	0.0000005	7E-11	0.0000007
Dermal Contact with Surface Soil: Groundskeeper	2E-10	0.000002	2E-10	0.000002
Inhalation Exposure to Particulates: Groundskeeper	NA	NA	NA	NA
TOTAL: GROUNDSKEEPER	**2E-10**	**0.000003**	**3E-10**	**0.000003**
FUTURE USE				
Incidental Ingestion of Surface Soil: Residential Adult	7E-10	0.000007	9E-10	0.00001
Dermal Contact with Surface Soil: Residential Adult	1E-09	0.00001	1E-09	0.00001
Inhalation Exposure to Particulates: Residential Adult	NA	NA	NA	NA
TOTAL: RESIDENTIAL ADULT	**2E-09**	**0.00002**	**2E-09**	**0.00002**
Incidental Ingestion of Surface Soil: Residential Child	2E-09	0.00006	2E-09	0.00009
Dermal Contact with Surface Soil: Residential Child	2E-09	0.00009	3E-09	0.0001
Inhalation Exposure to Particulates: Residential Child	NA	NA	NA	NA
TOTAL: RESIDENTIAL CHILD	**4E-09**	**0.0002**	**5E-09**	**0.0002**
Incidental Ingestion of Subsurface Soil: Construction Worker	1E-07	0.0005	3E-07	0.001
Dermal Contact with Subsurface Soil: Construction Worker	9E-10	0.00001	2E-09	0.00002
Inhalation Exposure to Particulates: Construction Worker	2E-09	NA	4E-09	NA
TOTAL: CONSTRUCTION WORKER	**1E-07**	**0.0005**	**3E-07**	**0.001**
Ingestion of Groundwater: Residential Adult (Summers Model)			8E-07	0.006
Dermal Contact with Groundwater: Residential Adult			5E-08	0.00039
TOTAL: RESIDENTIAL ADULT			**8E-07**	**0.007**

NOTES:
NA- Toxicity values not available to evaluate risks

22-Oct-93 \Table B.6-7

TABLE B.6-8
RISK SUMMARIES
FUEL DROP SITE SOUTH (ACTIVE)

OU 6 ROD
LORING AIR FORCE BASE

	AVERAGE		MAXIMUM	
	Total Cancer Risk	Total Hazard Index	Total Cancer Risk	Total Hazard Index
CURRENT USE				
Incidental Ingestion of Surface Soil: Groundskeeper	---	0.0000008	---	0.000002
Dermal Contact with Surface Soil: Groundskeeper	---	0.00000005	---	0.0000001
Inhalation Exposure to Particulates: Groundskeeper	---	NA	---	NA
TOTAL: GROUNDSKEEPER	---	0.0000009	---	0.0000021
FUTURE USE				
Incidental Ingestion of Surface Soil: Residential Adult	---	0.00001	---	0.00002
Dermal Contact with Surface Soil: Residential Adult	---	0.0000003	---	0.0000007
Inhalation Exposure to Particulates: Residential Adult	---	NA	---	NA
TOTAL: RESIDENTIAL ADULT	---	0.00001	---	0.00002
Incidental Ingestion of Surface Soil: Residential Child	---	0.0001	---	0.0002
Dermal Contact with Surface Soil: Residential Child	---	0.000003	---	0.000006
Inhalation Exposure to Particulates: Residential Child	---	NA	---	NA
TOTAL: RESIDENTIAL CHILD	---	0.0001	---	0.0002
Incidental Ingestion of Subsurface Soil: Construction Worker	3E-09	0.000033	7E-09	0.0001
Dermal Contact with Subsurface Soil: Construction Worker	4E-09	0.000015	7E-09	0.000047
Inhalation Exposure to Particulates: Construction Worker	3E-13	NA	9E-13	NA
TOTAL: CONSTRUCTION WORKER	7E-09	0.00005	1E-08	0.0001
Ingestion of Groundwater: Residential Adult (Summers Model)			5E-07	0.0045
Dermal Contact with Groundwater: Residential Adult			3E-08	0.00027
TOTAL: RESIDENTIAL ADULT			6E-07	0.005

NOTES:
--- No carcinogens detected
NA – Toxicity values not available to evaluate risks

22-Oct-93\Tab B.6-8

TABLE B.6-9
RISK SUMMARIES
FUEL DROP SITE SOUTH (FORMER)

OU 6 ROD
LORING AIR FORCE BASE

	AVERAGE		MAXIMUM	
	Total Cancer Risk	Total Hazard Index	Total Cancer Risk	Total Hazard Index
CURRENT USE				
Incidental Ingestion of Surface Soil: Groundskeeper	3E-09	0.00003	3E-08	0.00007
Dermal Contact with Surface Soil: Groundskeeper	9E-09	0.000004	8E-08	0.00009
Inhalation Exposure to Particulates: Groundskeeper	4E-11	0.000000005	4E-10	0.000000007
TOTAL: GROUNDSKEEPER	1E-08	0.00003	1E-07	0.00008
FUTURE USE				
Incidental Ingestion of Surface Soil: Residential Adult	4E-08	0.0005	4E-07	0.001
Dermal Contact with Surface Soil: Residential Adult	6E-08	0.00003	6E-07	0.00007
Inhalation Exposure to Particulates: Residential Adult	3E-10	0.00000003	2E-09	0.00000004
TOTAL: RESIDENTIAL ADULT	1E-07	0.0005	9E-07	0.001
Incidental Ingestion of Surface Soil: Residential Child	1E-07	0.005	9E-07	0.01
Dermal Contact with Surface Soil: Residential Child	1E-07	0.0003	1E-06	0.0005
Inhalation Exposure to Particulates: Residential Child	4E-10	0.0000002	4E-09	0.0000003
TOTAL: RESIDENTIAL CHILD	2E-07	0.005	2E-06	0.01
Incidental Ingestion of Subsurface Soil: Construction Worker	1E-06	0.01	2E-05	0.04
Dermal Contact with Subsurface Soil: Construction Worker	4E-07	0.0002	6E-06	0.002
Inhalation Exposure to Particulates: Construction Worker	7E-09	0.0005	9E-08	0.003
TOTAL: CONSTRUCTION WORKER	2E-06	0.01	2E-05	0.05
Ingestion of Groundwater: Residential Adult (Summers Model)			3E-04	0.09
Dermal Contact with Groundwater: Residential Adult			5E-04	0.03[illegible]
TOTAL: RESIDENTIAL ADULT			8E-04	0.12

Only one organic chemical, bis(2-ethylhexyl)phthalate (BEHP), was reported in the soils at FDS-N1; it is believed to be a sampling artifact. A groundwater concentration value of 5.29 μg/L for BEHP, which is less than the MEDEP maximum exposure guideline (25 μg/L), was predicted using the Summers Model (Appendix L of the RI/FFS). No VOCs, SVOCs, or pesticides/PCBs were detected in groundwater samples collected from monitoring wells associated with FDS-N1. These results are inconclusive because a comprehensive groundwater study has not been completed. This groundwater study will be completed under OU 12. If data gathered during that investigation changes the interpretation of site conditions, the need for additional work at the site will be evaluated and work performed if necessary.

Risk Characterization for FDS-N2

Surface Soils

The potential cancer risk associated with exposure to surface soils under current land use for the groundskeeper is 3×10^{-10} for the RME scenario (see Table B.6-7).

The highest carcinogenic risks are associated with theoretical future residential exposure to children (5×10^{-9}) and adults (2×10^{-9}) using the RME scenario for contaminants in soil. Therefore, the total 30-year residential cancer risk associated with the RME scenario is equal to the sum, or 7×10^{-9}. These cancer risk estimates represent the sum of the ingestion, dermal, and inhalation pathways. In calculating future residential exposure, the use of the RME scenario yields a cancer risk level well below the MEDEP's and USEPA's target risk criteria.

Subsurface Soils

The carcinogenic risk associated with a future construction worker RME to subsurface soils is 3×10^{-7}.

The non-carcinogenic HIs associated with exposure under all scenarios (for both subsurface and surface soils) are well below 1.0. These HIs indicate minimal non-carcinogenic hazards to human health. Based on the results of the baseline risk assessment, remedial action objectives are not considered necessary to protect against dermal contact, incidental ingestion, or inhalation of particulates exposure to soil contaminants at FDS-N2.

Only one organic chemical, BEHP, was reported in the soils at FDS-N2, and it is believed to be an artifact of the sample collection process. A groundwater concentration of 4.7 μg/L for BEHP, which is below the MEDEP maximum exposure guideline (25 μg/L), was predicted using the Summers Model (Appendix L of the RI/FFS). No VOCs, SVOCs, or pesticides/PCBs were detected in groundwater samples collected from wells associated with the site. These results are inconclusive because a comprehensive groundwater study has not been completed. This groundwater study will be completed under OU 12. If the data gathered during that investigation changes the interpretation of site conditions, the need for additional work at the site will be evaluated and work performed if necessary.

Risk Characterization for FDS-SA

Surface Soils

No carcinogens were detected in surface soils. The non-carcinogenic HIs were well below 1.0 (see Table B.6-8).

Subsurface Soils. The carcinogenic risk associated with a future construction worker RME to subsurface soils is $1x10^{-8}$.

The non-carcinogenic HIs associated with exposure under all scenarios (for both subsurface and surface soils, are well below 1.0. These HIs indicate minimal non-carcinogenic hazards to human health. Based on the results of the baseline risk assessment, remedial action objectives are not considered necessary to protect against dermal contact, incidental ingestion, or inhalation of particulates exposure to soil contaminants at FDS-SA.

Only one organic chemical, BEHP, was evaluated in the Summers Model for FDS-SA, and it is believed to be an artifact of the sample collection process. A groundwater concentration of 4.7 μg/L for BEHP, which is below the MEDEP maximum exposure guideline (25 μg/L), was predicted using the Summers Model (Appendix L of the RI/FFS). No VOCs, SVOCs, or pesticides/PCBs were detected in groundwater samples collected from wells associated with the site. These results are inconclusive because a comprehensive groundwater study has not been completed. This groundwater study will be completed under OU 12. If data gathered during that investigation changes the interpretation of site conditions, the need for additional work at the site will be evaluated and work performed if necessary.

Risk Characterization for FDS-SF

Surface Soils

The potential cancer risk associated with exposure to surface soils under current land use for the groundskeeper is $1x10^{-7}$ for the RME scenario (Table B.6-9).

The carcinogenic risks associated with theoretical future residential exposure to children and adults using the RME scenario are $2x10^{-6}$ and $9x10^{-7}$, respectively. Thus, the total 30-year residential risk is equal to the sum, or $3x10^{-6}$. These cancer risk estimates represent the sum of the ingestion, dermal, and inhalation pathways and are within all regulatory criteria.

Subsurface Soils

The highest carcinogenic risks are associated with the theoretical future construction worker exposure scenario ($2x10^{-5}$) using the RME scenario. This cancer risk estimate represents the sum of the ingestion, dermal, and inhalation pathways. Although this value is below the USEPA's risk limit of $1x10^{-4}$, it slightly exceeds the MEDEP cancer risk target level of $1x10^{-5}$. The use of the average exposure scenario (yielding a cancer risk level of $2x10^{-6}$) is more reflective of actual conditions at the site. Most of the risk reflected in these estimations is from the presence of carcinogenic PAHs (i.e., cancer risk = $2x10^{-5}$ [RME scenario]).

The non-carcinogenic HIs associated with exposure under all scenarios, for both subsurface and surface soils, are well below 1.0. These HIs indicate minimal non-carcinogenic hazards to human health.

Fourteen PAHs and the BEHP detected in soils at the FDS-SF were evaluated in the Summers Model. The results are presented in Appendix L of the RI/FFS. The estimated groundwater concentration for BEHP was below the MEDEP maximum exposure guideline (25 μg/L). There are no groundwater standards for the PAHs. No VOCs, SVOCs, or pesticides/PCBs were detected in groundwater samples collected from wells associated with FDS-SF.

Using the groundwater concentrations derived from the Summers Model for the chemicals that do not have a groundwater standard in the risk assessment in a future groundwater ingestion scenario, yields a cancer risk of $8x10^{-4}$ (Appendix J of the RI/FFS). This risk is associated with subsurface soils in the FDS-SF area. Thus, it is possible that the soils in this area could act as a contaminant source, although none of the contaminants detected in the soils were detected in groundwater samples from the site. These results are inconclusive because a comprehensive groundwater study has not been completed; this study will be completed under OU 12. If data gathered during that investigation changes the interpretation of site conditions, the need for additional work at the site will be evaluated and work performed if necessary.

Based on the slight exceedance of the screening criteria by subsurface soils, an imminent threat from dermal toxicity of PAH-contaminated soils may exist if subsurface soils are transferred to the surface (no benzo(a)pyrene was detected in surface soils; total carcinogenic PAHs in surface soils = 0.21 mg/kg). Additionally, the exceedance of the screening criteria indicates possible acute dermal risks to workers if remediation occurs at the site. This suggests that appropriate skin covering should be worn during any subsurface soil excavation.

Uncertainty Evaluation

Quantitative estimates of risk are based on numerous assumptions, most of which are intended to be protective of human health (i.e., conservative). As such, risk estimates are not truly probabilistic estimates of risk, but are conditional estimates given a series of conservative assumptions about exposure and toxicity. While it is true there are some uncertainties inherent in the risk assessment methodology that might lead to an underestimation of true risks, most assumptions will bias an evaluation in the direction of overestimation of risk.

The possibility for underestimation of true risks is caused by the exclusion from quantitative evaluation of several pathways (i.e., residential exposures to potentially excavated subsurface soils spread aboveground, and ingestion of homegrown produce from backyard garden plots). Under certain circumstances, these pathways may be significant and therefore may be quantitatively evaluated in those cases. The potential residential exposure to subsurface soils was not evaluated at the FDSs. There was no contamination found in subsurface soils at FDS-N1, FDS-N2, or FDS-SA. Although subsurface contamination was detected at FDS-SF, quantitative evaluation of residential risks from these soils was not completed. Additionally, the FDSs are approximately three acres each, portions of which are covered by asphalt. Because the sites are larger than one acre, the potential contribution to residential risks from a backyard garden plot could be important. Therefore, in the absence of remediation, risk to residents from subsurface soils and risks from surface soils (from ingestion of produce grown in backyard gardens) will need to be reevaluated if residential land use is considered likely. However, the FDSs have been classified for an industrial future land use because of the extensive asphalt paving (runway and taxi areas) and the plan to utilize the base flightline area in an aircraft-related industry.

As stated, the RI/FFS does not evaluate the risks associated with exposure to groundwater at the FDSs, other than the evaluation of the leaching potential for contaminants in soil using the Summers Model. Groundwater at the site will be evaluated as a separate operable unit. This could cause underestimation of total risks from the site if the risk from groundwater proves significant. Should this occur, reevaluation of total site risks would be warranted.

Because benzo(a)pyrene and naphthalene are the most toxic representatives of carcinogenic and non-carcinogenic PAHs, respectively, the use of their toxicity values to estimate the adverse effects of exposure to PAHs lacking specific toxicity values will likely result in overestimation of risks. Other sources of uncertainty that could cause overestimation of risks include the use of purposive (biased) sampling (targeting only the "hot spots"); the estimation of exposure concentrations by the use of maximum detections (while assuming no degradation, dilution, and so forth); the use of the 95 percent (or upper-bound 90 percent) exposure parameter values such as contact rate and exposure frequency and duration; and the use of conservatively derived toxicity values such as RfDs (incorporating multiple safety factors) and CSFs, which are based on experimental animal data used in a multistage model. The USEPA Risk Assessment Guidance states that the carcinogenic risk estimate will generally be an upper-bound estimate, and that USEPA is reasonably confident that the 'true risk' will not exceed the risk estimate derived through use of this model and is likely to be less than predicted (USEPA, 1989b). Therefore, the true risk is likely not much more than the estimated risk, but it could very well be considerably lower, even approaching zero.

Ecological Risk Assessment

The ecological risk assessment selected five indicator species to represent exposure for terrestrial organisms through ingestion of food and soil:

- short-tailed shrew (*Blarina brevicauda*), small mammal, carnivore
- American woodcock (*Scolopax minor*), small bird, omnivore
- garter snake (*Thamnophis s. sirtalis*), reptile, carnivore
- marten (*Martes americana*), predatory mammal, carnivore
- broad-winged hawk (*Buteo platypterus*), predatory bird, carnivore

Use of these species in estimating risk is conservative because the species are predominantly carnivorous, and therefore highly prone to exposure to chemicals through the food chain. Organisms with small home ranges, such as the shrew and garter snake, and/or that ingest a high proportion of earthworms and other terrestrial invertebrates, are particularly susceptible to food chain exposures.

These five indicator species were chosen for the following reasons: (1) these species may be potential ecological receptors at the FDSs; (2) the various feeding habits (e.g., omnivore, carnivore) are representative of those typical of a terrestrial ecological community; and (3) these species were recommended for a conservative evaluation of ecological risk by USEPA and USFWS (USEPA, 1991c). It is assumed that each indicator species chosen is the most sensitive representative of other species at a similar trophic position occurring at the FDSs. Modeling of exposures to rare species was not performed because no rare, threatened, or endangered species have been identified at LAFB (see Subsection 10.3.2 of the RI/FFS) (ABB-ES, 1993b).

Lethal effects related to short-term exposures to cyanide in surface soils at FDS-N1 are not anticipated. Lethal effects related to acute exposures at the FDS-Ss surface soils may be possible for small mammals (shrew HI = 2.0) and small birds (woodcock HI = 1.1). Cadmium is the greatest contributor to risk for both species (cadmium HQ for shrew = 1.3, cadmium HQ for woodcock = 0.76) at the FDS-SF. No adverse effects related to acute exposures at the FDSs are expected for the snake, the marten, or the hawk.

Adverse effects related to long-term effects at FDS-N1 are possible for small mammals (shrew HI = 5.6). Cyanide is the sole contributor to risk at the FDS-N1.

Effects related to chronic exposures are not expected for the woodcock, snake, marten, or hawk at FDS-N1. Adverse effects related to long-term effects at the FDS-SA are possible for small mammals (shrew HI = 6.6). Cyanide is the major contributor to chronic exposure risk at the FDS-N1. Adverse effects related to chronic exposures at the FDSs are not anticipated for the woodcock, the snake, the marten, or the hawk.

Cadmium is the greatest contributor to risks from acute exposures to small mammals at the FDS-SF. This risk estimate is, however, based on only one detection of cadmium out of seven samples analyzed. It is possible that the detected cadmium concentration of 1.3 mg/kg represents a statistically insignificant outlier for naturally occurring background levels.

These total HIs are within the risk management range of 1 to 10. HIs slightly greater than 1 are predicted for short-term exposures for none of the species at FDS-N1 and only two of the indicator species at FDS-SA and FDS-SF. A similar scenario exists for long-term exposures. In view of the occurrences of HIs within the risk range, the few indicator species likely to be affected, and the poor habitat at the sites making an exposure pathway unlikely, the need for remediation of surface soils under CERCLA for the protection of the environment is unnecessary.

B.7 DESCRIPTION OF NO ACTION ALTERNATIVE FOR EGWST AND FDS SITES

There are no construction activities associated with the No Action decisions under CERCLA at EGWST and the FDSs. However, residual soil contamination at the EGWST and FDS-SF, which will be present after the non-CERCLA actions being taken by the Air Force pursuant to state requirements, will be monitored and the results incorporated, if appropriate, into the remedial action for the separate operable unit which deals with groundwater and the management of migration for this portion of the base.

B.8 DOCUMENTATION OF NO SIGNIFICANT CHANGES

The USAF presented a Proposed Plan for EGWST and FDS Sites on July 28, 1993, which described USAF's decision to pursue no further action under CERCLA at these sites. No significant changes have been made to the No Action decision under CERCLA described in the Proposed Plan.

B.9 STATE ROLE

The Maine Department of Environmental Protection concurs with the Air Force's No Action decision under CERCLA for FSD-N1, FDS-N2, and FDS-SA. A copy of the declaration of concurrence is attached as Appendix C. In separate actions which are not part of this ROD, the Air Force is taking non-CERCLA remedial actions at EGWST and FDS-SF pursuant to state requirements under an Air Force/State Two-Party Supplement to the FFA being signed simultaneously with this ROD.

ABB-ES	ABB Environmental Services, Inc.
ARARs	Applicable or Relevant and Appropriate Requirements
BEHP	bis-2-ethylhexylphthalate
CERCLA	Comprehensive Environmental Restoration, Compensation, and Liability Act
CLP	Contract Laboratory Program
CRP	Community Relations Plan
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
EGWST	East Gate Waste Storage Tanks
FDS-N1	Fuel Drop Site - North No. 1
FDS-N2	Fuel Drop Site - North No. 2
FDS-SA	Fuel Drop Site - South (Active)
FDS-SF	Fuel Drop Site South (Former)
FFA	Federal Facility Agreement
FFS	Focused Feasibility Study
HAZWRAP	Hazardous Waste Remedial Actions Program
HI	Hazard Index
HQ	Hazard Quotient
IRP	Installation Restoration Program
LAFB	Loring Air Force Base
MEDEP	Maine Department of Environmental Protection
μg/L	micrograms per liter
MOGAS	Motor Vehicle Gasoline
MMES	Martin Marietta Energy Systems, Inc.
NCP	National Contingency Plan
NOEL	No Observed Effect Level
NPL	National Priorities List

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

NPW	Net Present Worth
OU	Operable Units
PA	Preliminary Assessment
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PHC	petroleum hydrocarbon
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RME	reasonable maximum exposure
RRMS	Railroad Maintenance Site
RTV	Reference Toxicity Value
SARA	Superfund Amendment and Reauthorization Act
SI	Site Inspection
SQL	Sample Quantitation Limit
SVOC	semivolatile organic compound
TAL	Target Analyte List
TCL	Target Compound List
TPH	total petroleum hydrocarbon
TRC	Technical Review Committee
USAF	U.S. Air Force
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound

ABB Environmental Services, Inc. (ABB-ES), 1990. "Remedial Investigation/ Feasibility Study at Loring Air Force Base; Status Report"; Installation Restoration Program; prepared for HAZWRAP; Portland, Maine; August 1990.

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TRANSCRIPT OF THE PUBLIC MEETING (AUGUST 23, 1993) AND COMMENT LETTERS ON OU 6 PROPOSED PLAN

STATE OF MAINE
LORING AIR FORCE BASE

AROOSTOOK, ss.

PUBLIC HEARING

ENVIRONMENTAL CLEANUP OF OPERABLE UNIT (OU) 6

HEARD BEFORE: DANA E. COLEMAN, CHAIRPERSON, LORING COMMUNITY RELATIONS AND PUBLIC AFFAIRS OFFICER FOR THE 42ND BOMB WING INSTALLATION RESTORATION PROGRAM

PETER FORBES, LORING REMEDIAL PROJECT MANAGER

CARIBOU CENTER FOR THE PERFORMING ARTS
410 SWEDEN STREET
CARIBOU, MAINE
AUGUST 23, 1993
7:15 P.M.

Philip R. Bennett, Jr.
Court Reporter
13 Vaughn Street
Caribou, Maine 04736
207-498-2729

TABLE OF CONTENTS

EXHIBITS

ENVIRONMENTAL CLEANUP OF OU6

August 23, 1993

CHAIRPERSON COLEMAN: Good evening. This is the OU6 Public Hearing to receive comments on the OU6 Proposed Plan. Today's date is 23 August, 1993. The time is 7:15 p.m.. My name is Dana Coleman. I am the Loring Community Relations and Public Affairs Officer for the base's Installation Restoration Program.

This is Mr. Peter Forbes, Loring Remedial Project Manager and he will assist me in taking commentary from the public.

The public is asked to comment on the OU6 Proposed Plan, which is comprised of six sites on Loring Air Base. These sites are the Railroad Maintenance Site, the East Gate Waste Storage Tanks Site and four Fuel Drop Sites. These sites were grouped into an operable unit, or what we call OU, based on the fact that each was found to have soil contamination resulting from the release of petroleum based compound.

Everything that is said from this moment on will be a matter of public record. We have Mr. Bennett from

Aroostook Legal Reporters recording all statements and testimony. Those individuals who would like to make a comment, will you please raise your hand. Lieutenant Wolfe is going to give you an address reply card. Please fill out your name and the organization that you are representing and the Air Force will formally respond to your comment. Is there anyone else that intends to make a formal comment?

At a public hearing, only testimony is acceptable. If you have questions, our technical advisers or technical representatives will be available to answer those later on or in another part of the auditorium but not as part of the formal hearing.

Ma'am, would you like to make a formal comment? Would you like to make --?

BEEJ STOECKELER: I just wanted to ask when is this all going to be starting?

CHAIRPERSON COLEMAN: The formal portion has started.

BEEJ STOECKELER: No, no, when is all the remediation going to start on the -- what is the schedule for what you just--?

CHAIRPERSON COLEMAN: Okay. We're asking that any questions that you have about OU6, if you could hold them until after we've made our comments or taken our testimony, because this is a part of the record and we are interested in simply getting the citizens' statements, opinions on the proposed plan; but we do have technical representatives here that will answer that question for you after the hearing or in another part of the auditorium.

For those who are interested in making a comment, would they please come to the--one moment, please, we're not ready to take comments but I'm giving instructions right now. I apologize. Would they please come to the mike, state your name and your organization. Please do not give us your address, that's a personal matter that we won't actually put on the record right here; and state your testimony. Mr. Bennett will record it as close to possible as you make the statement.

Before we proceed on to the formal hearing, are there any questions on the procedures? Yes, ma'am.

BEEJ STOECKELER: The discussion before --

CHAIRPERSON COLEMAN: Yes.

BEEJ STOECKELER: --this, doesn't count?

CHAIRPERSON COLEMAN: That does not count as part of the formal public record. That was an informal meeting.

BEEJ STOECKELER: So then when everybody stated off the record that they agreed that they would diminish(sic)their personal statements, whether it be from the Air Force or the Maine DEP or whatever, that's all off the record?

CHAIRPERSON COLEMAN: That will not be part of this record, no, ma'am.

BEEJ STOECKELER: Well, then, can we re-ask it?

CHAIRPERSON COLEMAN: Because testimony--the formal hearing is not to ask--or answer questions. You may make a comment to that effect but---

MARY SANDERSON: I'm with EPA. I'd like to suggest one thing, because of the format we have here and the size of the group and there might have been some misunderstanding. I would propose that we allow people to submit questions for the record. We will not be formally responding to them--to you here now, you will get written responses in the Responsiveness Summary as a part of the record selection and then once everyone has a chance to give a comment or a question, we're then willing to stay this evening and to reiterate--you know, give any answers that we can. Does that sound okay? Because I think we have the questions and I think the questions could be in the form of testimony, if you will,--

CHAIRPERSON COLEMAN: They can.

MARY SANDERSON:--and you can still formally get your responses to those. I understand they're important ones in terms of the future land use for these sites and such and that we can certainly make that a part of the record.

UNKNOWN PERSON: Ma'am, could you tell who you are for the record?

MARY SANDERSON: I'm sorry. And for the record, I am Mary Sanderson with the Environmental Protection Agency. And if that's okay-- I don't mean to -- let's call those questions testimony.

CHAIRPERSON COLEMAN: And, for

the record, I'm Dana Coleman. Community Relations and Public Affairs for IRP at Loring. Ma'am, would you like to make a comment?

BEEJ STOECKELER: You want(sic)--?

CHAIRPERSON COLEMAN: Well, we have a --Lieutenant Wolfe will give you an --.

BEEJ STOECKELER: Oh, boy. I can't even remember how to phrase a question.

CHAIRPERSON COLEMAN: Ma'am, we're not opening the floor just yet. Lieutenant, could you give her a card? Okay. Are there any other questions on our procedures before we begin to accept testimony?

UNKNOWN PERSON: Dana, can you move the podium by this mike?

CHAIRPERSON COLEMAN: Yes. One more time, are there any questions on the procedures? Are there any other people who would like to make a comment and do not have an address reply card? Okay. Mr. Robichaud, would you like to begin? Please state your name and the organization you're representing, for the record.

ENVIRONMENTAL CLEANUP OF OU6

LEO ROBICHAUD: My name is Leo Robichaud. I'm chairman of the Loring Readjustment Committee's Environmental Subcommittee.

My comments on OU6 are mainly based on Craig Gendron's--who's our technical assistant grant consultant, on the letters that he sent to our committee dated June 21st, 1993 and August 17th, 1993.

We feel the proposed plan for OU6 as described is on the right track for the most part. The concern our consultant has is that by using the excavated material from the East Gate waste storage tank site and the fuel drop sites as part of the closing of landfill number two, these materials with their contaminants should be included in evaluating remedial action on landfill two.

The groundwater and surface water will be assessed as separate operating unit, namely OU12 and OU13.

Along with my comments, I will provide you with copies of Craig Gendron's letters of June 21st, 1993 and August 17th, 1993.

I would like to thank you for giving me the opportunity to comment on your proposal. I am looking forward to commenting on all of your future clean up proposals. Thank you.

CHAIRPERSON COLEMAN: Thank you, Mr. Robichaud. Ma'am, would you like to address--present your comments? Please state your name and the organization you're representing.

BEEJ STOECKELER: My name is Beej Stoeckeler, I'm with Uniterra Groups. My -- essentially I don't have a problem with your proposed plans if your people will go on record, in writing, to say that they agree with this; whether it be the U. S. Air Force that is submitting the proposal, the EPA and the Maine DEP, that they agree with this in its entirety and that if they have specific problems with various areas of this, that they should be identified. I'd like to know also when is this going to start, when is the actual schedule for each and every site--I have not so much problems with you picking it up, but where you're putting it. You're putting it back on the same--either putting it--it's more like a shell game and essentially you're taking one thing and putting it to another area on the site and so my concern is that I haven't got enough information to state my objections because I don't know enough about your process.

However, my biggest concern is that if there is a specific site on this base that is going to be used as--whether it's a spreading site or a land fill or whatever it is, that that--the recipient of all the garbage from all the other areas is, number one, documented so everybody knows what that new stuff is and, number two, that -- that significant measures are made to restrict or reduce migration from that land fill or that repository for all the other stuff. That it doesn't continue spreading because you've got-- you've got little green hats(sic)and you've got sugared water; each of which are known entities but when you mix those together, you could have sulfuric acid, you know what I mean?

So my problem is that I think we're--we have a significant problem in that there's very, very great potential for redistribution of contamination through other media; through the aquifers, through the ground and surface water sources. And that anybody reusing-- or air, just evaporation. And so that people that are very much concerned with reusing the site who have real and valuable uses for this site and to the tune of hundreds of people living on there or working on there. Hundreds or thousands. The bottom line is what is this new mixture? Is it going to hurt my people? If so, when? What can we expect? How can we prevent it? Real questions here. It's one thing to say--it's one thing to say I've got this plan for remediation. It's a horse of a different shade to be the new recipient of this base and to live and work and play on this base as a turnkey function. Every single thing on this base essentially being used as a turn-key function, other than the planes and critical computers and critical documents. I don't want to live with their contamination for the next thirty or forty years and put my people in jeopardy.

My biggest problem is my own lawyers are having a very big problem with this. What is our corporate liability? What is the EPA, Maine DEP, et cetera, going to do to assure not just us but are they willing to pick up the differential in tabs of liability because of these unknowns that are being introduced? What--and just morally, how do you protect your people and somebody's got to be responsible for saying what we've got to live with for the next thirty or forty years. I'm really concerned about that. So I'd like to have people be put on the record, you know what I mean? Not a committee, not a blind man's bluff search. Real people committing their word, their professional integrity to the validity of what you're doing on all levels. So anyway that's, again, a primary concern, where you're making a finite decision on those three sites that you are calling clean. So if you could kind of clarify those things for us.

CHAIRPERSON COLEMAN: Ms. Stoeckeler, we have a point of clarification. Your concerns are the three sites that are being declared clean, is that what --?

BEEJ STOECKLER: Yeah, and if you can, you're sending--you're bringing stuff to a third--another place on the base as a whole. We're interested in the base as a whole. We see no reason to even be here if it isn't a turnkey operation. Therefore we are concerned about the whole base because essentially our people are going to be all over the place on that site.

CHAIRPERSON COLEMAN: Ma'am, you're also concerned about landfill two?

BEEJ STOECKELER: Very much,

yeah.

CHAIRPERSON COLEMAN: The receptor--.

BEEJ STOECKELER: Any landfill, any recipient of these contaminants that you're--when you say the word "Cap", my heart goes pitter-patter because I know it's going to be there for a period of time or forever. And that isn't even determined yet, do you see? We're just pushing peas under a shell.

CHAIRPERSON COLEMAN: Does that concluded your commentary?

BEEJ STOECKELER: Yeah, I think so.

CHAIRPERSON COLEMAN: One more time, is there anyone else who would like to make a statement, state a concern, pro or con, for the record? We've invited the public to comment on OU6 Proposed Plan at this public hearing up until 8:30 and we will be available to receive comments up until that time, but seeing that there is no one else at this point in the juncture that would like to make a comment, we do advise you, if you want to, you can speak to our technical representatives from ABB Environmental Services or the Maine DEP or U.S. EPA. So unless there's someone else that comes in within the next hour or so, we will take a slight break in the action and then I will officially close the hearing, which you do not need to be present for. You may leave at any point between now and 8:30. And any comments and the statements that you make will not be part of the record. Okay. We'll take a break.

RECESS

CHAIRPERSON COLEMAN: Ladies and gentlemen, it is 8:25 p.m., and we're calling the hearing back in to session. We're calling the hearing back in to session so that we may close. Is there anyone else who has a formal comment that they would like to present before we close the meeting? Before we close the hearing?

For the record, let it be shown that there are no more comments. Before we close, I'd like to enter into evidence, four pieces of paper presented by Mr. Leo Robichaud from the LRC Environmental Committee. The first page is a letter dated August 23rd, 1993 signed by Mr. Robichaud and addressed to Mr. Peter

Forbes; the second piece of paper is a memorandum to the LRC Committee from Mr. Craig Gendron, P.G., P.E., dated June 21st, 1993 regarding the review of Proposed Plan for OU6 CH Project reference LRC-OS/609234 -- excuse me. 354. I will repeat that correction. The number is LRC-OS/6092354. And that's pages two and three. And page four is also a memorandum and it's to the LRC Environmental Committee. It is from Mr. Craig R. Gendron, P.G., P.E. It is dated August 17th of 1993, regarding public comment for final OU6 Proposed Plan.

I'd like to also bring to the attention that Mr. Craig R. Gendron, P.G., P.E., is associated with Caswell, Eichler & Hill, a firm out of Portsmouth, New Hampshire.

Ladies and gentlemen, it is 8:29 p.m., the 23rd of August, 1993 and I officially declare the public hearing to discuss and receive comments for OU6 Proposed Plan officially closed.

END OF HEARING

C E R T I F I C A T I O N

I HEREBY CERTIFY THAT the foregoing is a true and correct transcript of the record of proceedings held on the afore-designated hearing date.

Philip R. Bennett, Jr.

Philip R. Bennett, Jr.,
Court Reporter

Leo J. Robichaud, Chairman
LRC Environmental Committee
PO Box 779
Caribou, ME 04736
August 23, 1993

Peter Forbes
Remedial Project Manager
42 CES/CEVR
Loring AFB, ME 04751-5000

Dear Peter:

My comments on OU6 are mainly based on Craig Gendron's (Technical Assistant Grant Consultant) letters to our committee dated June 21, 1993 and August 17, 1993.

We feel the proposed plan for OU6 as described is on the right track for the most part. The concern our consultant has is that by using the excavated material from the East Gate Waste Storage Tank Site and the Fuel Drop Sites as part of closing Landfill 2, these materials with their contaminants should be included in evaluating a remedial action on Landfill 2. The groundwater and surface water will be assessed as separate operable units namely OU12 and OU13.

Along with my comments, I will provide you with copies of Craig Gendron's letters of June 21, 1993 and August 17, 1993. I would like to thank you for giving me the opportunity to comment on your proposal, and I am looking forward to commenting on all of your future cleanup proposals.

Sincerely,

Leo Robichaud, Chairman
LRC Environmental Committee

Enclosure

LR/kp

CASWELL, EICHLER & HILL

ONE HARBOUR PLACE, SUITE 300
POST OFFICE BOX 4696
PORTSMOUTH, NEW HAMPSHIRE 03802-4696
TEL: (603) 431-4899 FAX: (603) 431-5982

MEMORANDUM

TO: LRC - Environmental Committee

FROM: Craig R. Gendron, P.G., P.E.

DATE: August 17, 1993

RE: Public Comment for Final OU 6 Proposed Plan

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The June 21, 1993 memo we submitted to the LRC-EC outlined our findings with regard to the Proposed Plan for OU 6. These findings are summarized below in a format that we hope you will find useful for the August 23rd Public Meeting and Hearing.

By way of a brief summary, the Proposed Plan for OU 6 consists of the following components:

- Excavation of contaminated soil;
- Off-site treatment of contaminated soil at a State of Maine Special Solid Waste Landfill or treatment facility; and
- Backfilling, regrading, and seeding.

East Gate Waste Storage Tanks Site (EGWST) and Fuel Drop Site-South Former (FDS-SF):

- Excavation of contaminated soil;
- On-site disposal of contaminated soil in Landfill 2 (LF 2); and
- Backfilling, regrading, and seeding.

We feel that the Proposed Plan for OU 6 as described herein is consistent with the identified soil risks. Further, we feel that the Proposed Plan is consistent with the intended future use of these areas as developed in the May, 1993 Management Action Plan (MAP). We do, however, wish to voice several concerns. Management of the risks posed by these soils, including remedial action scheduling, will require coordination with the closure of LF 2. In other words, the risks posed by the OU 6 soils once deposited in LF 2 will have to be considered when evaluating and selecting a remedial action for LF 2. LF 2 constitutes a portion of OU 2. Additionally, these actions are meant to mitigate the risks posed to human and environmental receptors by exposure to the soils, not the groundwater, at each site. Groundwater and surface water will be assessed as separate operable units, OU 12 and OU 13, respectively.

CASWELL, EICHLER & HILL

ONE HARBOUR PLACE, SUITE 300
POST OFFICE BOX 4696
PORTSMOUTH, NEW HAMPSHIRE 03802-4696
TEL: (603) 431-4899 FAX: (603) 431-5982

MEMORANDUM

TO: LRC-Environmental Committee

FROM: Craig R. Gendron, P.G., P.E.

DATE: June 21, 1993

RE: Review of Proposed Plan for OU 6
CEH Project Reference: LRC-OS/6092354

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The Air Force prepared a Final Work Plan Addendum for OU 6 (RRMS, EGWSTS, and FDS) which presented the proposed FY93 field investigation programs for the operable unit (OU). The work plan addressed the Air Force's media (soil, groundwater, etc.) sampling needs. The need for additional characterization was identified during regulatory review of the Draft RI/FFS Report for OU 6. The results of the additional sampling activities were incorporated into a Draft Final RI/FFS Report. The Draft Final RI/FFS Report was submitted in April, 1993.

OU 6:

The Draft Final RI/FFS included an evaluation of several remedial alternatives for each of the three sites which comprise OU 6: Railroad Maintenance Site (RRMS); East Gate Waste Storage Tanks Site (EGWSTS); and Fuel Drop Sites (FDS). In general, the remedial alternatives which were found to address the remedial action objectives included the following components:

- Excavation of contaminated soil;
- On- or off-site disposal of contaminated soil; and
- Backfilling, regrading, and seeding.

The preferred alternative outlined in the Proposed Plan includes the above-referenced

(5586)

components and clarifies the question of on- versus off-site disposal of contaminated soil. The preferred alternative identifies either Landfill 2 or 3 as the disposal site for the contaminated soil. We have three primary concerns with this selection. First of all, the remedial action schedules for Landfills 2 and 3 and OU 6 will have to be coordinated. Second, the risk assessment (RA), RI/FFS, and Proposed Plan for Landfills 2 and 3 should be modified to reflect OU 6 soils. And third, the placement of OU 6 soils on either Landfill 2 or 3 may impact the configuration of an as yet unspecified capping system.

Additionally, as we stated in the April 13, 1993 memorandum concerning the OU 6 Draft RI/FFS, it is clear that these actions are meant to mitigate the risks posed to human and environmental receptors by exposure to the soils (not the groundwater) at each site. The preferred alternative seems consistent with the identified soil risks. As we suggested in our April 13th memo, if soil cleanup levels are to be established, in part, on groundwater leaching models (Summers), it seems that the Air force should more clearly identify the mitigation of risks to groundwater as a remedial action objective for the RRMS as they did for the remainder of OU 6. In the Draft Final RI/FFS, groundwater impacts due to leaching were used to evaluate risks and to develop soil cleanup criteria at the EGWSTS, the FDS, and the RRMS. Finally, it is clearly stated in both the Draft RI/FFS and the Draft Final RI/FFS Reports that groundwater characterization at all three of the OU 6 sites is incomplete. Groundwater impacts and remedial alternative evaluations, therefore, remain to be addressed as part of the Base-wide Groundwater Operable Unit (OU-12). Surface water will be addressed as part of the Base-wide Surface Water Operable Unit (OU 13).

RESPONSIVENESS SUMMARY

FINAL

OPERABLE UNIT (OU) 6 RESPONSIVENESS SUMMARY

March 1994

Installation Restoration Program

Loring Air Force Base, Maine

FINAL

Loring Air Force Base

OU 6 RESPONSIVENESS SUMMARY

March 1994

Prepared for:

42nd Support Group
42nd Civil Engineering Squadron
Environmental Management Flight
Loring Air Force Base, Maine
DSN: 920-2257 Com: (207) 999-2257

Prepared by:

Service Center: Hazardous Waste Remedial Actions Program
Oak Ridge, Tennessee

Contractor: ABB Environmental Services, Inc.
Portland, Maine

Project No. 7626-08

OU 6 RESPONSIVENESS SUMMARY
LORING AIR FORCE BASE

TABLE OF CONTENTS

The U.S. Air Force (USAF) held a 30-day comment period from July 28 to August 27, 1993, to provide an opportunity for the public to comment on the Proposed Plan and other documents developed for Operable Unit No. 6 (OU 6) source control at Loring Air Force Base Superfund Site in Limestone, Maine. The Proposed Plan is the document that identifies remedial action objectives, evaluates remedial alternatives, and recommends the alternative that best meets the evaluation criteria. The USAF made a preliminary recommendation of its preferred alternative for remedial action in Proposed Plan Section 6.0, which was issued on July 28, 1993. All documents on which the preferred alternative was based were placed in the administrative record for review. The administrative record is a collection of the documents considered by the USAF while choosing the remedial action for OU 6 source areas. It is available to the public at the following locations:

Robert A. Frost Memorial Library
238 Main Street
Limestone, ME 04750

The purpose of this Responsiveness Summary is to document USAF responses to the questions and comments raised during the public comment period regarding the proposed OU 6 source control. USAF considered all comments in this document before selecting a final removal alternative to address soil contamination from OU 6.

This Responsiveness Summary is organized into the following sections:

1.0 **Overview of Remedial Alternatives Considered in Proposed Plan, including the Selected Remedy.** This section briefly outlines the remedial alternatives evaluated in the Proposed Plan, including USAF's selected remedy.

2.0 **Background on Community Involvement and Concerns.** This section provides a brief history of community interest in OU 6 and concerns regarding these areas.

3.0 **Summary of Comments Received During the Public Comment Period and USAF Responses.** This section summarizes and provides USAF's responses to all written and oral comments received from the public during the public comment period.

1.0 OVERVIEW OF REMEDIAL ALTERNATIVES CONSIDERED IN THE PROPOSED PLAN INCLUDING THE SELECTED REMEDY

I. RRMS

Using information gathered during field investigations, USAF identified remedial and response objectives for the source control actions at RRMS:

- Reduce the ecological risk associated with the contaminated surface soil.
- Reduce human health risk associated with carcinogenic PAH-contaminated surface soil.

Target Clean-up Levels for soil are set at levels that the U.S. Environmental Protection Agency (USEPA) and USAF considered to be protective of human health and the environment. After identifying the remedial action objectives, the USAF developed and evaluated potential remedial alternatives. The Proposed Plan describes the remedial alternatives considered to address the contaminants of concern and the media in which they pose a threat. The Proposed Plan also describes the criteria the USAF used to narrow the range of alternatives to one alternative. These criteria are the same nine criteria USEPA uses to evaluate clean-up alternatives.

The remedial action selected by the USAF to address remedial objectives includes excavation of contaminated soil, disposal of the excavated material in a landfill or treatment facility, and restoration of RRMS. The remedial alternatives identified for implementation for the RRMS source area are described in the Focused Feasibility Study and the Proposed Plan.

II. EGWST AND FDS

The Air Force has determined no action is necessary under CERCLA for the EGWST, FDS-N1, FDS-N2, FDS-SA, and FDS-SF sites. For two of the sites (i.e., EGWST and FDS-SF), the Air Force proposed in Part II of the Proposed Plan to take action pursuant to state requirements.

2.0 BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Throughout LAFB's history, the community has been active and involved to a high level in base activities. The Air Force and USEPA have kept the community and other interested parties apprised of the LAFB activities through informational meetings, fact sheets, press releases, public meetings, site tours and open houses, and Technical Review Committee (TRC) meetings. Membership of the TRC is comprised of LAFB Officials, USEPA, MEDEP, and local officials and community representatives.

A Federal Facilities Agreement (FFA) between USEPA Region I, the Maine Department of Environmental Protection (MEDEP), and the U.S. Air Force signed on January 30, 1991, governs environmental activities being conducted at LAFB. The FFA provides the framework for addressing environmental effects associated with the past and present activities so that appropriate investigations and remedial actions are implemented to protect human health, welfare, and the environment. Since the signing of this agreement, LAFB has been placed on Congress' Base Closure List and is scheduled to be closed in September 1994.

During August 1991, the LAFB community relations plan (CRP) was released. The CRP outlined a program to address community concerns and keep citizens informed about and involved during remedial activities. In February and March 1993, LAFB held three public informational meetings in the towns of Limestone, Caribou, and Fort Fairfield, respectively. The purpose of these meetings was to introduce the IRP program to the public and respond to their questions.

On June 24, 1992, USAF made the administrative record available for public review at the Robert A. Frost Memorial Library, Limestone, Maine. A TRC meeting was held on June 2, 1993, to review and comment on the proposed remedy for OU 6. USAF published a notice and brief analysis of the Proposed Plan on July 28, 1993, and made the plan available to the public at the Robert A. Frost Public Library. The USAF mailed a fact sheet to approximately 300 citizens of central Aroostook County during the public comment period.

From July 28 through August 27, 1993, the Agency held a 30-day public comment period to accept public input on the alternatives presented in the FFS and the Proposed Plan and on any other documents previously released to the public. On

August 23, 1993, LAFB held an informational meeting to discuss the results of the OU 6 RI and the cleanup alternatives presented in the FFS, and to present the Air Force's Proposed Plan. Also during this meeting, the Air Force answered questions from the public. Immediately following the public meeting, a public hearing was held to accept any oral comments.

3.0 SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND USAF RESPONSES

This Responsiveness Summary addresses comments received by the USAF and USEPA during the public comment period from July 28 to August 27, 1993. Comments include those received verbally during the public hearing and letters from the Loring Readjustment Committee and Caswell, Eichler & Hill. The comments and corresponding responses are included herein. It is noted that the comments which relate to the Air Force's proposed action for EGWST and FSD-SF as discussed in Part II of the Proposed Plan, are for the proposed action under state requirements and not under CERCLA.

1. Comment: One commenter requested that the excavated material and contaminants from EGWST and FDS-SF be included in the evaluation of the remedial action at LF-2.

   USAF Response: The excavated material and contaminants from the EGWST and the FDS-SF will be included in the evaluation of the remedial action at LF-2. The objectives of the remedial alternatives for LF-2, (to prevent exposure of the contaminants of concern to the soil, water, and air), will remain unchanged after the addition of OU 6 soil. The technologies identified for LF-2 will include one or a combination of the following; (1) no action, (2) institutional controls, (3) groundwater monitoring, (4) containment, (5) treatment, and (6) extraction. LF-2 is part of OU 2 under the Federal Facility Agreement. The Air Force is currently preparing a Remedial Investigation/Focused Feasibility Study under CERCLA on remedial alternatives for LF-2. OU 2 will be the subject of a separate CERCLA Proposed Plan and ROD. The Air Force's proposed action for EGWST and FDS-SF is set forth in Part II of the OU 6 Proposed Plan. The material from EGWST and FDS-SF will be handled pursuant to state requirements and will be included in the evaluation of the CERCLA remedial action decision at LF-2.

2. Comment: One commenter asked when the remediation activities for OU 6 would start.

USAF Response: Remedial construction for OU 6 is planned for summer 1994. The Air Force will complete the design documents which are subject to EPA and MEDEP review and approval. The schedule includes preparation of construction documents and selection of a contractor in spring 1994, and construction by summer 1994.

3. Comment: One commenter was concerned with the on-base location for disposal of the OU 6 soils. The commenter stated that if an on-base site is used as a spreading site or a landfill, that the site be documented and significant measures be made to restrict or reduce migration of contaminants.

USAF Response: The on-base disposal site for soils from EGWST and FDS-SF is LF-2. Proposed remedial action for LF-2, a low permeable cap, will include documentation of placement of EGWST and FDS-SF soil under the cap and a post-closure plan. The post-closure plan for LF-2 will include monitoring activities for a minimum of 30 years in accordance with USEPA requirements for closing landfills. The plan will identify the location and frequency of groundwater and air monitoring, and the compounds for which samples will be analyzed.

As noted in the response to Comment #1, the concern for EGWST and FDS-SF soils will be evaluated under state requirements and the CERCLA remedial action decision at LF-2.

4. Comment: One commenter didn't have enough information to state his opinion because he didn't know enough about the process.

USAF Response: Interested parties can consult the Administrative Record and the Information Repository for information regarding a specific OU or the IRP Program. In addition, the public is welcome to contact the Loring IRP office at telephone 207-999-2257.

5. Comment: One commenter expressed concern for potential redistribution of contamination through various media, specifically groundwater, surface water and air.

USAF Response: The prevention of cross contamination of media is recognized as an important issue. During construction the contractor will use protective measures to prevent the migration of contaminants from wind blown dust and leachate while performing the tasks of excavating, hauling, and stockpiling. Construction activities will include water misting during excavation to prevent dust, covering soil with tarpaulins while hauling and stockpiling, and continuous monitoring for fugitive emissions and leachate.

6. Comment: One commenter was concerned with reusing the disposal site and the base after the remedial actions are complete.

   USAF Response: The risk assessment took into account likely reuse scenarios based on input from the Loring Readjustment Committee's (LRCs) initial land use plans. All sites will be compatible with these use classifications. In addition the property deed for the disposal site will have a restriction to notify future landowners of its contents.

7. Comment: One commenter asked about the consequence of mixing wastes together, and specifically about the impact to future population in the area.

   USAF Response: The soils from EGWST and FDS-SF are contaminated with similar Petroleum Hydrocarbons (PHCs) and Polynuclear Aromatic Hydrocarbons (PAHs). The excavated soil will be stockpiled and covered together in one designated area at LF-2. Later, during proposed remediation activities for LF-2, the stockpile will be combined with clean common borrow and used for the subgrade under the proposed low-permeability cap.

   The impact to future population in the area of the EGWST and FDS-SF sites will be negligible because the human health risk exposures under existing conditions are already within the USEPA's acceptable range. The excavated RRMS soil will either be disposed of in an off-base landfill or treated.

8. Comment: One commenter wanted clarification on the USEPA's and MEDEP's liability, should additional remedial actions for OU 6 be necessary in the future.

   USAF Response: The Air Force will be liable for any future remediation necessary for OU 6. USEPA and MEDEP are responsible for oversight of the Air Force clean-up activities. The Air Force is required to include the following CERCLA clause, Section 120(h)(3) , in property deed transfers:

"The United States warrants that-
(i) all remedial action necessary to protect human health and the environment with respect to any such substance remaining on the property has been taken before the date of such transfer, and (ii) any additional remedial action found to be necessary after the date of such transfer shall be conducted by the United States."

9. Comment: The commenter stated that personal and professional responsibility should be identified for the remedial actions, including the three no action sites.

   USAF Response: A Record of Decision for the remedy selection of OU 6 will be signed by Alan K. Olsen, Director of the Air Force Base Closure Agency, and Paul Keough, Acting Regional Administrator, USEPA Region I in their official capacities. The Air Force is responsible for design and construction of the selected remedy. Confirmation sampling and analysis during excavation will be conducted by qualified personnel and laboratories, and will be used to demonstrate that clean-up goals are met.

10. Comment: Another commenter stated the remedial action schedules for OU 6 and Landfills 2 and 3 needed to be coordinated.

    USAF Response: The EGWST and FDS-SF remediation work will precede the proposed landfill capping and the sequence will allow storage of the EGWST and FDS-SF soils at the landfills.

11. Comment: One commenter stated that the risk assessment, remedial investigation/focused feasibility study (RI/FFS), and proposed plan for Landfills 2 and 3 and OU 6 should be modified to reflect disposal of OU 6 soils.

    USAF Response: No change to the risk assessment for LF-2 is necessary because the EGWST and FDS-SF soil does not present an unacceptable human health or ecological risk under CERCLA. The material from EGWST and FDS-SF will be handled pursuant to state requirements and will be included in the evaluation of the CERCLA remedial action decision at LF-2.

12. Comment: A commenter noted the placement of OU 6 soils on either Landfills 2 or 3 may impact the configuration of a capping system.

    USAF Response: The estimated volume of EGWST and FDS-SF soil, about 2,325 cubic yards, is much less than LF-2 subgrade volume which is estimated at more than 200,000 cubic yards. The volume of EGWST and FDS-SF soil will not significantly impact the proposed cap configuration; however, locating the stockpile near the center of the proposed cover will minimize the effort of spreading the EGWST and FDS-SF soil into the subgrade.

13. Comment: One commenter requested that the Air Force more clearly identify the mitigation of risks to groundwater as a remedial action objective for the Railroad Maintenance site as they did for the remainder of OU 6.

    USAF Response: Groundwater characterization at the six sites is incomplete and will be addressed as part of the base-wide groundwater operable unit (i.e., OU 12).

STATE LETTER OF CONCURRENCE

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JOHN R. McKERNAN, JR.
GOVERNOR

DEAN C. MARRIOTT
COMMISSIONER

DEBRAH RICHARD
DEPUTY COMMISSIONER

Peter Forbes, Project Manager
42 CES/CEVR
7300 Pennsylvania Road
Loring Air Force Base, ME 04751-5000

MAR 28 1994

Re: Loring Air Force Base, Limestone, Maine

Dear Sirs:

The Maine Department of Environmental Protection (MEDEP) has reviewed the Final Record of Decision (ROD) for Operable Unit 6 (OU 6) at the Loring Air Force Base Superfund Site located in Limestone, Maine, which has been amended pursuant to the comments of United States Environmental Protection Agency (USEPA) and the State.

The OU 6 ROD describes a CERCLA-driven remedial action for the Railroad Maintenance Site (RRMS) and, finding that remedial action is not called for by CERCLA, the OU 6 ROD selects "no action" alternatives under CERCLA for the remaining five sites which comprise OU 6. Notwithstanding the ROD, the Air Force will be undertaking remedial actions at two of the OU 6 sites, the East Gate Waste Storage Tank (EGWST) site and the Fuel Drop Site-South Former (FDS-SF) site, pursuant to Maine's Oil Discharge Prevention and Pollution Control Act, 38 M.R.S.A. §541, et seq. (1989). These non-CERCLA remedial actions are described in the Two Party Supplement to the Loring Air Force Base Federal Facility Agreement entered between the United States Air Force and the State of Maine ("Two Party Supplement").

The MEDEP concurs in the "no action" alternatives selected in the OU 6 ROD for the following sites: Fuel Drop Site-North 1 (FDS-N1); Fuel Drop Site-North 2 (FDS-N2); and Fuel Drop Site-South Active (FDS-SA).

The MEDEP concurs with the remedial action described in the OU 6 ROD for the RRMS. This remedial action includes excavating approximately 200 cubic yards (cy) of the rface soils at the RRMS site. Soil sampling will be conducted during excavation to confirm the limits of excavation. Samples will be collected and analyzed for Semi-Volatile Organic Compounds (SVOCs). Analytical results will be compared to target cleanup levels for SVOCs to determine whether additional soil should be excavated.

Following excavation, soil from the RRMS site will be transported to a landfill or treatment facility which is licensed to accept such waste. Debris, stumps and other non-soil materials from the RRMS site will be disposed of at the landfill operated by the remedial contractor for the Loring Air Force Base. The RRMS site will then be restored to a similar topography as currently exists by placing clean fill into the areas affected by the soil excavation called for in the remedial action. The disturbed area will be graded and seeded with grass. The gravel roadbase placed over the railroad tracks to serve as an access road will then be removed.

The MEDEP concurs with the non-CERCLA remedial actions described in the Two Party Supplement for the EGWST site (Alternative 5 in the FFS), and for the FDS-SF (Alternative 3 in the FFS) site. These remedial actions involve the same activities at each site, consisting of: (1) excavating the contaminated soil from both the EGWST and FDS-SF sites and (2) transporting this soil to the Loring Air Force Base Landfill 2 site. At both sites, limits of excavation will be based on confirmation sampling. Soil samples will be collected and analyzed for TCL VOCs and SVOCs and the results compared to target remediation levels to determine if additional soil excavation is required. Areas where analytical results dicate the presence of compounds targeted or remediation at concentrations exceeding soil remediation levels will be excavated and disposed of. After removal of contaminated soil, the FDS-SF and EGWST sites will be backfilled with clean fill, graded, and seeded to promote growth of vegetation.

The excavated soils for the EGWST and FDS-SF sites will be used as subgrade materials for a landfill cover system at Loring Air Force Base Landfill 2 (OU 2 under the FFA). Prior to construction of the cover system, the excavated soils will be temporarily stockpiled at Landfill 2. At temporary cover (e.g., tarp, polyethylene sheeting, or similar material) will be placed over the stockpile and secured to minimize leachate, odors, and fugitive dust. Prior to constructing the landfill cover system, the stockpiled soils will be uncovered and spread over a portion of the landfill as subgrade material. The landfill cover system will then be constructed over these soils. The cover will further reduce human and ecological exposure to the excavated soils. This spreading action will assist the natural degradation process thus reducing contaminants of concern in the soils.

Each of the above-described remedial actions will include:

I. Development of a Health and Safety Plan.

A detailed Health and Safety Plan will be developed prior to any remedial actions at OU 6. This plan will comply with OSHA and other state and federal regulations, as appropriate.

Site Preparation.

A. Access roads and small staging areas will be constructed at the EGWST and FDS-SF sites outside the limits of the waste for storage of equipment during excavation, decontamination of these areas, and as access for trucks to remove soil and debris.

B. Erosion control measures will be employed during construction to minimize soil/sediment from entering receiving waters adjacent to the EGWST or FDS-SF sites, in accordance with the Natural Resources Protection Act Permit by Rule Standards, Chapter 305.

III. Excavation and Confirmation Sampling.

A. Excavation shall proceed pursuant to schedules contained in the remedial action workplans for the above-referenced sites.

B. After excavation is completed, soil samples will be collected at the above-referenced sites to confirm that no site-related contaminants are left in place.

C. A sampling and analysis plan will be developed by the remedial construction contractor before work begins and submitted for regulatory and comment.

This concurrence is based upon the State's understanding that:

A. The MEDEP will continue to participate in the Loring Air Force Base Federal Agreement dated January 30, 1991, as amended, and in the review and approval of operational designs and monitoring plans.

The MEDEP looks forward to working with the Air Force and the USEPA to resolve the environmental problems posed by the OU 6 site. If you need any additional information, do not hesitate to contact me or members of my staff.

Sincerely,

Debrah J. Richard
Acting Commissioner

MAR 28 1994

DJR:tcb
Enclosure

Michael Nalipinski, EPA
Naji Akladiss, BHM&SWC