PB94-963717
EPA/ROD/R01-94/091
December 1994

EPA Superfund Record of Decision:

Loring Air Force Base (OU 2) and Landfills 2 and 3, Limestone, ME 9/30/1994

FINAL

LANDFILLS 2 AND 3 SOIL/SOURCE CONTROL OPERABLE UNIT 2 (OU 2) RECORD OF DECISION

September 1994

Installation Restoration Program
Loring Air Force Base, Maine

FINAL

Loring Air Force Base

LANDFILLS 2 AND 3 SOIL/SOURCE CONTROL OPERABLE UNIT 2 RECORD OF DECISION

September 1994

Prepared for:

Air Force Base Conversion Agency
Loring Air Force Base, Maine
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Project No. 7626-09

OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

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OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

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DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Loring Air Force Base (LAFB) Operable Unit (OU) 2, Landfill 2 (LF-2) and Landfill 3 (LF-3) Limestone, Maine.

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected source control and soil remedial action for LF-2 and LF-3, which comprise OU 2 at Loring Air Force Base, Maine. 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, (42 U.S.C. §9601 et seq) and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP); 40 CFR Part 300 et seq (1990). This decision 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, the Office of Public Affairs at LAFB, AFBCA/OL-M, Building 5100, Texas Road, Loring AFB, Maine. Through the interim remedial action at OU 2, the U.S. Air Force (USAF) plans to remedy the threat to human health and the environment posed by the presence of LF-2 and LF-3 through the implementation of a source control and soil remedial action.

The Maine Department of Environmental Protection (MEDEP) concurs with the selected remedy for the OU 2.

ASSESSMENT OF OU 2

Actual or threatened releases of hazardous substances from the OU 2, if not addressed by implementing the response action selected in this Record of Decision, may pose an imminent and substantial endangerment to human health, welfare, and the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy for OU 2 is containment using a cover system. The major components of the remedy include:

- Site preparation, consolidation of LAFB soils for subgrade and grading to minimize erosion and manage runoff;
- Multi-layer cover system installation which will comply with RCRA Subtitle C and Maine hazardous waste requirements including landfill gas assessment and controls, and assessment of adjacent wetlands;
- Gates and warning signs installation;
- Deed restrictions on land in the vicinity of the landfills;
- Post closure monitoring and maintenance; and
- Five year site reviews.

The remedy for this operable unit at the site addresses source control. A management of migration operable unit, OU 4, will subsequently be developed for this operable unit. The selected remedy addresses remediation of the source of contamination at OU 2 by eliminating or reducing the risks posed by the presence of LF-2 and LF-3. This action is intended to be the permanent source control remedy for OU 2 and will be combined with a management of migration remedial action at a later date. A Record of Decision will be issued for the management of migration operable unit prior to the completion of construction of the OU 2 Source Control Remedial Action.

Excavated material from other areas on Loring AFB will be used at OU 2 for fill material to meet the subgrade design specifications for the OU 2 cap. Before material from other sites can be used as subgrade material at OU 2, the Air Force must comply with CERCLA and the NCP for any areas which are CERCLA sites, and must demonstrate that it has complied with the procedures set forth in the "Technical Memorandum - A Land Disposal Restriction Evaluation of Soils Proposed as Landfill Subgrade Materials, July 1994" (LDR Technical Memorandum, July 1994). At present, it is anticipated that these other areas will include OU 7, the Quarry site, which is the subject of separate CERCLA ROD which is expected to be issued concurrently with this OU 2 ROD, the OU 6, Railroad Maintenance Site, which was subject of a CERCLA ROD issued in April 1994, and for which an Explanation of Significant Differences (ESD) relating to use of the material at OU 2 is expected to be issued concurrently with this OU 2 ROD and the Coal Ash Pile which is a component of OU 2A.

STATUTORY DETERMINATIONS

The remedy selected by the Air Force is protective of human health and the environment, complies with federal and state applicable or relevant and appropriate requirements for this action, and is cost-effective. This remedy uses permanent solutions to the maximum extent practicable. The selected remedy does not, however, satisfy the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element because such treatment of two entire landfills is impractical. The selected remedy will reduce mobility of contaminants through its containment features. Because this remedy will result in hazardous substances remaining on site above health based levels, the USAF will conduct a review within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

DECLARATION

The foregoing represents the selection of a remedial action under CERCLA for OU 2 at LAFB by the USAF and the USEPA-New England, with the concurrence of the MEDEP.

Concur and recommend for immediate implementation:

By: ______________________ Date: September 19, 1994

Alan K. Olsen
Director
Air Force Base Conversion Agency

By: ______________________ Date: 9/20/94

John P. DeVillars
Regional Administrator
USEPA-New England

DECISION SUMMARY

1.0 SITE NAME, LOCATION AND DESCRIPTION

Loring Air Force Base (LAFB) is a National Priorities List (NPL) site. There are currently 21 areas of concern within LAFB that are under investigation. The areas of concern at LAFB have been organized into several operable units (OUs) for remediation purposes. This Record of Decision (ROD) relates to the Source Control Remedial Action for OU 2, which is comprised of Landfill 2 (LF-2) and Landfill 3 (LF-3) soils/source. A more complete description of LF-2 and LF-3 can be found in Subsections 2.2 and 2.3 of the Remedial Investigation (RI)/Focused Feasibility Study (FFS) Report (ABB Environmental Services, Inc. [ABB-ES], 1994a).

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 (Figure 1-1). The populations of Caswell, Connor, and Limestone are 408, 468 and 2,093, respectively. The base population will be zero beginning October 1994. The base is approximately 3 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. The nearest residence is approximately one-half mile from LF-2. The land adjacent to OU 2 is mostly undeveloped.

Because of its primary mission, LAFB personnel have been 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 Installation Restoration Program (IRP), LAFB has initiated activities to identify, evaluate, and remediate former disposal or spill sites containing hazardous substances.

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 by the U.S. Air Force (USAF), the USEPA, and the Maine Department of Environmental Protection (MEDEP).

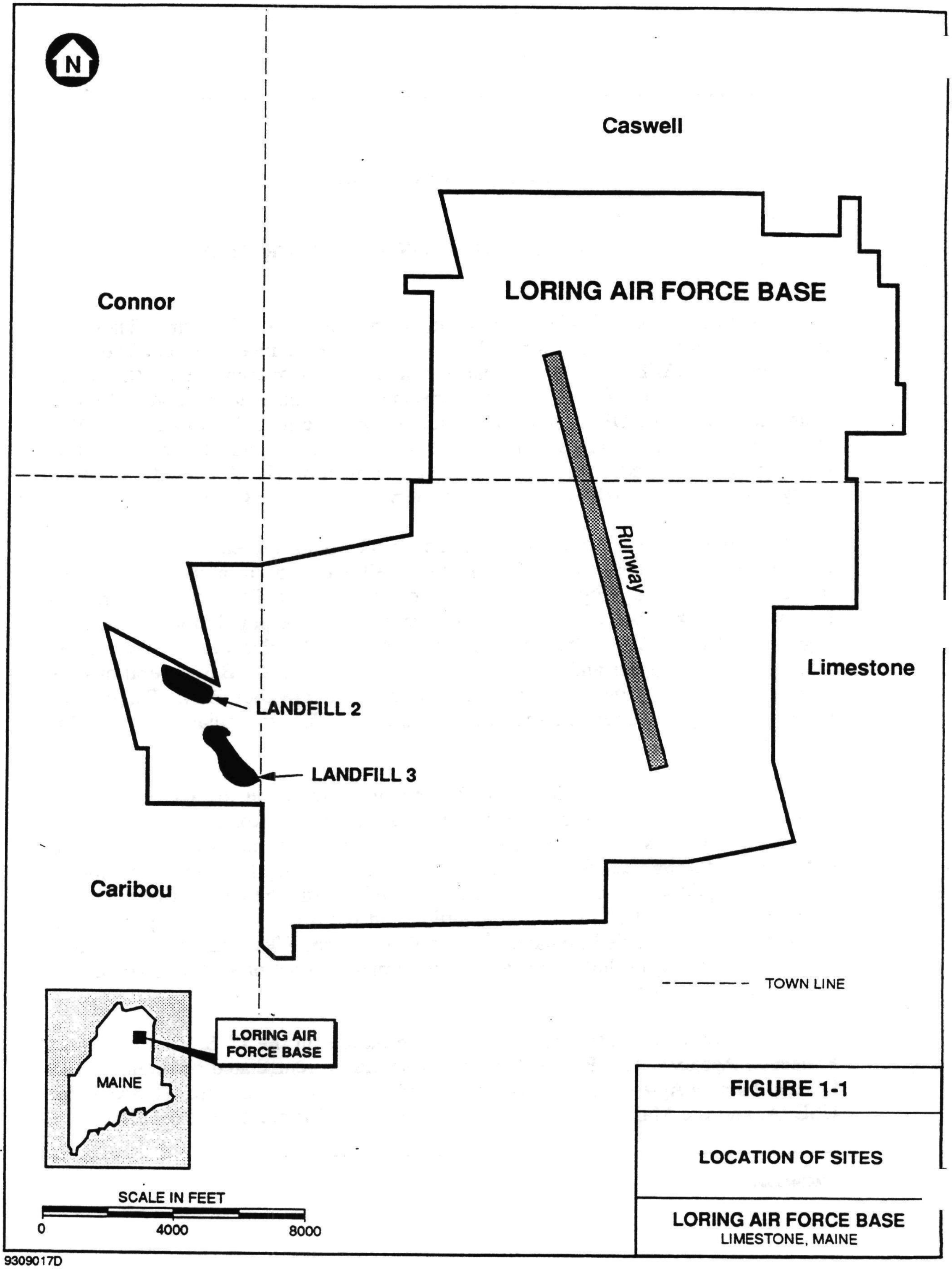


FIGURE 1-1

LOCATION OF SITES

LORING AIR FORCE BASE
LIMESTONE, MAINE

1.1 LANDFILL 2 DESCRIPTION

LF-2, located approximately one mile from the West Gate on Nebraska Road, received waste from base activities from 1956 to 1974 (Figure 1-2). LF-2 covers approximately 9 acres, and was covered in 1974 with a foot of clean soil. Settlement resulting from decomposition of organic material in the landfill has formed two separate intermittently wet areas on the surface of the landfill. It is possible that groundwater contacts the landfilled wastes during part of the year. Wet areas have been identified in LF-2 originating from landfill settlement.

1.2 LANDFILL 3 DESCRIPTION

LF-3 is located approximately one-half mile from the West Gate on Sawyer Road, and received waste from base activities from 1974 to 1991 (Figure 1-3). Another IRP site, the Coal Ash Pile, is located northeast of LF-3; they are separated by a dirt access road. Before its use as a landfill, the site was mined extensively for gravel, and quarrying operations continue today in the northwestern portion of the site. LF-3 covers approximately 17 acres, and was covered with native soil similar to LF-2. During parts of the year, groundwater contacts the landfilled wastes. Several small wet areas (i.e., less than one acre in size) have been identified on the periphery of LF-3. An approximately five acre wetland is located west of LF-3. This wetland is at a higher elevation than LF-3.

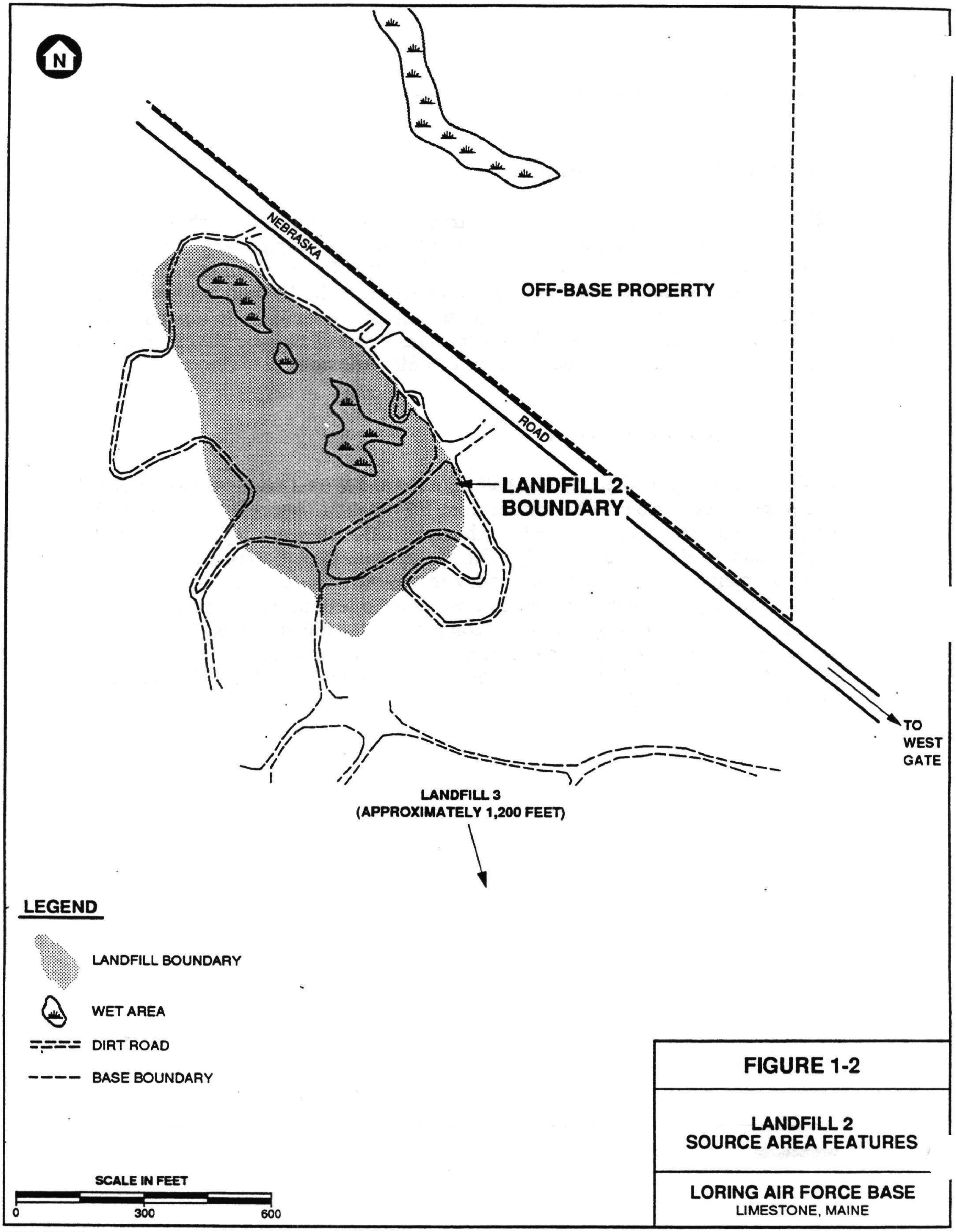
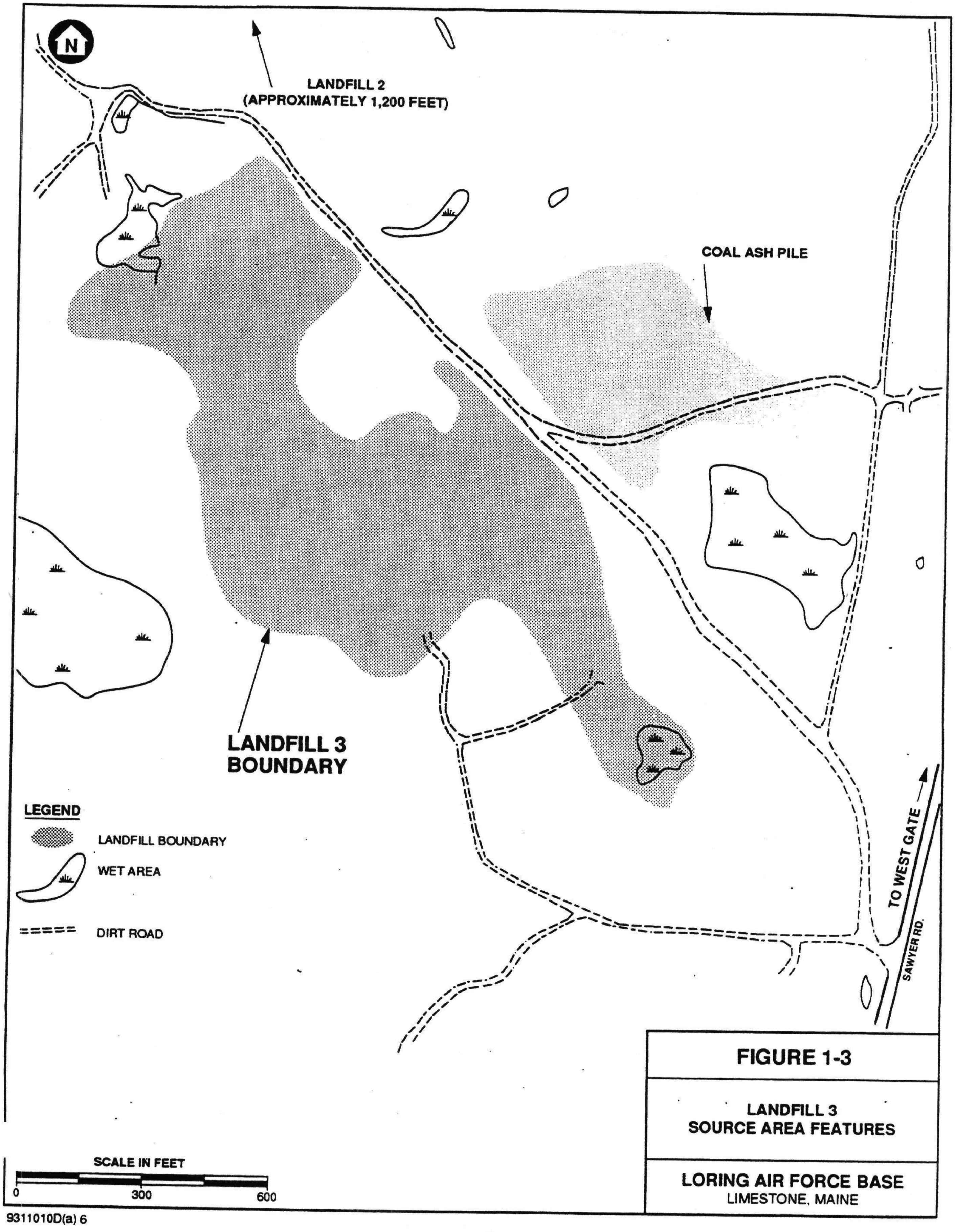


FIGURE 1-2

LANDFILL 2 SOURCE AREA FEATURES

LORING AIR FORCE BASE
LIMESTONE, MAINE

9311010D 1C


N
LANDFILL 2
(APPROXIMATELY 1,200 FEET)
COAL ASH PILE
LANDFILL 3
BOUNDARY
LEGEND
LANDFILL BOUNDARY
WET AREA
DIRT ROAD
TO WEST GATE
SAWYER RD.
SCALE IN FEET
0
300
600
FIGURE 1-3
LANDFILL 3
SOURCE AREA FEATURES
LORING AIR FORCE BASE
LIMESTONE, MAINE
9311010D(a) 6

2.0 SITE HISTORY AND INVESTIGATION HISTORY

This section summarizes the uses, response history, and investigation history at LF-2 and LF-3.

2.1 LAND USE AND RESPONSE HISTORY

Landfill 2. The area occupied by LF-2 was quarried for gravel during base construction. From 1956 (when the gravel supply was exhausted) until 1974, the site was used as a waste disposal area receiving waste from base activities. Wastes disposed of included domestic waste, construction debris, flightline wastes such as fuels, oil, solvents, hydraulic fluids, and paints, and sewage sludge. There are no records of waste segregation within LF-2; operators interviewed said that waste was evenly distributed. Oil-filled switches, containing an estimated quantity of more than 3,000 gallons of oil and possibly containing polychlorinated biphenyls (PCBs) also were reportedly disposed of at this site. From 1956 to 1968, wastes were typically burned and buried. Disposal of significant quantities of hazardous substances at this site reportedly terminated by 1968 (CH_2M Hill, 1984). In 1974, the landfill was closed and was covered with a foot of clean soil.

Landfill 3. Like LF-2, the area occupied by LF-3 was mined extensively for gravel during construction of the base runway and flightline area, and quarrying operations continue today in the northwestern portion of the site. LF-3 received waste from 1974 to 1991. Hazardous wastes are not known to have been placed at LF-3. However, small quantities of wastes governed by Resource Conservation and Recovery Act of 1976 (RCRA) (42 U.S.C §6901) (i.e, waste oil/fuels, solvents, paints, thinners, hydraulic fluids) may have been buried in the landfill prior to enactment of RCRA. A former coal ash disposal area is located northeast of the central portion of LF-3. A former drum disposal area is located between the coal ash disposal area and LF-3. The soils in these former disposal areas will be addressed under OU 2A, and the groundwater will be addressed as part of OU 4. LF-3 was closed in 1991 and covered with a 6-inch layer of native soil.

A more complete description of the LF-2 and LF-3 can be found in the RI/FFS Report (ABB-ES, 1994a) in Subsections 2.2 and 2.3, at pages 2-2 through 2-5.

2.2 INVESTIGATION HISTORY

The investigation history of OU 2 is summarized as follows:

- In 1984, a Preliminary Assessment was completed detailing historical hazardous material usage and waste disposal practices at LAFB (CH_2M Hill, 1984).
- Initial Site Investigation field work to determine if contaminants were present at the OU 2 sites was conducted in 1985 (Weston, 1988).
- An RI process by commenced in 1988 and continued into 1993.
- LAFB was added to the NPL in February of 1990.
- The USAF entered into a FFA (FFA, 1991) in 1991 with the USEPA and MEDEP regarding the cleanup of environmental contamination at LAFB. The FFA was revised in December 1993 to address base closure related issue, such as real property transfer and a revised schedule.
- An FFS (ABB-ES, 1994a) was completed in 1994 for LF-2 and LF-3 to determine alternatives for remediation of contamination based on information presented in the RI report, and a Proposed Plan (ABB-ES, 1994b) was submitted for public review.

3.0 COMMUNITY PARTICIPATION

Throughout LAFB's history, the community has been active and involved in base activities. The USAF 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 USAF, MEDEP, and local officials and community representatives. A TRC meeting was held on September 30, 1993 to discuss the Proposed Plan for OU 2.

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. The CRP can be found in the administrative record.

On June 24, 1992, the USAF initially made the LAFB 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, AFBCA/OL-M, Building 5100, Texas Road, Loring AFB, Maine. The administrative record was updated on July 14, 1994 to include OU 2 information. The USAF published a notice and brief analysis of the Proposed Plan in the Bangor Daily News and the Aroostook Republican on July 13, 1994 and made the plan available to the public at the Robert A. Frost Public Library.

From July 15, 1994 through August 15, 1994, the USAF 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 July 26, 1994, 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 USAF's response to comments are included in the Responsiveness Summary in Appendix B. Based on public comments, the public is in agreement regarding the preferred Remedial Alternative for OU 2 as presented in the Proposed Plan.

4.0 SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The selected remedy was developed by combining components of different source control alternatives to obtain a comprehensive approach for source remediation. The selected remedy for OU 2 is containment using a composite cover system. The major components of the remedy include:

- Site preparation, consolidation of LAFB soils for subgrade and grading to minimize erosion and manage runoff;
- Multi-layer cover system installation which will comply with RCRA Subtitle C and Maine hazardous waste requirements including landfill gas assessment and controls, and assessment of adjacent wetlands;
- Gates and warning signs installation;
- Deed restrictions on land in the vicinity of the landfills;
- Post closure monitoring and maintenance; and
- Five year site reviews.

Construction of the landfill cap for source control described in this ROD will allow time to evaluate the impact of LF-2 and LF-3 on groundwater quality and leachate production, landfill gas generation and adjacent wetlands, while minimizing further impact on the environment. The nature and distribution of contaminants in groundwater will be evaluated as part of the OU 4 landfill groundwater investigations. The groundwater characterizations are incomplete at the time of this ROD. The OU 4 ROD, however, will be issued prior to the completion of the construction of the OU 2 source control operable unit. Additional modifications to the cap design to allow for installation of a groundwater treatment system will be taken in this operable unit if the groundwater investigations indicate that action is required.

This remedial action will minimize environmental risks associated with LF-2 and LF-3 soil/source by eliminating direct contact with soil and the landfill contents, windborne migration of dust, and incidental ingestion of soils, sediment, and surface water by animals and humans. It will also provide for passive venting of landfill gases. In addition, after construction of the landfill caps, gases will be tested and evaluated to ensure that air emissions and ambient air quality on- and off-site do not pose unacceptable health risks and are protective of human health and the environment. The cover system minimizes, but will not eliminate, infiltration leading to leachate production and continued contamination of groundwater.

5.0 SUMMARY OF SITE CHARACTERISTICS

Subsections 5.4 and 6.1 of the RI/FFS Report (ABB-ES, 1994a) contain an overview of the RI field activities at OU 2, including discussions on the nature and distribution of contaminants. The significant findings of the RI are summarized below.

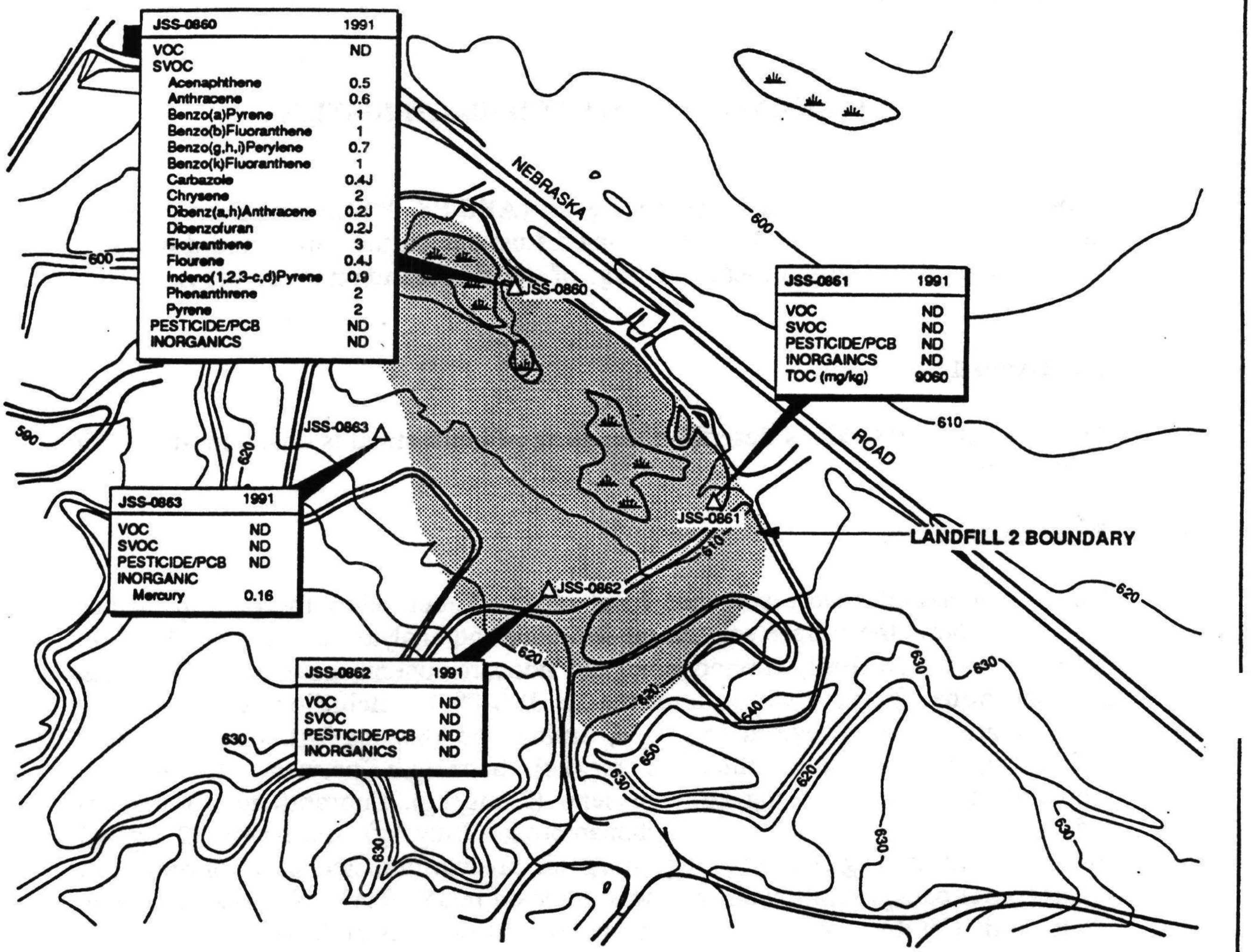
5.1 LANDFILL 2

The following subsections describe the nature of contaminants detected at LF-2 in various media.

5.1.1 Surface Soil

Surface soil samples were collected from zero to 2 feet below the landfill surface. Figure 5-1 shows the surface soil sample locations and analytes detected at LF-2 from 1988 to 1992. In 1991, carcinogenic and noncarcinogenic polynuclear aromatic hydrocarbons (PAHs) were detected in JSS-0860, including acenaphthene (0.5 milligrams per kilogram [mg/kg]), anthracene (0.6 mg/kg), benzo(a)pyrene (1 mg/kg), benzo(b)fluoranthene (1 mg/kg), benzo(g,h,i)perylene (0.7 mg/kg), benzo(k)fluoranthene (1 mg/kg), chrysene (2 mg/kg), fluoranthene (3 mg/kg), indeno(1,2,3-c,d)pyrene (0.9 mg/kg), phenanthrene (2 mg/kg), and pyrene (2 mg/kg). Mercury (0.16 mg/kg) was the only inorganic analyte detected at a concentration greater than background levels, and was detected in JSS-0863. No volatile organic compounds (VOCs) were detected in surface soil samples collected in 1991. The pesticide 4,4'-dichlorodiphenyltrichloroethene (4,4'-DDT) was detected in two samples, but at concentrations below background ranges.

In 1993, fuel-related VOCs and carcinogenic and noncarcinogenic PAHs were detected, and included chlorobenzene (0.05 mg/kg), toluene (0.02 mg/kg), xylenes (0.04 mg/kg), acenaphthene (4 mg/kg), anthracene (6 mg/kg), benzo(a)anthracene (9 mg/kg), benzo(a)pyrene (5 mg/kg), carbazole (3 mg/kg), chrysene (8 mg/kg), fluoranthene (16 mg/kg), fluorene (4 mg/kg), indeno(1,2,3-c,d)pyrene (3 mg/kg), naphthalene (3 mg/kg), phenanthrene (16 mg/kg), and pyrene (13 mg/kg). Figure 5-2 shows the surface soil sample locations and analytes detected in 1993. Very low concentrations of pesticides were detected in most 1993 samples. The significance of these detections and the basis for reporting them are discussed in the 1993 data quality report (Appendix G of the RI/FFS report). The fuel-related VOCs and



LEGEND

△	SURFACE SOIL SAMPLE LOCATION
(symbol)	WET AREA
J	ESTIMATED
ND	NOT DETECTED. FOR PESTICIDES AND INORGANIC PARAMETERS, NOT DETECTED ABOVE BACKGROUND

NOTE ALL RESULTS ARE REPORTED IN mg/kg.

SCALE IN FEET
0 300 600

FIGURE 5-1

ANALYTES DETECTED IN SURFACE SOIL, 1988-1992 LANDFILL 2

LORING AIR FORCE BASE
LIMESTONE, MAINE

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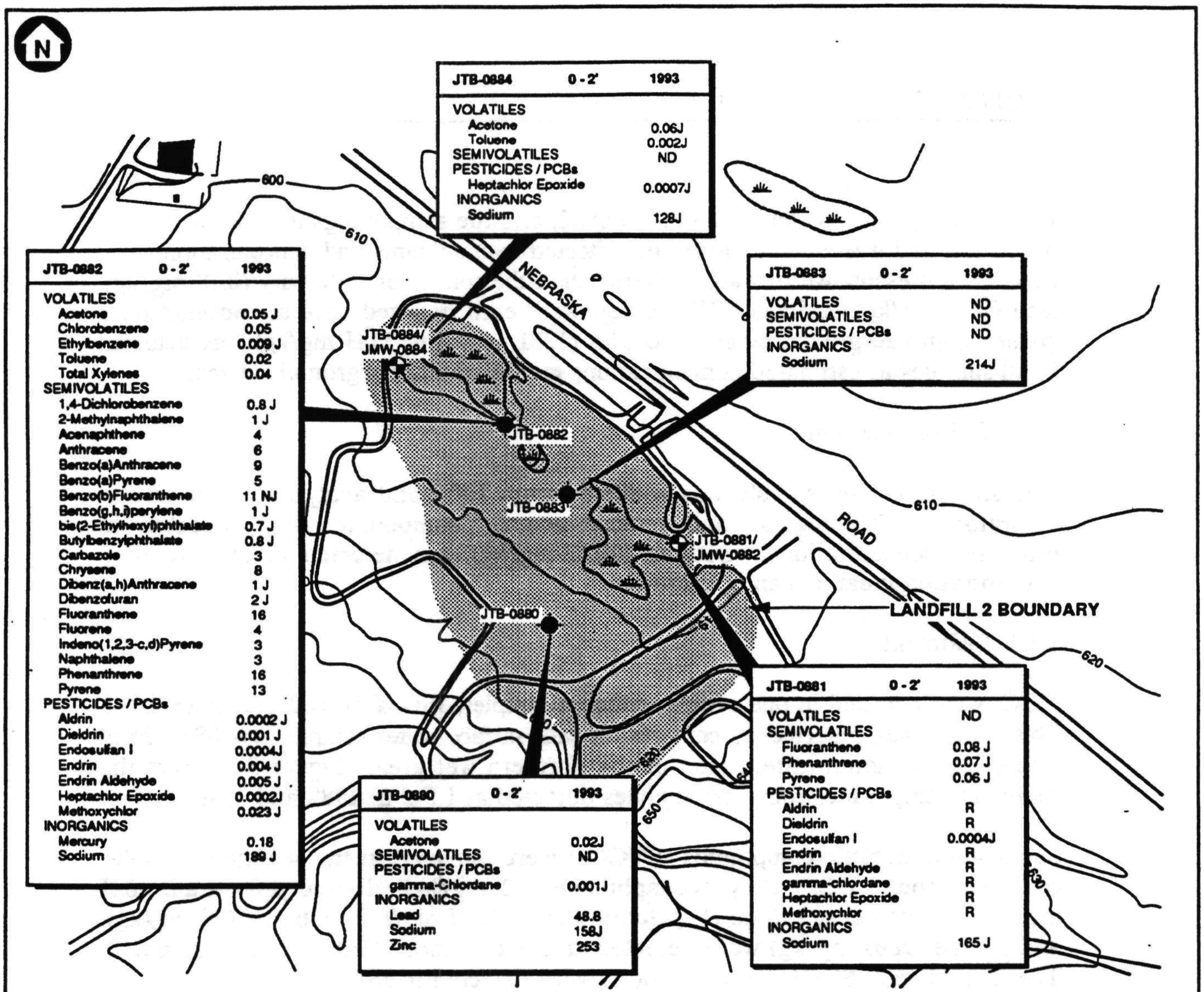


LEGEND

(symbol)	TEST BORING LOCATION
(symbol)	WETLAND
J	ESTIMATED
NJ	PRESUMPTIVE EVIDENCE OF COMPOUND IDENTITY; REPORTED CONCENTRATION IS AN ESTIMATED VALUE.
R	REJECTED SAMPLE; QC CRITERIA NOT MET
ND	NOT DETECTED. FOR PESTICIDES AND INORGANIC PARAMETERS, NOT DETECTED ABOVE BACKGROUND

NOTE ALL RESULTS ARE REPORTED IN mg/kg.

SCALE IN FEET

0 300 600

FIGURE 5-2

ANALYTES DETECTED IN SURFACE SOIL, MARCH 1993 LANDFILL 2

LORING AIR FORCE BASE
LIMESTONE, MAINE

9407042D(a) 1 JK

PAHs were primarily detected in JTB-0882, and the sample logs indicate a zone of mixed soil and waste. Therefore, the detected contaminants and concentrations may be more representative of waste material than the soil cover. Mercury (0.18 mg/kg), lead (48.8 mg/kg), and zinc (253 mg/kg) were each detected once at concentrations greater than background ranges. Sodium (128J mg/kg to 214J mg/kg) was detected in all samples at estimated concentrations greater than background ranges.

5.1.2 Subsurface Soil

One subsurface soil sample was collected from LF-2 and analyzed by an off-site laboratory. Carcinogenic and noncarcinogenic compounds were detected at estimated concentrations. Sodium (167J mg/kg) was detected at an estimated concentration greater than background.

5.1.3 Sediment

VOCs were detected in one of five sediment samples, JSD-0801, collected from LF-2. This sample was collected, in conjunction with surface water sample JSW-0801, from a seep on the southwestern side of the northern wet area. Figure 5-3 shows the sediment sample locations and analytes detected at LF-2 in 1988 and 1990.

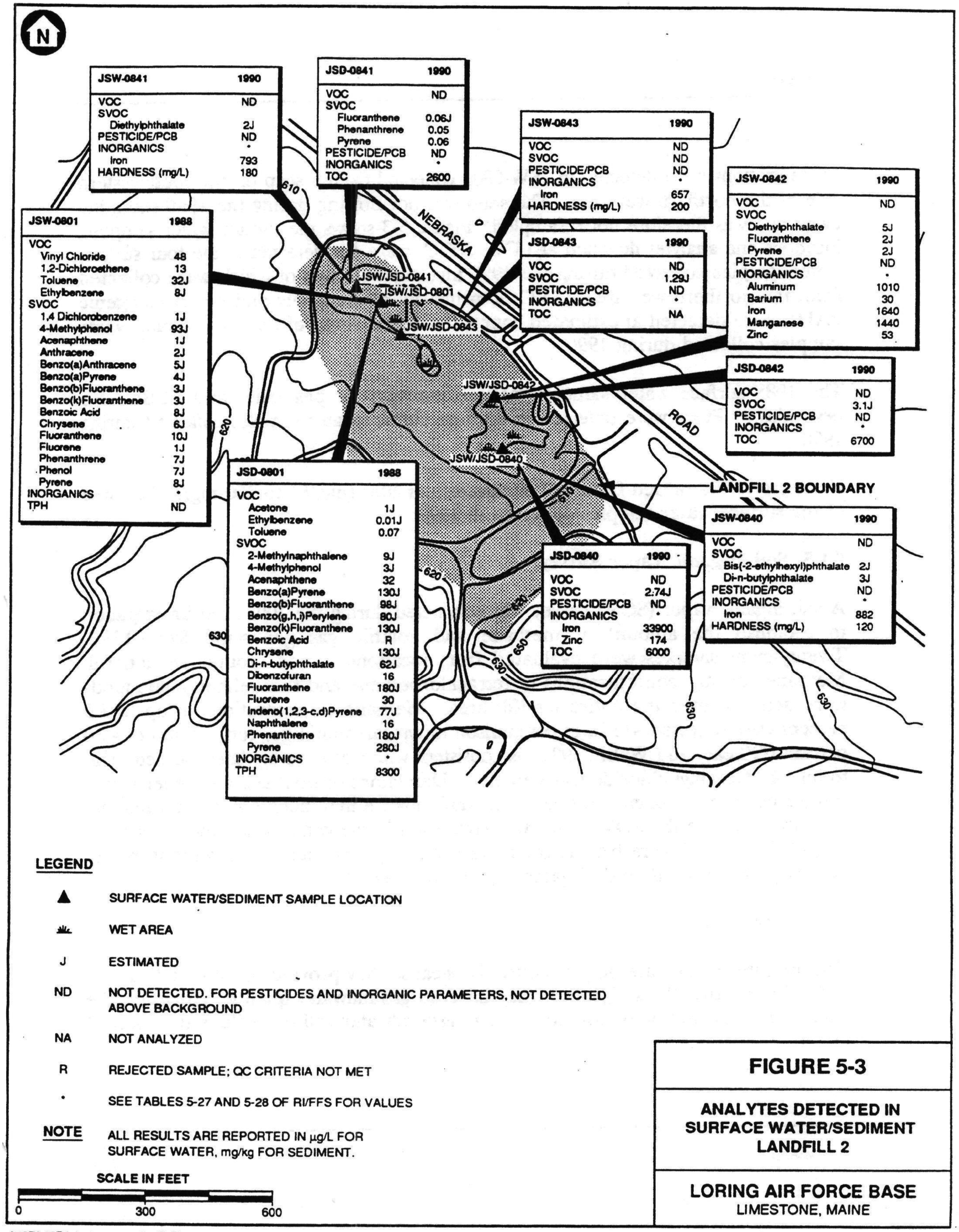
Semivolatile organic compounds (SVOCs) were detected in the sediment samples collected from LF-2. Only acenaphthene (32 mg/kg), di-n-butylphthalate (62J mg/kg), dibenzofuran (16 mg/kg) fluoranthene (180J mg/kg), fluorene (30 mg/kg), and pyrene (280J mg/kg) were detected at concentrations that were not estimated. The highest total SVOC concentrations were detected in JSD-0801.

No pesticides or PCBs were detected in the sediment samples collected from LF-2. Inorganic analytes were detected in all five sediment samples collected from this site.

One sediment sample, JSD-0801, was analyzed for total petroleum hydrocarbons (TPH), returning a concentration of 8,300 parts per million. Total organic carbon (TOC) concentrations detected in the sediment samples collected during the 1990 field investigation ranged from 2,600 to 6,200 mg/kg.

5.1.4 Surface Water

In 1988, vinyl chloride (48 micrograms per liter [μg/L]), 1,2-dichloroethene (13 μg/L), toluene (32J μg/L), ethylbenzene (8J μg/L), and SVOCs at estimated



9407042D(a) 1 8 GE

concentrations were detected in JSW-0801 collected from a seep on the southwestern side of the northern wet area. The seep was not flowing during the 1990 sampling event and was therefore not resampled. Figure 5-3 shows the surface water sampling locations and analytes detected at LF-2. VOCs were not detected in the four surface water samples collected during the 1990 investigation, two of which were collected from the northern wet area. SVOCs, primarily carcinogenic and noncarcinogenic PAHs, were detected at estimated concentrations in three of the four surface water samples collected during 1990.

The 1988 surface water sample was not analyzed for pesticides and PCBs. No pesticides or PCBs were detected in the four surface water samples collected during 1990.

Hardness values ranged from 120 milligrams per liter (mg/L) to 200 mg/L for three of the surface water samples collected in 1990.

5.1.5 Soil Organic Vapor Survey

A soil organic vapor (SOV) survey was conducted during the 1993 field investigation to establish the amount of methane and volatile gas generated from LF-2. Twenty-eight samples were evaluated from locations in and around the landfill. Methane and low concentrations of tetrachloroethene and fuel-related compounds were detected over the entire landfill area. Methane concentrations of up to 3.5 percent were detected which, in comparison to typical landfill gas composition of 47.4 percent (O'Leary and Walsh, 1991), is consistent with waste having been burned prior to burial. No vinyl chloride was detected. Detections of methane and other target compounds at SOV points outside the landfill indicate that landfill gases may migrate laterally. Because the SOV survey was conducted in the winter when the top several feet of the landfill were frozen, the frozen soil may have acted as a temporary cap that may have caused landfill gases to migrate laterally.

5.1.6 Groundwater

Groundwater results are discussed briefly because they provide possible indications of the impact that the soil/source may have on groundwater quality. However, the nature and distribution of contaminants in groundwater will be evaluated as part of OU 4.

Groundwater samples were collected for off-site laboratory analysis from LF-2 perimeter wells in 1988, 1989, and 1993, and from wells within LF-2 in 1993. Off-site laboratory analysis detected fuel-related VOCs in one sample from the perimeter wells. Phthalates were detected in several perimeter well samples at estimated concentrations. The VOC 1,2,4-trichlorobenzene was detected in sample JMW-0842 at an estimated concentration. Very low concentrations (less than or equal to 0.001 μg/L) of pesticides were detected in all samples collected from perimeter wells in 1993 (1988 and 1989 perimeter well samples were not analyzed for pesticides). In most perimeter well samples, inorganic analytes were detected at concentrations greater than background concentrations.

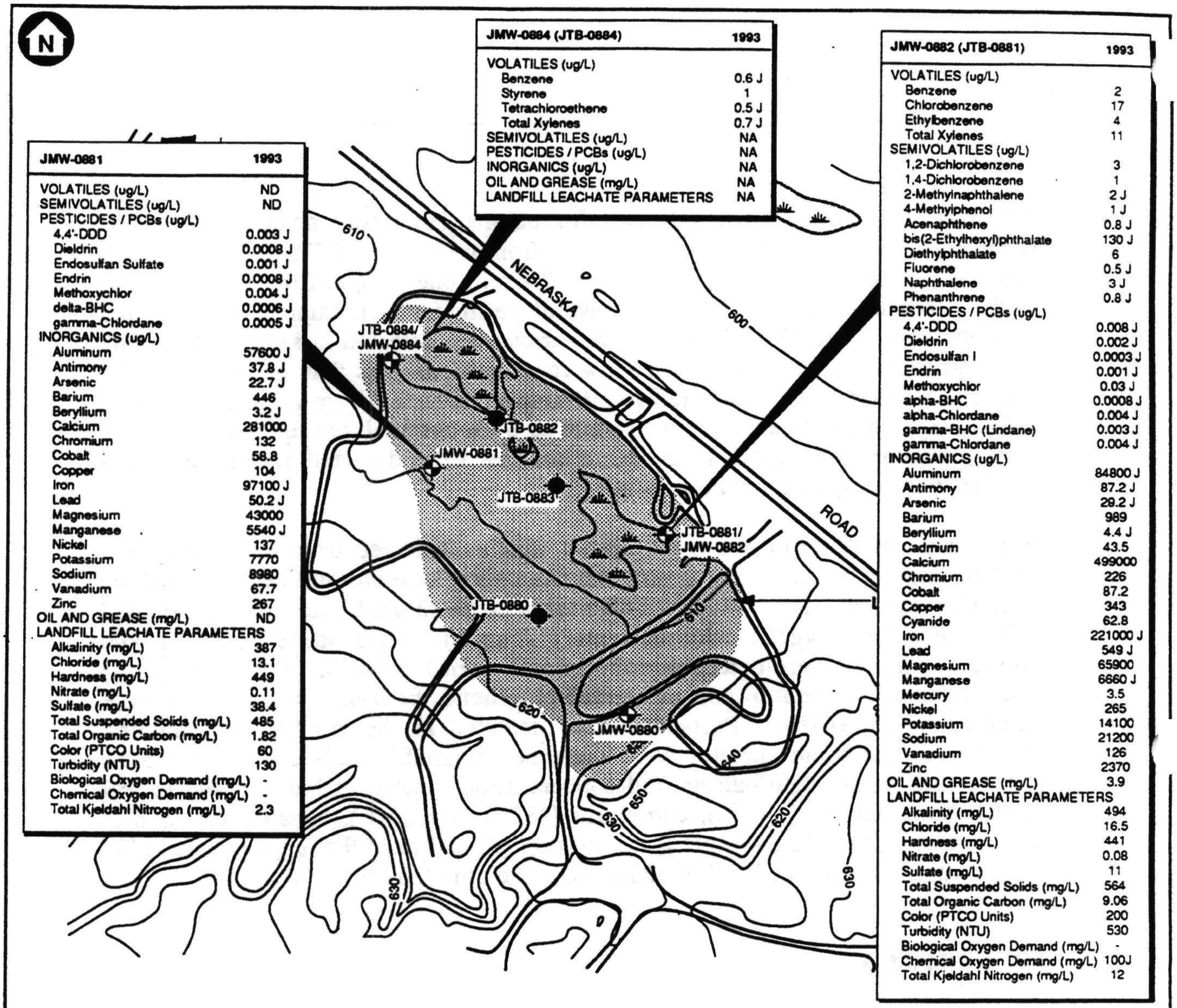
VOCs were detected in two groundwater samples collected from wells within the landfill. Figure 5-4 shows the groundwater sampling locations and detected analytes within the landfill. The SVOC, 1,2-dichlorobenzene (3 μg/L), and the fuel-related VOCs benzene (2 μg/L) chlorobenzene (17 μg/L), ethylbenzene (4 μg/L), and xylenes (11 μg/L), were detected in the sample from JMW-0882. Styrene (1 μg/L) and estimated concentrations of tetrachloroethene, benzene, and xylenes were detected in JMW-0884. Pesticides were detected in the landfill well samples. Twenty-one inorganic analytes were detected in landfill wells at concentrations greater than established background concentrations, including barium (446 to 989 μg/L), cadmium (43.5 μg/L), chromium (132 to 226 μg/L), cobalt (58.8 to 87.2 μg/L), copper, (104 to 343 μg/L), magnesium (43,000 to 65,900 μg/L), nickel (137 to 265 μg/L), vanadium (67.7 to 126 μg/L), and zinc (267 to 2,370 μg/L).

5.2 LANDFILL 3

The following subsections describe the nature of contaminants detected at LF-3 in various media.

5.2.1 Surface Soil

Figure 5-5 shows the surface soil sampling locations and analytes detected at LF-3 in 1991. Xylene, the only VOC detected in 1991, was detected in three of eight surface soil samples collected from LF-3: JSS-0960 (0.01 mg/kg), JSS-0961 (0.02 mg/kg), and JSS-0962 (0.005J mg/kg). SVOCs, including benzo(a)anthracene (up to 0.5 mg/kg), benzo(a)pyrene (up to 0.4 mg/kg), chrysene (up to 0.4 mg/kg), fluoranthene (up to 0.5 mg/kg), and pyrene (0.4 mg/kg), were detected in samples collected at JSS-0964 and JSS-0965 in 1991. Most SVOCs were detected at estimated



JMW-0884 (JTB-0884)	1993
VOLATILES (ug/L)	
Benzene	0.6 J
Styrene	1
Tetrachloroethene	0.5 J
Total Xylenes	0.7 J
SEMIVOLATILES (ug/L)	NA
PESTICIDES / PCBs (ug/L)	NA
INORGANICS (ug/L)	NA
OIL AND GREASE (mg/L)	NA
LANDFILL LEACHATE PARAMETERS	NA

JMW-0881	1993
VOLATILES (ug/L)	ND
SEMIVOLATILES (ug/L)	ND
PESTICIDES / PCBs (ug/L)	
4,4'-DDD	0.003 J
Dieldrin	0.0008 J
Endosulfan Sulfate	0.001 J
Endrin	0.0008 J
Methoxychlor	0.004 J
delta-BHC	0.0006 J
gamma-Chlordane	0.0005 J
INORGANICS (ug/L)	
Aluminum	57600 J
Antimony	37.8 J
Arsenic	22.7 J
Barium	446
Beryllium	3.2 J
Calcium	281000
Chromium	132
Cobalt	58.8
Copper	104
Iron	97100 J
Lead	50.2 J
Magnesium	43000
Manganese	5540 J
Nickel	137
Potassium	7770
Sodium	8980
Vanadium	67.7
Zinc	267
OIL AND GREASE (mg/L)	ND
LANDFILL LEACHATE PARAMETERS	
Alkalinity (mg/L)	387
Chloride (mg/L)	13.1
Hardness (mg/L)	449
Nitrate (mg/L)	0.11
Sulfate (mg/L)	38.4
Total Suspended Solids (mg/L)	485
Total Organic Carbon (mg/L)	1.82
Color (PTCO Units)	60
Turbidity (NTU)	130
Biological Oxygen Demand (mg/L)	-
Chemical Oxygen Demand (mg/L)	-
Total Kjeldahl Nitrogen (mg/L)	2.3

JMW-0882 (JTB-0881)	1993
VOLATILES (ug/L)	
Benzene	2
Chlorobenzene	17
Ethylbenzene	4
Total Xylenes	11
SEMIVOLATILES (ug/L)	
1,2-Dichlorobenzene	3
1,4-Dichlorobenzene	1
2-Methylnaphthalene	2 J
4-Methylphenol	1 J
Acenaphthene	0.8 J
bis(2-Ethylhexyl)phthalate	130 J
Diethylphthalate	6
Fluorene	0.5 J
Naphthalene	3 J
Phenanthrene	0.8 J
PESTICIDES / PCBs (ug/L)	
4,4'-DDD	0.008 J
Dieldrin	0.002 J
Endosulfan I	0.0003 J
Endrin	0.001 J
Methoxychlor	0.03 J
alpha-BHC	0.0008 J
alpha-Chlordane	0.004 J
gamma-BHC (Lindane)	0.003 J
gamma-Chlordane	0.004 J
INORGANICS (ug/L)	
Aluminum	84800 J
Antimony	87.2 J
Arsenic	29.2 J
Barium	989
Beryllium	4.4 J
Cadmium	43.5
Calcium	499000
Chromium	226
Cobalt	87.2
Copper	343
Cyanide	62.8
Iron	221000 J
Lead	549 J
Magnesium	65900
Manganese	6660 J
Mercury	3.5
Nickel	265
Potassium	14100
Sodium	21200
Vanadium	126
Zinc	2370
OIL AND GREASE (mg/L)	3.9
LANDFILL LEACHATE PARAMETERS	
Alkalinity (mg/L)	494
Chloride (mg/L)	16.5
Hardness (mg/L)	441
Nitrate (mg/L)	0.08
Sulfate (mg/L)	11
Total Suspended Solids (mg/L)	564
Total Organic Carbon (mg/L)	9.06
Color (PTCO Units)	200
Turbidity (NTU)	530
Biological Oxygen Demand (mg/L)	-
Chemical Oxygen Demand (mg/L)	100J
Total Kjeldahl Nitrogen (mg/L)	12

LEGEND

- MONITORING WELL LOCATION
- TEST BORING LOCATION
- WETLAND
- J — ESTIMATED
- NA — NOT ANALYZED
- ND — NOT DETECTED

NOTE ALL RESULTS ARE REPORTED AS NOTED.

SCALE IN FEET: 0 — 300 — 600

FIGURE 5-4

ANALYTES DETECTED IN GROUNDWATER, MARCH 1993 LANDFILL 2

LORING AIR FORCE BASE
LIMESTONE, MAINE

9407042D(a) 1 J MP

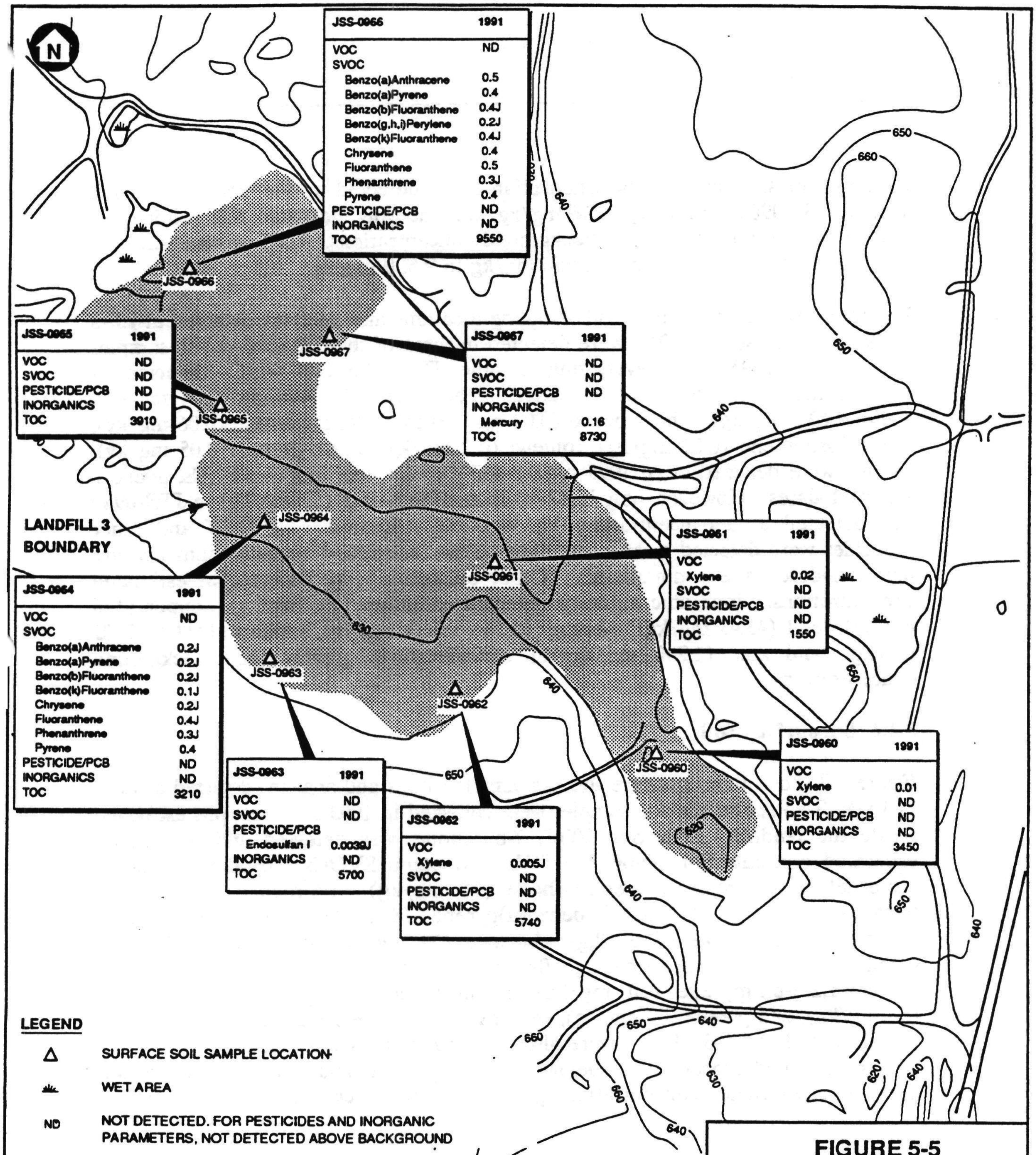


FIGURE 5-5

ANALYTES DETECTED IN SURFACE SOIL, 1988-1992 LANDFILL 3

LORING AIR FORCE BASE
LIMESTONE, MAINE

9407042D(b) 4 C

concentrations. The pesticide Endosulfan I was detected in one 1991 surface soil sample (JSS-0963). Mercury (0.16 mg/kg) was the only inorganic detected in 1991 at a concentration greater than background concentrations. TOC was measured in 1991 samples, and ranged from 1,550 mg/kg to 9,550 mg/kg.

Figure 5-6 shows the surface soil sampling locations and analytes detected at LF-3 in 1993. Up to seven VOCs were detected in three of the five surface soil samples collected in 1993. However, only sample JTB-0980 had VOCs detected at concentrations that were not estimated. These were 2-butanone (0.04 mg/kg), acetone (0.2 mg/kg), ethylbenzene (0.02 mg/kg) methylene chloride (0.06 mg/kg), tetrachloroethene (0.02 mg/kg), toluene (0.2 mg/kg), and xylenes (0.05 mg/kg). SVOCs were detected in all 1993 surface soil samples, and included PAHs, phenols, and phthalates. However, only bis(2-ethylhexyl)phthalate (53 mg/kg) in JTB-0980 was detected at a concentration that was not estimated. 4,4'-DDT and other pesticides were detected at concentrations below background concentrations and are not considered site contaminants. Other pesticides were detected at estimated concentrations. Inorganic analyses detected cadmium (1.9 mg/kg), copper (126 mg/kg), lead (43.4J mg/kg), mercury (0.14 to 0.23 mg/kg), sodium (141J to 260J mg/kg), and zinc (1,240 mg/kg) at concentrations greater than background concentrations.

5.2.2 Subsurface Soil

Figure 5-7 shows the subsurface soil sampling locations and analytes detected at LF-3 in 1993. Two subsurface soil samples were collected in 1993 from test pits excavated inside the landfill. Only one VOC, 2-butanone, was detected and only at an estimated concentration below the SQL. Nineteen SVOCs, including 2-methylnaphthalene (3 mg/kg), acenaphthene (10 mg/kg), anthracene (15 mg/kg), benzo(a)anthracene (28 mg/kg), benzo(a)pyrene (18 mg/kg), benzo(g,h,i)perylene (11 mg/kg), carbazole (7 mg/kg), chrysene (21 mg/kg), dibenz(a,h)anthracene (2 mg/kg), dibenzofuran (6 mg/kg), fluoranthene (55 mg/kg), fluorene (9 mg/kg), indeno(1,2,3-c,d)pyrene (10 mg/kg), naphthalene (3 mg/kg), phenanthrene (58 mg/kg), and pyrene (60 mg/kg), were detected in the sample from JTB-0983 at the north end of LF-3. PAHs were also detected in the sample from JTB-0981, but only at estimated concentrations below the SQLs. The inorganic analyte sodium was detected at estimated concentrations greater than the background concentration.

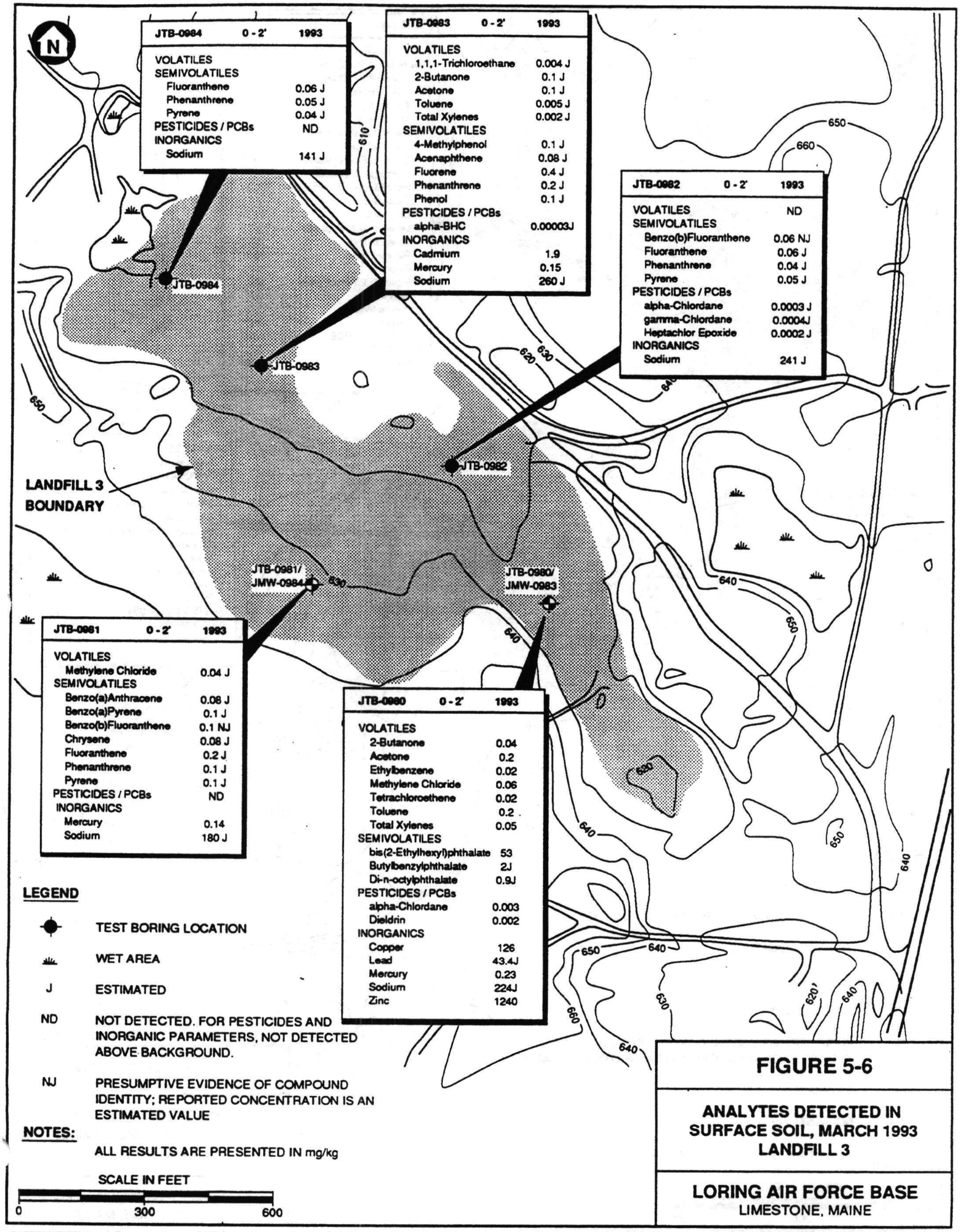


FIGURE 5-6

ANALYTES DETECTED IN SURFACE SOIL, MARCH 1993 LANDFILL 3

LORING AIR FORCE BASE
LIMESTONE, MAINE

9407042D(b) H K

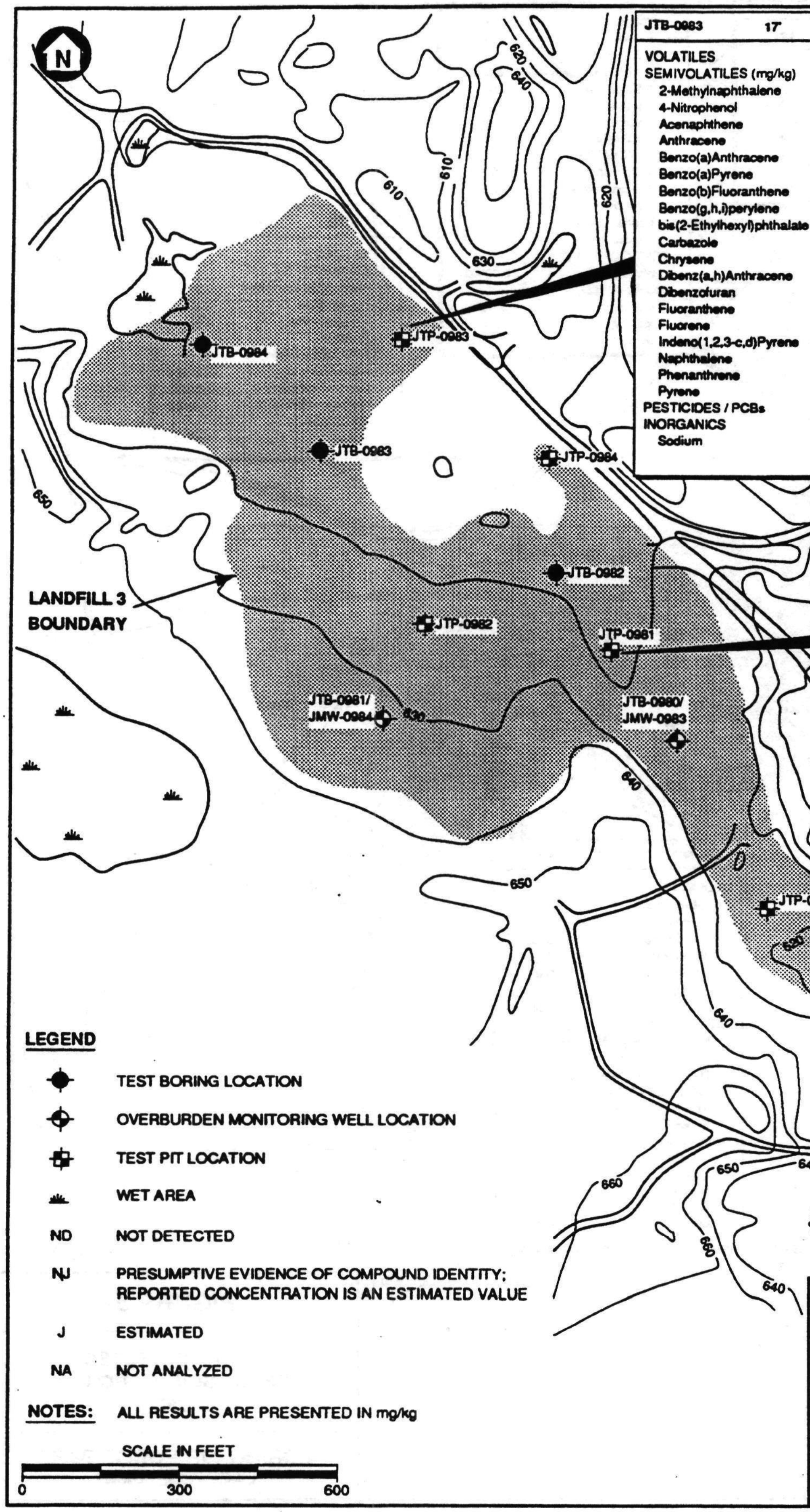


FIGURE 5-7

ANALYTES DETECTED IN SUBSURFACE SOIL, MARCH 1993 LANDFILL 3

LORING AIR FORCE BASE
LIMESTONE, MAINE

9407042D(b) G L

5.2.3 Sediment

Figure 5-8 shows the sediment sampling locations and analytes detected at LF-3. No VOCs were detected in the three sediment samples collected from LF-3. SVOC analyses detected PAHs, mostly at estimated concentrations, in the sample from JSD-0942. Estimated concentrations of benzoic acid and benzyl alcohol were detected in the other two samples. Aroclor-1260 was detected in one sediment sample, JSD-0941, at a concentration of 1.2 mg/kg. No other PCBs or pesticides were detected. Inorganic analytes, including arsenic (4.8J to 6.3J mg/kg), chromium (35.3 to 86.8 mg/kg), and lead (25 to 455J mg/kg), were detected in all three sediment samples collected from this site. TOC was measured in two of the three sediment samples collected from LF-3, with values ranging from 2,600 mg/kg to 11,000 mg/kg.

Sediment sample location JSD-0942 is adjacent to the Coal Ash Pile. It is possible that contaminants detected in the samples collected from this location have migrated from the Coal Ash Pile.

5.2.4 Surface Water

Figure 5-8 shows the surface water sampling locations and analytes detected at LF-3. 1,2-Dichloroethene (17 μg/L) and estimated concentrations of 2-butanone, toluene, and trichloroethene were detected in one surface water sample (JSW-0901) collected from the northeastern side of LF-3. Acetone and methylene chloride were detected at estimated concentrations in JSW-0942, collected approximately 200 feet east of JSW-0901. Acetone and methylene chloride have been identified as potential laboratory contaminants; the detection of these compounds in only one sample indicates they are most likely introduced contaminants, and are not shown on Figure 5-8. SVOC analyses detected only estimated concentrations of phenols, phthalates, and benzoic acid in one sample (JSW-0901). No pesticides or PCBs were detected in the surface water samples collected from this site. Eighteen inorganic analytes including arsenic (56.6J μg/L), chromium (8.7 μg/L), and lead (5.2 to 54.3 μg/L) were detected in surface water samples. Two of the three surface water samples collected in 1990 were analyzed for hardness, with results ranging from 340 to 590 mg/L.

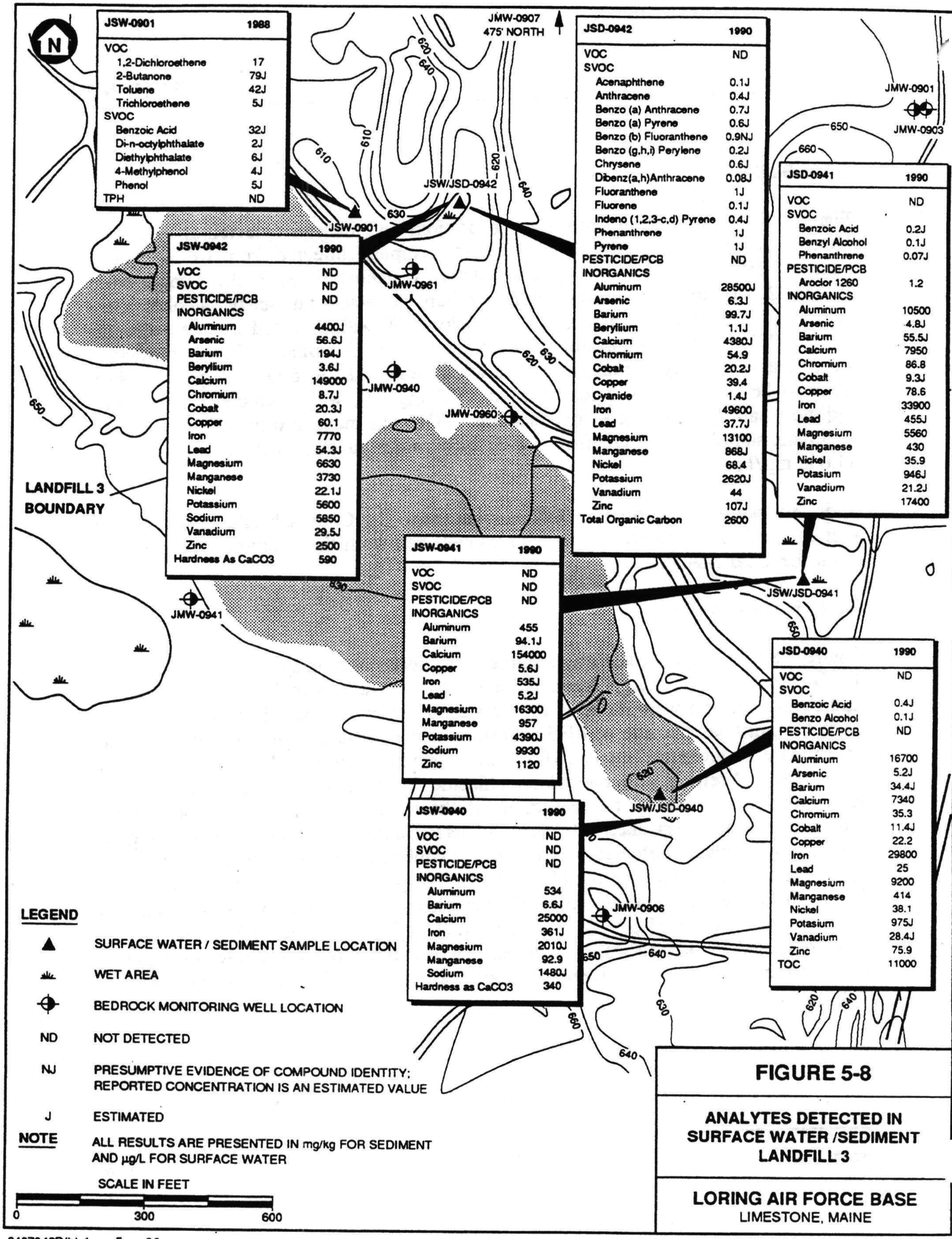


FIGURE 5-8

ANALYTES DETECTED IN SURFACE WATER /SEDIMENT LANDFILL 3

LORING AIR FORCE BASE
LIMESTONE, MAINE

9407042D(b) 1 5 90

5.2.5 Soil Organic Vapor Survey

Forty-five SOV samples were collected from 50 staked locations in and around LF-3 and were analyzed for methane and target VOCs. Methane, low concentrations of chlorinated solvents, and benzene, toluene, ethylbenzene, and xylenes were detected over the entire landfill area. Methane concentrations of up to 8.5 percent were detected which, in comparison to typical landfill gas composition of 47.4 percent (O'Leary and Walsh, 1991), is consistent with waste having been burned prior to burial. Vinyl chloride was detected in one sample, approximately half-way between wells JMW-0940 and JMW-0941. Detections of methane and other target compounds at SOV points outside the landfill indicate that landfill gases may migrate laterally. Because the SOV survey was conducted in the winter when the top several feet of the landfill were frozen, the frozen soil may have acted as a temporary cap that may have caused landfill gases to migrate laterally.

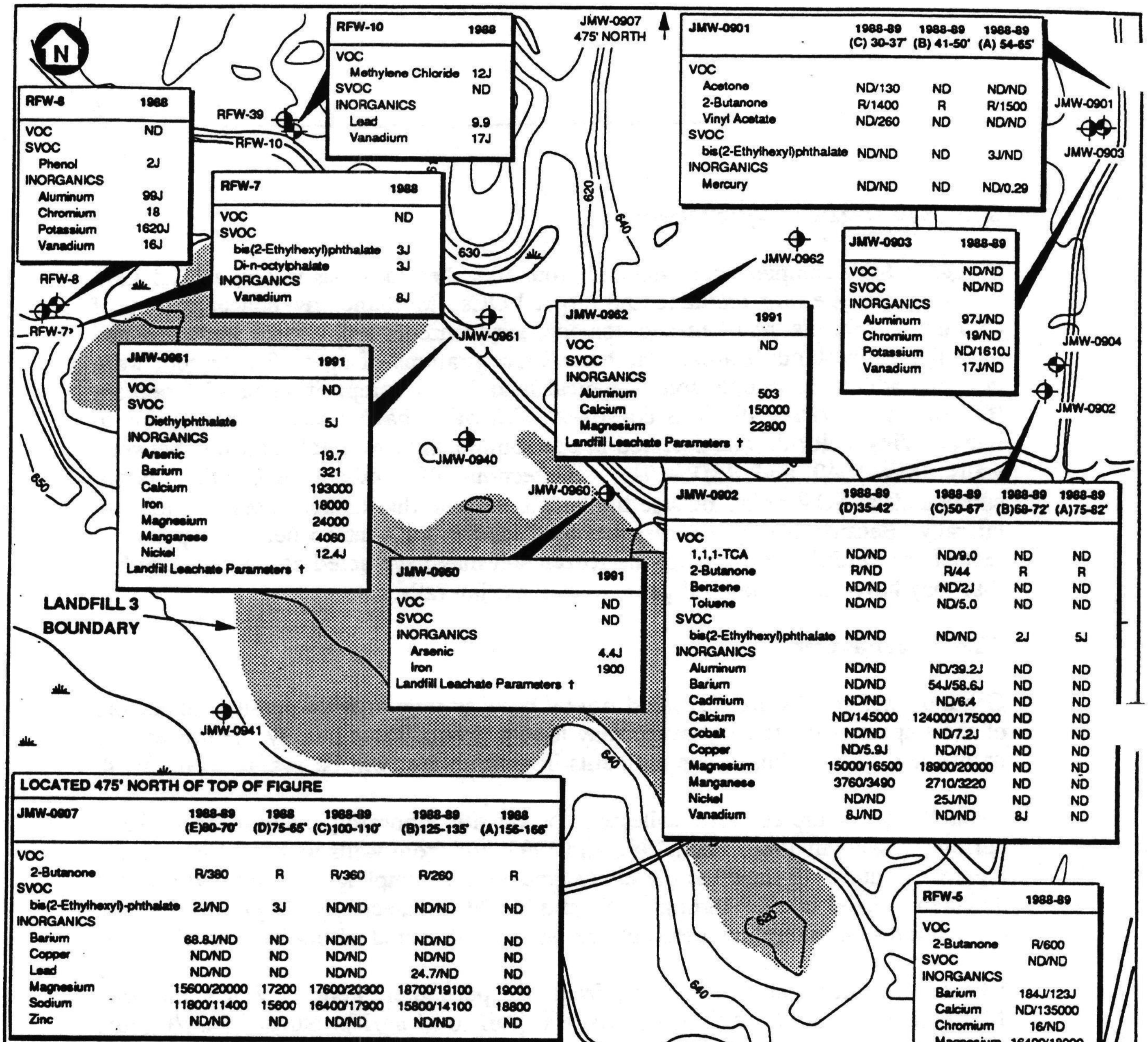
5.2.6 Groundwater

Groundwater results are discussed briefly because they provide possible indicators of the impact that the soil/source may have a groundwater quality. However, the nature and distribution of contaminants in groundwater will be evaluated in OU 4.

Groundwater samples were collected for off-site laboratory analysis from LF-3 perimeter wells in 1988, 1989, 1991 and 1993, and from wells within LF-3 in 1993. Figures 5-9 and 5-10 show the perimeter groundwater sampling locations and analytes detected at LF-3 in 1988 through 1991 and in 1993, respectively. Figure 5-11 shows the groundwater sampling locations and analytes detected within LF-3 in 1993.

VOCs were detected in samples from six perimeter wells. VOCs included 1,1,1-trichloroethane (1 to 9 μg/L), benzene (0.6J to 2J μg/L), toluene (5 μg/L), and vinyl acetate (260 μg/L). SVOC analyses detected phthalates and phenol in some perimeter wells at estimated concentrations. Low concentrations of pesticides were detected in five groundwater samples collected in 1993. Inorganic analytes were detected in every groundwater sample analyzed and collected from perimeter wells. The detection of greater numbers of inorganic analytes in 1993 samples at concentrations greater than background may have been because, unlike previous samples, the 1993 samples were unfiltered.

Groundwater samples were collected from wells within the landfill in 1993. VOC analyses detected chlorinated solvents and fuel-related compounds. The most



RFW-8	1988
VOC	ND
SVOC	
Phenol	2J
INORGANICS	
Aluminum	99J
Chromium	18
Potassium	1620J
Vanadium	16J

RFW-10	1988
VOC	
Methylene Chloride	12J
SVOC	ND
INORGANICS	
Lead	9.9
Vanadium	17J

RFW-7	1988
VOC	ND
SVOC	
bis(2-Ethylhexyl)phthalate	3J
Di-n-octylphalate	3J
INORGANICS	
Vanadium	8J

JMW-0901	1988-89 (C) 30-37'	1988-89 (B) 41-50'	1988-89 (A) 54-65'
VOC			
Acetone	ND/130	ND	ND/ND
2-Butanone	R/1400	R	R/1500
Vinyl Acetate	ND/260	ND	ND/ND
SVOC			
bis(2-Ethylhexyl)phthalate	ND/ND	ND	3J/ND
INORGANICS			
Mercury	ND/ND	ND	ND/0.29

JMW-0903	1988-89
VOC	ND/ND
SVOC	ND/ND
INORGANICS	
Aluminum	97J/ND
Chromium	19/ND
Potassium	ND/1610J
Vanadium	17J/ND

JMW-0962	1991
VOC	ND
SVOC	
INORGANICS	
Aluminum	503
Calcium	150000
Magnesium	22800
Landfill Leachate Parameters †	

JMW-0961	1991
VOC	ND
SVOC	
Diethylphthalate	5J
INORGANICS	
Arsenic	19.7
Barium	321
Calcium	193000
Iron	18000
Magnesium	24000
Manganese	4060
Nickel	12.4J
Landfill Leachate Parameters †	

JMW-0960	1991
VOC	ND
SVOC	ND
INORGANICS	
Arsenic	4.4J
Iron	1900
Landfill Leachate Parameters †	

JMW-0902	1988-89 (D)35-42'	1988-89 (C)50-67'	1988-89 (B)68-72'	1988-89 (A)75-82'
VOC				
1,1,1-TCA	ND/ND	ND/9.0	ND	ND
2-Butanone	R/ND	R/44	R	R
Benzene	ND/ND	ND/2J	ND	ND
Toluene	ND/ND	ND/5.0	ND	ND
SVOC				
bis(2-Ethylhexyl)phthalate	ND/ND	ND/ND	2J	5J
INORGANICS				
Aluminum	ND/ND	ND/39.2J	ND	ND
Barium	ND/ND	54J/58.6J	ND	ND
Cadmium	ND/ND	ND/6.4	ND	ND
Calcium	ND/145000	124000/175000	ND	ND
Cobalt	ND/ND	ND/7.2J	ND	ND
Copper	ND/5.9J	ND/ND	ND	ND
Magnesium	15000/16500	18900/20000	ND	ND
Manganese	3760/3490	2710/3220	ND	ND
Nickel	ND/ND	25J/ND	ND	ND
Vanadium	8J/ND	ND/ND	8J	ND

LOCATED 475' NORTH OF TOP OF FIGURE

JMW-0907	1988-89 (E)60-70'	1988 (D)75-65'	1988-89 (C)100-110'	1988-89 (B)125-135'	1988 (A)156-166'
VOC					
2-Butanone	R/380	R	R/360	R/260	R
SVOC					
bis(2-Ethylhexyl)-phthalate	2J/ND	3J	ND/ND	ND/ND	ND
INORGANICS					
Barium	68.8J/ND	ND	ND/ND	ND/ND	ND
Copper	ND/ND	ND	ND/ND	ND/ND	ND
Lead	ND/ND	ND	ND/ND	24.7/ND	ND
Magnesium	15600/20000	17200	17600/20300	18700/19100	19000
Sodium	11800/11400	15600	16400/17900	15800/14100	18800
Zinc	ND/ND	ND	ND/ND	ND/ND	ND

RFW-5	1988-89
VOC	
2-Butanone	R/600
SVOC	ND/ND
INORGANICS	
Barium	184J/123J
Calcium	ND/135000
Chromium	16/ND
Magnesium	16400/18000
Vanadium	8J/ND

JMW-0906	1988-89 (A)73-83'
VOC	
Chloroform	5/ND
Toluene	ND/5
SVOC	4J/ND
INORGANICS	
Calcium	ND/ND
Magnesium	21700/26100
Manganese	ND/ND
Mercury	NA/ND
Nickel	ND/ND
Sodium	ND/ND
Vanadium	ND/ND
Zinc	47.9/77.8

LEGEND

OVERBURDEN MONITORING WELL LOCATION

BEDROCK MONITORING WELL LOCATION

WET AREA

ND NOT DETECTED. FOR PESTICIDES AND INORGANIC PARAMETERS, NOT DETECTED ABOVE BACKGROUND

R REJECTED SAMPLE; QC CRITERIA NOT MET

J ESTIMATED

NOTES:

1. ALL RESULTS ARE PRESENTED IN µg/L.
2. † = SEE TABLES FOR VALUES

SCALE IN FEET

0 300 600

FIGURE 5-9

ANALYTES DETECTED IN GROUNDWATER, 1988-1992 LANDFILL 3

LORING AIR FORCE BASE
LIMESTONE, MAINE

9407042D(b) 12 A

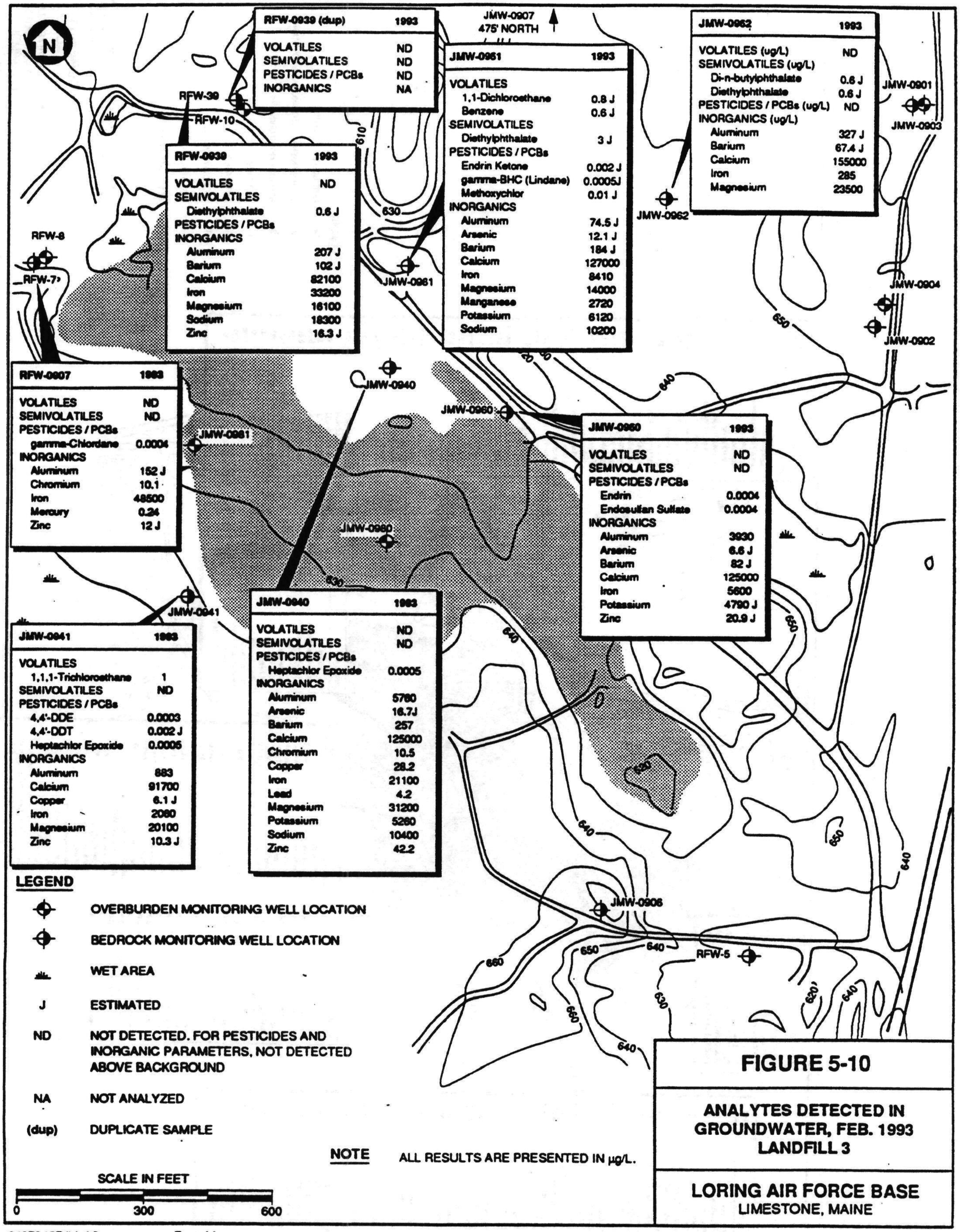
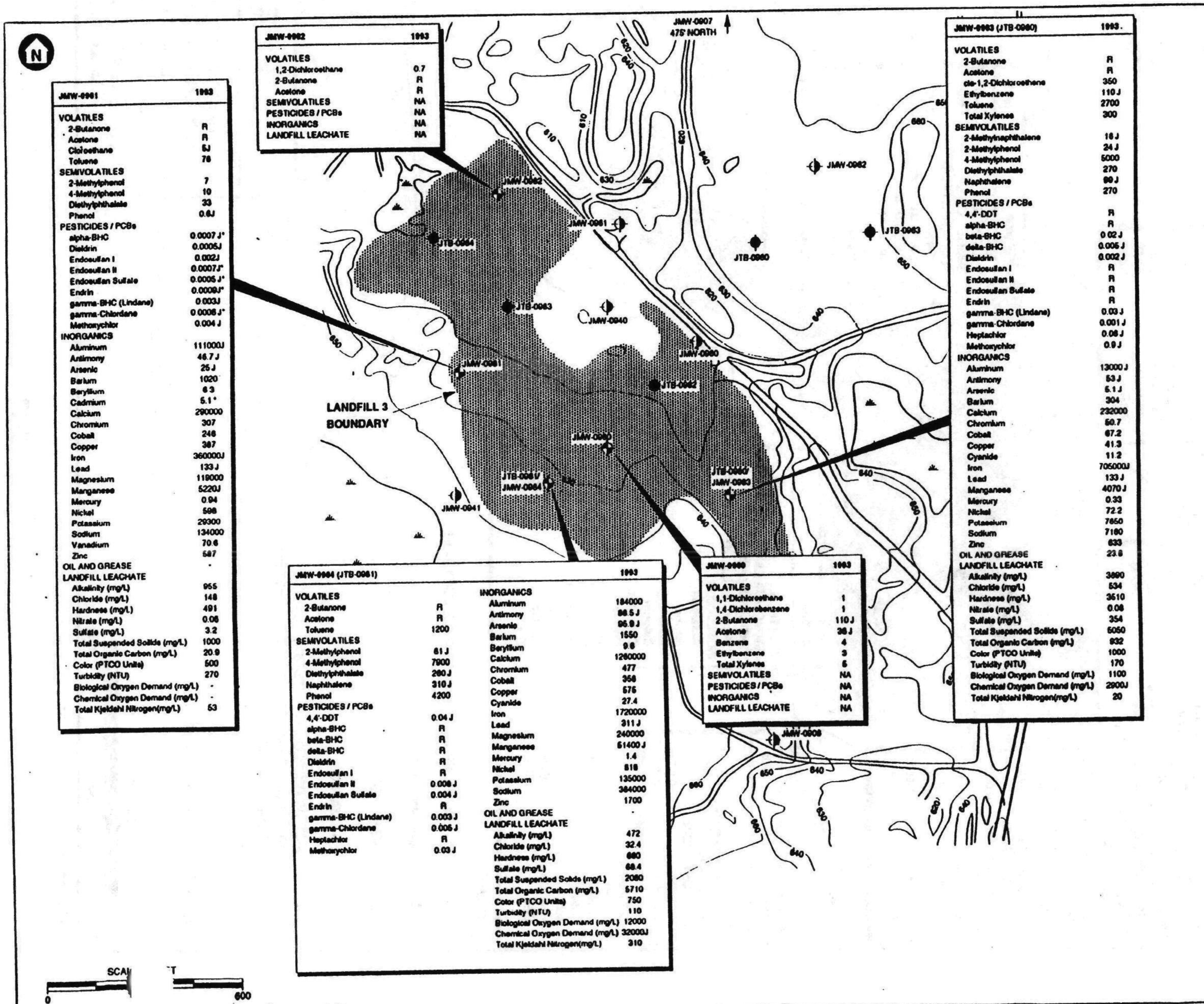


FIGURE 5-10

ANALYTES DETECTED IN GROUNDWATER, FEB. 1993 LANDFILL 3

9407042D(b) 12 F M



JMW-0962	1993
VOLATILES	
1,2-Dichloroethane	0.7
2-Butanone	R
Acetone	R
SEMIVOLATILES	NA
PESTICIDES / PCBs	NA
INORGANICS	NA
LANDFILL LEACHATE	NA

JMW-0961	1993
VOLATILES	
2-Butanone	R
Acetone	R
Chloroethane	5J
Toluene	76
SEMIVOLATILES	
2-Methylphenol	7
4-Methylphenol	10
Diethylphthalate	33
Phenol	0.6J
PESTICIDES / PCBs	
alpha-BHC	0.0007 J*
Dieldrin	0.0005J
Endosulfan I	0.002J
Endosulfan II	0.0007J*
Endosulfan Sulfate	0.0005 J*
Endrin	0.0009J*
gamma-BHC (Lindane)	0.003J
gamma-Chlordane	0.0006 J*
Methoxychlor	0.004 J
INORGANICS	
Aluminum	111000J
Antimony	46.7 J
Arsenic	25 J
Barium	1020
Beryllium	6.3
Cadmium	5.1 *
Calcium	290000
Chromium	307
Cobalt	246
Copper	387
Iron	360000J
Lead	133 J
Magnesium	119000
Manganese	5220J
Mercury	0.94
Nickel	598
Potassium	29300
Sodium	134000
Vanadium	70.6
Zinc	587
OIL AND GREASE	-
LANDFILL LEACHATE	
Alkalinity (mg/L)	955
Chloride (mg/L)	148
Hardness (mg/L)	491
Nitrate (mg/L)	0.06
Sulfate (mg/L)	3.2
Total Suspended Solids (mg/L)	1000
Total Organic Carbon (mg/L)	20.9
Color (PTCO Units)	500
Turbidity (NTU)	270
Biological Oxygen Demand (mg/L)	-
Chemical Oxygen Demand (mg/L)	-
Total Kjeldahl Nitrogen(mg/L)	53

JMW-0963 (JTB-0960)	1993.
VOLATILES	
2-Butanone	R
Acetone	R
cis-1,2-Dichloroethene	350
Ethylbenzene	110 J
Toluene	2700
Total Xylenes	300
SEMIVOLATILES	
2-Methylnaphthalene	18 J
2-Methylphenol	24 J
4-Methylphenol	5000
Diethylphthalate	270
Naphthalene	90 J
Phenol	270
PESTICIDES / PCBs	
4,4'-DDT	R
alpha-BHC	R
beta-BHC	0.02 J
delta-BHC	0.005 J
Dieldrin	0.002 J
Endosulfan I	R
Endosulfan II	R
Endosulfan Sulfate	R
Endrin	R
gamma-BHC (Lindane)	0.03 J
gamma-Chlordane	0.001 J
Heptachlor	0.08 J
Methoxychlor	0.9 J
INORGANICS	
Aluminum	13000 J
Antimony	53 J
Arsenic	5.1 J
Barium	304
Calcium	232000
Chromium	50.7
Cobalt	67.2
Copper	41.3
Cyanide	11.2
Iron	705000J
Lead	133 J
Manganese	4070 J
Mercury	0.33
Nickel	72.2
Potassium	7650
Sodium	7180
Zinc	633
OIL AND GREASE	23.8
LANDFILL LEACHATE	
Alkalinity (mg/L)	3890
Chloride (mg/L)	534
Hardness (mg/L)	3610
Nitrate (mg/L)	0.06
Sulfate (mg/L)	354
Total Suspended Solids (mg/L)	5050
Total Organic Carbon (mg/L)	932
Color (PTCO Units)	1000
Turbidity (NTU)	170
Biological Oxygen Demand (mg/L)	1100
Chemical Oxygen Demand (mg/L)	2900J
Total Kjeldahl Nitrogen(mg/L)	20

JMW-0964 (JTB-0961)			1993
VOLATILES		INORGANICS	
2-Butanone	R	Aluminum	184000
Acetone	R	Antimony	88.5 J
Toluene	1200	Arsenic	95.9 J
SEMIVOLATILES		Barium	1550
2-Methylphenol	61 J	Beryllium	9.8
4-Methylphenol	7900	Calcium	1260000
Diethylphthalate	260 J	Chromium	477
Naphthalene	310 J	Cobalt	358
Phenol	4200	Copper	576
PESTICIDES / PCBs		Cyanide	27.4
4,4'-DDT	0.04 J	Iron	1720000
alpha-BHC	R	Lead	311 J
beta-BHC	R	Magnesium	240000
delta-BHC	R	Manganese	61400 J
Dieldrin	R	Mercury	1.4
Endosulfan I	R	Nickel	818
Endosulfan II	0.008 J	Potassium	135000
Endosulfan Sulfate	0.004 J	Sodium	384000
Endrin	R	Zinc	1700
gamma-BHC (Lindane)	0.003 J	OIL AND GREASE	-
gamma-Chlordane	0.006 J	LANDFILL LEACHATE	
Heptachlor	R	Alkalinity (mg/L)	472
Methoxychlor	0.03 J	Chloride (mg/L)	32.4
		Hardness (mg/L)	680
		Sulfate (mg/L)	68.4
		Total Suspended Solids (mg/L)	2080
		Total Organic Carbon (mg/L)	5710
		Color (PTCO Units)	750
		Turbidity (NTU)	110
		Biological Oxygen Demand (mg/L)	12000
		Chemical Oxygen Demand (mg/L)	32000J
		Total Kjeldahl Nitrogen(mg/L)	310

JMW-0960	1993
VOLATILES	
1,1-Dichloroethane	1
1,4-Dichlorobenzene	1
2-Butanone	110 J
Acetone	36 J
Benzene	4
Ethylbenzene	3
Total Xylenes	6
SEMIVOLATILES	NA
PESTICIDES / PCBs	NA
INORGANICS	NA
LANDFILL LEACHATE	NA

LEGEND

- TEST BORING LOCATION
- OVERBURDEN MONITORING WELL LOCATION
- BEDROCK MONITORING WELL LOCATION
- WET AREA
- J ESTIMATED
- R REJECTED SAMPLE
- NA NOT ANALYZED
- * DUPLICATE SAMPLE

NOTE 1. ALL RESULTS ARE REPORTED IN µg/L EXCEPT AS NOTED UNDER LANDFILL LEACHATE PARAMETERS.

FIGURE 5-11

ANALYTES DETECTED
IN GROUNDWATER, MARCH 1993
LANDFILL 3

LORING RCE BASE
LIM MAINE

frequently detected VOC was toluene, ranging from 76 to 2,700 μg/L. SVOC analyses detected phenol (270 to 4,200 μg/l), diethylphthalate (33 to 270 μg/L), and estimated concentrations of noncarcinogenic PAHs. Pesticides were detected at estimated concentrations. Twenty-one inorganic analytes were detected at concentrations greater than background concentrations, including barium (304 to 1,550 μg/L), beryllium (6.3 to 9.6 μg/L), chromium (50.7 to 477 μg/L), cobalt (67.2 to 358 μg/L), copper (41.3 to 575 μg/L), cyanide (11.2 to 27.4 μg/L), mercury 0.33 to 1.4 μg/L), nickel (72.2 to 818 μg/L), vanadium (70.6 μg/L), and zinc (633 to 1,700 μg/L). Leachate parameters, analyzed for samples collected from wells within the landfill boundaries, were near the low end of the range reported for leachate (USEPA, 1991b).

5.3 Migration Pathways

Significant settlement has occurred at LF-2 since it was closed in 1974, resulting in two separate ponded water areas within the areal extent of the landfill. The wet areas receive surface water drainage from the soil cover and are potential recipients of leachate from seeps along the sloped sides. Surface water does not flow away from the site. LF-3 is more recent, and was constructed to slope primarily to the north, where surface waters settle in an area just beyond the areal extent of the waste. Surface water does not flow away from the site.

Potential migration pathways identified in the site conceptual models are percolation (e.g., contaminants from the landfill material migrating into the bedrock aquifer via surface water percolation), leachate seepage to surface water on top of the landfill material, volatilization, and migration by wind and fugitive dust of soil particles with adhering contaminants. Based on the topography of the landfills and the permeability of the landfill material and surrounding soils, minimal overland transport of contaminants to surface water bodies away from the landfills is anticipated. Information obtained from surface water, sediment, and groundwater samples indicates that VOCs and organics in the landfills (and SVOCs in LF-3) have migrated in these media to surface water on or adjacent to the landfills.

Contaminant migration in the bedrock aquifer is controlled by fractures and other structural features (e.g., faults) that may be present below the landfill material. Rainfall and melting snow will continue to infiltrate and percolate through the landfill materials and provide the mechanism for leaching soluble contaminants.

Contaminants detected in surface water and sediment could continue to migrate to other areas of the landfill surfaces during snowmelt and high rainfall events.

A complete discussion of site characteristics can be found in the RI/FFS Report (ABB-ES, 1994a).

6.0 SUMMARY OF SITE RISKS

A baseline risk assessment (RA) was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with LF-2 and LF-3 (ABB-ES, 1994a). The public health risk assessment followed a four-step process:

1) contaminant identification, which identified those hazardous substances which, 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 noncarcinogenic risks.

The results of the public health risk assessment for LF-2 and LF-3 are discussed below, followed by the conclusions of the environmental risk assessment.

6.1 HUMAN HEALTH RISK ASSESSMENT

The chemicals of potential concern (CPCs) identified for LF-2 and LF-3, listed in Tables 6-1 and 6-2 respectively, were selected for evaluation in the risk assessment. These CPCs, including 16 for LF-2 surface soil, 17 for LF-2 surface water, 21 for LF-2 sediment, 3 for LF-2 groundwater, 12 for LF-3 surface soil, 6 for LF-3 surface water, 21 for LF-3 sediment, and 6 for LF-3 groundwater, constitute a representative subset of all contaminants identified at the landfills during the RI. The CPCs 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 7.2.3 of the RI/FFS Report (ABB-ES, 1994a).

TABLE 6-1
CHEMICALS OF POTENTIAL CONCERN
LANDFILL 2
OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

CHEMICAL	RANGE OF SQLS	FREQUENCY OF DETECTION	MINIMUM DETECTED CONCENTRATION	MAXIMUM DETECTED CONCENTRATION	ARITHMETIC AVERAGE	MCL [a] (ug/L)	MEG [b] (ug/L)	CPC?	NOTES
Surface Soil (mg/kg)									
Acenaphthene	0.410 – 0.430	1/4	0.49	0.52	0.284			Yes	
Anthracene	0.410 – 0.430	1/4	0.61	0.62	0.311			Yes	
Benzo(a)Anthracene	0.410 – 0.430	1/4	1.8	1.8	0.410			Yes	
Benzo(a)Pyrene	0.410 – 0.430	1/4	1.1	1.4	0.470			Yes	
Benzo(b)Fluoranthene	0.410 – 0.430	1/4	1.2	1.2	0.458			Yes	
Benzo(g,h,i)perylene	0.410 – 0.430	1/4	0.74	0.89	0.361			Yes	
Benzo(k)Fluoranthene	0.410 – 0.430	1/4	1.2	1.6	0.508			Yes	
Carbazole	0.410 – 0.430	1/4	0.4	0.44	0.263			No	1
Chrysene	0.410 – 0.430	1/4	1.5	1.7	0.558			Yes	
Dibenz(a,h)Anthracene	0.410 – 0.430	1/4	0.2	0.38	0.230			Yes	
Dibenzofuran	0.410 – 0.430	1/4	0.19	0.2	0.206			Yes	
Fluoranthene	0.410 – 0.430	1/4	2.9	3.1	0.908			Yes	
Fluorene	0.410 – 0.430	1/4	0.38	0.4	0.255			Yes	
Indeno(1,2,3-c,d)Pyrene	0.410 – 0.430	1/4	0.91	1.1	0.409			Yes	
Phenanthrene	0.410 – 0.430	1/4	2.5	2.8	0.820			Yes	
Pyrene	0.410 – 0.430	1/4	2.3	2.5	0.758			Yes	
4'4-DDT	0.0039 – 0.0039	2/4	0.014	0.021	11.6			No	4
Lead		4/4	10.8	32.5	18.7			No	2
Mercury	0.110 – 0.130	1/4	0.16	0.16	0.08			Yes	
Aluminum		4/4	12000	18300	14000			No	4
Arsenic		4/4	6	11.3	7.9			No	4
Barium		4/4	39.5	48.8	42			No	4
Chromium		4/4	23.3	33	27			No	4
Cobalt		4/4	8.8	12.2	10.1			No	4
Copper	10.1 – 10.1	3/4	24.4	33.9	23.5			No	4
Iron		4/4	22600	30700	25600			No	4

TABLE 6-1
CHEMICALS OF POTENTIAL CONCERN
LANDFILL 2
OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

CHEMICAL	RANGE OF SQLS	FREQUENCY OF DETECTION	MINIMUM DETECTED CONCENTRATION	MAXIMUM DETECTED CONCENTRATION	ARITHMETIC AVERAGE	MCL [a] (ug/L)	MEG [b] (ug/L)	CPC?	NOTES
Magnesium		4/4	5170	6360	5802			No	4
Manganese		4/4	357	798	558			No	4
Nickel		4/4	27.5	39.2	31.3			No	4
Vanadium		4/4	16.5	24.6	20.1			No	4
Zinc		4/4	42.5	67.4	52.5			No	4
Surface Water (ug/L)									
1,2-Dichloroethene (total)	5 - 5	1/5	13	13	5			No	1
Ethylbenzene	5 - 5	1/5	8	8	4			No	1
Toluene	5 - 5	1/5	32	32	8			No	1
Vinyl Chloride	10 - 10	1/5	48	48	14			Yes	
1,4-Dichlorobenzene	10 - 10	1/5	1	1	4			No	1
4-Methylphenol	10 - 10	1/5	93	93	23			No	1
Acenaphthene	10 - 10	1/5	1	1	4			Yes	
Anthracene	10 - 10	1/5	2	2	4			Yes	
Benzo(a)Anthracene	10 - 10	1/5	5	5	5			Yes	
Benzo(a)Pyrene	10 - 10	1/5	4	4	5			Yes	
Benzo(b)Fluoranthene	10 - 10	1/5	3	3	5			Yes	
Benzo(k)Fluoranthene	10 - 10	1/5	3	3	5			Yes	
Benzoic Acid	50 - 50	1/5	8	8	22			No	1
bis(2-Ethylhexyl)phthalate	10 - 10	1/5	2	2	4			No	1
Chrysene	10 - 10	1/5	6	6	5			Yes	
Di-n-butylphthalate	10 - 10	1/5	3	3	5			No	1
Diethylphthalate	10 - 10	2/5	2	5	4			No	1
Fluoranthene	10 - 10	2/5	2	10	5			Yes	
Fluorene	10 - 10	1/5	1	1	4			Yes	
Phenanthrene	10 - 10	1/5	7	7	5			Yes	
Phenol	10 - 10	1/5	7	7	5			No	1

TABLE 6-1
CHEMICALS OF POTENTIAL CONCERN
LANDFILL 2
OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

CHEMICAL	RANGE OF SQLS	FREQUENCY OF DETECTION	MINIMUM DETECTED CONCENTRATION	MAXIMUM DETECTED CONCENTRATION	ARITHMETIC AVERAGE	MCL [a] (ug/L)	MEG [b] (ug/L)	CPC?	NOTES
Pyrene	10 - 10	2/5	2	8	5			Yes	
Aluminum	167 - 278	1/4	1010	1010	329.4			Yes	5
Arsenic	3 - 3	3/4	3.2	5.5	3.5			Yes	
Barium		4/4	14.4	30.6	20.3			Yes	
Calcium		4/4	43100	63700	51000.0			No	3
Copper	4 - 4	3/4	4.5	10.6	5.5			Yes	5
Iron		4/4	657	1640	993.0			No	3
Lead	3 - 3	1/2	5.2	5.2	3.4			No	2
Magnesium		4/4	2030	3080	2412.5			No	3
Manganese		4/4	66.4	1440	452.9			Yes	
Potassium		4/4	1260	2170	1667.5			No	3
Sodium	1920 - 1920	3/4	1410	2490	1682.5			No	3
Zinc		4/4	15.6	53.1	29.6			No	1
Sediment (mg/kg)									
Acetone	0.005 - 0.007	1/5	1	1	0.212			No	1
Ethylbenzene	0.005 - 0.007	1/5	0.014	0.014	0.005			No	1
Toluene	0.016 - 0.042	1/5	0.068	0.068	0.016			No	1
2-Methylnaphthalene	0.330 - 0.460	1/5	8.8	8.8	1.926			Yes	
4-Methylphenol	0.330 - 0.460	1/5	3.2	3.2	0.806			No	1
Acenaphthene	0.330 - 0.430	3/5	0.051	32	6.517			Yes	
Anthracene	0.430 - 6.600	3/5	0.056	0.12	0.769			Yes	
Benzo(a)Anthracene	0.430 - 6.600	3/5	0.11	0.33	0.831			Yes	
Benzo(a)Pyrene	0.430 - 0.430	4/5	0.067	130	26.141			Yes	
Benzo(b)Fluoranthene	0.430 - 0.430	4/5	0.18	98	19.827			Yes	
Benzo(g,h,i)perylene	0.330 - 0.460	1/5	80	80	16.166			Yes	
Benzo(k)Fluoranthene	0.430 - 0.430	1/2	130	130	65.108			Yes	
Benzoic Acid	2.100 - 2.200	1/4	0.04	0.04	0.810			No	1

TABLE -1
CHEMICALS OF POTENTIAL CONCERN
LANDFILL 2
OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

CHEMICAL	RANGE OF SQLS	FREQUENCY OF DETECTION	MINIMUM DETECTED CONCENTRATION	MAXIMUM DETECTED CONCENTRATION	ARITHMETIC AVERAGE	MCL [a] (ug/L)	MEG [b] (ug/L)	CPC?	NOTES
Benzyl Alcohol	0.330 – 6.600	1/5	0.071	0.071	0.794			No	1
bis(2-Ethylhexyl)phthalate	0.330 – 6.600	1/5	0.086	0.12	0.803			No	1
Chrysene	0.430 – 0.430	4/5	0.089	130	26.149			Yes	
Di-n-butylphthalate	0.330 – 0.460	2/5	0.15	62	12.737			No	1
Dibenzofuran	0.330 – 0.460	1/5	16	16	3.366			No	1
Fluoranthene		5/5	0.061	180	36.284			Yes	
Fluorene	0.330 – 0.440	2/5	0.059	30	6.132			Yes	
Indeno(1,2,3-c,d)Pyrene	0.330 – 0.460	1/5	77	77	15.566			Yes	
Naphthalene	0.330 – 0.460	1/5	16	16	3.366			Yes	
Phenanthrene		5/5	0.047	180	36.216			Yes	
Pyrene		5/5	0.055	280	56.201			Yes	
Aluminum		4/4	8270	19500	15117.5			Yes	5
Arsenic		4/4	3.9	26.5	10.4			Yes	
Barium		4/4	25.4	75.2	49.7			Yes	
Beryllium	0.320 – 0.710	2/4	0.51	0.64	0.4			No	1
Calcium		4/4	1410	2810	2180.0			No	3
Chromium		4/4	18.3	36.3	29.6			Yes	
Cobalt		4/4	6	14.3	10.6			No	1
Copper		4/4	19.9	31.2	24.8			Yes	5
Cyanide	0.660 – 0.710	2/4	0.7	8.3	2.4			No	1
Iron		4/4	13900	35700	27750.0			No	3
Lead		4/4	11.6	24.9	17.9			No	5
Magnesium		4/4	3420	9340	6943.8			No	3
Manganese		4/4	277	2260	871.8			Yes	
Mercury	0.110 – 0.115	1/4	0.1	0.1	0.07			No	1
Nickel		4/4	19.1	43.9	34.5			No	1
Potassium		4/4	528	1400	1013.3			No	3

TABLE 6-1
CHEMICALS OF POTENTIAL CONCERN
LANDFILL 2
OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

CHEMICAL	RANGE OF SQLS	FREQUENCY OF DETECTION	MINIMUM DETECTED CONCENTRATION	MAXIMUM DETECTED CONCENTRATION	ARITHMETIC AVERAGE	MCL [a] (ug/L)	MEG [b] (ug/L)	CPC?	NOTES
Sodium	123 - 148	2/4	163	234	129.8			No	3
Thallium	0.530 - 2.900	1/4	0.53	0.53	0.8			No	1
Vanadium		4/4	12	29	22.5			No	1
Zinc		4/4	50.3	174	81.9			No	1
Groundwater (ug/L)									
1,1,1-Trichloroethane	5 - 25	1/18	6	6	4	200	200	No	1
Chloroform	5 - 25	2/18	4	5	4	100	--	No	1
Toluene	5 - 25	1/18	13	13	5	1000	1400	No	1
bis(2-Ethylhexyl)phthalate	10 - 47	3/18	3	15	8	4	25	No	1
Di-n-butylphthalate	10 - 10	3/18	1	3	5	--	--	No	1
Arsenic	3 - 3	1/6	53.7	54.5	10.3	50	--	Yes	
Barium		6/6	47.6	232	99.6	2000	1500	Yes	
Calcium		6/6	17300	146000	89250.0	--	--	No	3
Chromium	3 - 3	1/6	7.5	7.5	2.5	100	100	No	1
Cobalt	4 - 4	1/6	10.1	11.3	3.5	--	--	No	1
Iron	44.500 - 370	3/6	543	6540	1319.3	300 (S)	--	No	3
Lead	1 - 1	5/6	1.5	9.2	4.1	15 (T)	20	No	2
Magnesium		6/6	7680	38800	21738.3	--	--	No	3
Manganese	14.400 - 19.800	3/6	58.1	1960	519.9	50	200	Yes	
Nickel	10 - 10	1/6	20.4	28.9	8.3	100	150	No	1
Potassium	623 - 623	2/6	729	3470	845.8	--	--	No	3
Sodium		6/6	4310	102000	23000.0	--	--	No	3
Zinc		6/6	8.3	93.2	34.9	5000 (S)	--	No	1

SQL - Sample Quantitation Limit
CPC - Chemical of Potential Concern

MEG - Maximum Exposure Guideline
(S) - Secondary Drinking Water Standard

TABLE ᴗ -1
CHEMICALS OF POTENTIAL CONCERN
LANDFILL 2
OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

CHEMICAL	RANGE OF SQLS	FREQUENCY OF DETECTION	MINIMUM DETECTED CONCENTRATION	MAXIMUM DETECTED CONCENTRATION	ARITHMETIC AVERAGE	MCL [a] (ug/L)	MEG [b] (ug/L)	CPC?	NOTES

MCL – Maximum Contaminant Level

mg/kg – Milligrams Per Kilogram

--- No Drinking Water Standard Available,

(T) – Based on treatment technique. Value given is an action level.

μg/L – Micograms Per Liter

SOURCES:

[a] – U.S. Environmental Protection Agency (USEPA). 1992. Fact Sheet: Drinking Water Regulations and Health Advisories. Office of Water, Washington DC, December, 1992

[b] – State of Maine Department of Human Services, 1992. Revised Maximum Exposure Guidelines. September 1992.

NOTES:

1 = Toxicity screening value (i.e. ratio of compound risk to total risk) was below 0.01 (See Tables J1 – J8)

2 = Concentrations of lead below MEDEP criteria for soil of 125 mg/kg and below, MEG of 20 ug/L, and MCL of 15 ug/L for groundwater

3 = Essential human nutrient, present at low concentration, and toxic only at high concentrations

4 = Below background level

5 = No dose response information available

6-7

TABLE 6-2
CHEMICALS OF POTENTIAL CONCERN
LANDFILL 3
OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

CHEMICAL	RANGE OF SQLS	FREQUENCY OF DETECTION	MINIMUM CONCENTRATION DETECTED	MAXIMUM CONCENTRATION DETECTED	AVERAGE	MCL [a] (ug.L)	MEG [b] (ug.L)	CPC?	NOTES
Surface Soil (mg/kg)									
Total Xylenes	0.011 - 0.011	3/8	0.005	0.017	0.008			No	1
Benzo(a)Anthracene	0.360 - 0.370	2/8	0.18	0.48	0.220			Yes	
Benzo(a)Pyrene	0.360 - 0.370	2/8	0.17	0.39	0.208			Yes	
Benzo(b)Fluoranthene	0.360 - 0.370	2/8	0.16	0.37	0.204			Yes	
Benzo(g,h,i)perylene	0.360 - 0.370	1/8	0.25	0.25	0.191			Yes	
Benzo(k)Fluoranthene	0.360 - 0.370	2/8	0.14	0.36	0.200			Yes	
Chrysene	0.360 - 0.370	2/8	0.2	0.43	0.217			Yes	
Fluoranthene	0.360 - 0.370	2/8	0.45	0.76	0.289			Yes	
Indeno(1,2,3-c,d)Pyrene	0.360 - 0.370	1/8	0.29	0.29	0.196			Yes	
Phenanthrene	0.360 - 0.370	2/8	0.34	0.42	0.233			Yes	
Pyrene	0.360 - 0.370	2/8	0.39	0.6	0.262			Yes	
Endosulfan I	0.004 - 0.004	1/8	0.0039	0.0039	0.002			No	1
Cobalt		8/8	11.3	15.7	13.0			Yes	
Mercury	0.100 - 0.120	1/8	0.16	0.16	0.06			Yes	
4,4'-DDE	7.2-7.7	1/8	0.0085	0.0085	0.004			No	4
4,4'-DDT	7.2-7.6	4/8	0.0081	0.02	0.009			No	4
Aluminum		8/8	13500	21600	17000			No	4
Arsenic		8/8	5.2	9.2	7.1			No	4
Barium		8/8	40	78	53.6			No	4
Beryllium	0.36 - 0.42	1/8	0.44	0.44	0.2			No	4
Calcium	2590 - 11600	1/8	19900	19900	5070			No	4
Chromium		8/8	26.1	41.9	33.8			No	4
Copper		8/8	21.8	28.2	24.9			No	4
Iron		8/8	27100	34800	>18			No	4
Lead		8/8	14	24.2	30400			No	4

TABLE 6-2
CHEMICALS OF POTENTIAL CONCERN
LANDFILL 3
OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

CHEMICAL	RANGE OF SQLS	FREQUENCY OF DETECTION	MINIMUM CONCENTRATION DETECTED	MAXIMUM CONCENTRATION DETECTED	AVERAGE	MCL [a] (ug.L)	MEG [b] (ug.L)	CPC?	NOTES
Magnesium		8/8	6790	8660	7840			No	4
Manganese		8/8	500	1200	663			No	4
Nickel		8/8	34.4	45.9	40.7			No	4
Potassium	667 - 667	7/8	914	2920	1430			No	4
Vanadium		8/8	18.2	33	24.6			No	4
Zinc		8/8	54.8	74.1	62.7			No	4
Surface Water (ug/L)									
1,2-Dichloroethene (total)	5.000 - 5.000	1/4	17	17	6			No	1
2-Butanone	10.000 - 10.000	1/4	79	79	24			No	1
Toluene	5.000 - 5.000	1/4	42	42	12			No	1
Trichloroethene	5.000 - 5.000	1/4	5	5	3			No	1
4-Methylphenol	10.000 - 10.000	1/4	4	4	5			No	1
Benzoic Acid	50.000 - 50.000	1/4	32	32	27			No	1
Di-n-octylphthalate	10.000 - 10.000	1/4	2	2	4			No	1
Diethylphthalate	10.000 - 10.000	1/4	6	6	5			No	1
Phenol	10.000 - 10.000	1/4	5	5	5			No	1
Aluminum		3/3	455	4400	1581.3			Yes	5
Arsenic	3.000 - 3.000	1/3	26.8	56.6	14.9			Yes	
Barium		3/3	6.6	194	94.2			Yes	
Beryllium	1.000 - 1.000	1/3	2.6	3.6	1.4			Yes	
Calcium		3/3	25000	154000	110000.0			No	3
Chromium	5.000 - 5.000	1/3	6.3	8.7	4.2			No	1
Cobalt	5.000 - 5.000	1/3	19.1	20.3	8.2			No	1
Copper	4.000 - 4.000	2/3	5.6	60.1	20.1			Yes	5
Cyanide	10.000 - 10.000	1/3	11	11	6.0			No	1
Iron		3/3	361	7770	2670.3			No	3

TABLE 6-2
CHEMICALS OF POTENTIAL CONCERN
LANDFILL 3
OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

CHEMICAL	RANGE OF SQLS	FREQUENCY OF DETECTION	MINIMUM CONCENTRATION DETECTED	MAXIMUM CONCENTRATION DETECTED	AVERAGE	MCL [a] (ug.L)	MEG [b] (ug.L)	CPC?	NOTES
Lead	3.000 - 3.000	2/3	5.2	54.3	14.8			Yes	5
Magnesium		3/3	2010	16300	8306.7			No	3
Manganese		3/3	92.9	3830	1610.0			Yes	
Nickel	14.000 - 14.000	1/3	17.2	22.1	11.2			No	1
Potassium	1080.000 - 1080.000	2/3	4390	6470	3655.0			No	3
Sodium		3/3	1480	9930	5773.3			No	3
Vanadium	5.000 - 5.000	1/3	22.6	29.5	10.4			No	1
Zinc	10.200 - 10.200	2/3	1120	2600	1225.0			No	1
Sediment (mg/kg)									
2-Methylnaphthalene	0.500 - 0.720	1/3	0.25	0.25	0.300			Yes	
Acenaphthene	0.500 - 0.720	1/3	0.099	0.25	0.261			Yes	
Anthracene	0.500 - 0.720	1/3	0.37	0.96	0.425			Yes	
Benzo(a)Anthracene	0.500 - 0.720	1/3	0.72	2.1	0.673			Yes	
Benzo(a)Pyrene	0.500 - 0.720	1/3	0.58	1.6	0.567			Yes	
Benzo(b)Fluoranthene	0.500 - 0.720	1/3	0.92	2.8	0.823			Yes	
Benzo(g,h,i)perylene	0.500 - 0.720	1/3	0.23	0.6	0.341			Yes	
Benzoic Acid	3.200 - 3.200	2/3	0.17	0.38	2.000			No	1
Benzyl Alcohol	0.660 - 0.660	2/3	0.11	0.14	0.271			No	1
Chrysene	0.500 - 0.720	1/3	0.6	1.8	0.611			Yes	
Dibenz(a,h)Anthracen	0.500 - 0.720	1/3	0.084	1.8	0.203			Yes	
Fluoranthene	0.500 - 0.720	1/3	1	3.8	1.070			Yes	
Fluorene	0.500 - 0.720	1/3	0.1	0.27	0.268			Yes	
Indeno(1,2,3-c,d)Pyrene	0.500 - 0.720	1/3	0.37	0.95	0.423			Yes	
Phenanthrene	0.720 - 0.720	2/3	0.067	2.6	0.742			Yes	
Pyrene	0.500 - 0.720	1/3	1.2	3.6	1.003			Yes	
Aroclor-1260	0.320 - 0.350	1/3	1.2	1.2	0.555			No	1
Aluminum		3/3	10500	28500	16616.7			Yes	5

..ABLE 6-2
CHEMICALS OF POTENTIAL CONCERN
LANDFILL 3
OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

CHEMICAL	RANGE OF SQLS	FREQUENCY OF DETECTION	MINIMUM CONCENTRATION DETECTED	MAXIMUM CONCENTRATION DETECTED	AVERAGE	MCL [a] (ug.L)	MEG [b] (ug.L)	CPC?	NOTES
Arsenic		3/3	4.8	18.8	7.5			Yes	
Barium		3/3	34.4	99.7	62.7			Yes	
Beryllium	0.310 - 0.540	1/3	1.1	2.2	0.7			Yes	
Cadmium	1.300 - 5.500	1/3	1	1	1.4			No	1
Calcium		3/3	4380	7950	6626.7			No	3
Chromium		3/3	35.3	86.8	56.0			No	1
Cobalt		3/3	9.3	20.2	13.1			No	1
Copper		3/3	22.2	78.6	48.5			Yes	5
Cyanide	0.760 - 1.100	1/3	1.4	1.4	0.6			No	1
Iron		3/3	29800	49600	34866.7			No	3
Lead		3/3	20.6	455	169.7			Yes	5
Magnesium		3/3	5560	13100	8410.0			No	3
Manganese		3/3	414	868	521.7			Yes	
Nickel		3/3	35.9	68.4	44.7			No	1
Potassium		3/3	946	2620	1325.3			No	3
Vanadium		3/3	21.2	44	30.0			No	1
Zinc		3/3	75.9	17400	5860.1			No	1
Groundwater (ug/L)									
1,1,1-Trichloroethane	5.000 - 50.000	1/28	9	9	5	200	200	No	1
Acetone	10.000 - 120.000	1/28	130	130	13	--	--	No	1
Benzene	5.000 - 50.000	1/28	2	2	5	5	5	Yes	
Chloroform	5.000 - 50.000	1/28	5	5	5	100	--	No	1
Methylene Chloride	5.000 - 110.000	1/28	12	12	7	5	48	Yes	
Toluene	5.000 - 50.000	2/28	5	5	5	1000	1400	No	1
Vinyl Acetate	10.000 - 100.000	1/28	260	260	18	--	--	No	1
Di-n-butylphthalate	10.000 - 11.000	1/28	4	4	5	--	220	No	1

TABLE 6-2
CHEMICALS OF POTENTIAL CONCERN
LANDFILL 3
OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

CHEMICAL	RANGE OF SQLS	FREQUENCY OF DETECTION	MINIMUM CONCENTRATION DETECTED	MAXIMUM CONCENTRATION DETECTED	AVERAGE	MCL [a] (ug.L)	MEG [b] (ug.L)	CPC?	NOTES
Di-n-octylphthalate	10.000 - 11.000	2/28	3	3	5	--	--	No	1
Phenol	10.000 - 11.000	1/28	2	2	5	--	--	No	1
bis(2-Ethylhexyl)phthalate	10.000 - 11,000	6/28	2	5	5	4	25	Yes	
Barium		10/10	17.1	123	54.9	2000	1500	Yes	
Cadmium	5.000 - 5.000	1/10	6.4	6.4	2.9	5	5	No	1
Calcium		10/10	49200	175000	101390.0	--	--	No	3
Cobalt	4.000 - 4.000	2/10	4.9	7.2	2.8	--	--	No	1
Copper	3.000 - 4.200	5/10	3.2	5.9	3.0	1.3 (T)	--	Yes	5
Lead	2.000 - 2.000	4/10	1.7	3.1	1.5	15 (T)	20	No	2
Magnesium		10/10	4290	26100	15453.0	--	--	No	3
Manganese	3.100 - 3.700	8/10	12	3490	729.3	50 (S)	200	Yes	
Mercury	0.200 - 0.200	1/10	0.29	0.29	0.12	2	2	No	1
Potassium	623.000 - 2140.000	1/10	1610	1610	648.8	--	--	No	3
Sodium		10/10	1080	17900	6683.0	--	--	No	3
Zinc	7.300 - 35.600	3/10	15.3	77.8	17.7	5000 (S)	--	No	1
Iron	5.8 - 300	3/10	22.7	229	64			No	4

SQL - Sample Quantitation Limit

CPC - Compound of Potential Concern

MCL - Maximum Contaminant Level

MEG - Maximum Exposure Guideline

(S) - Secondary Drinking Water Standard

(T) - Based on treatment technique. Value given is an action level.

-- - No drinking water standard available

mg/kg - Milligrams Per Kilogram

µg/L - Micrograms Per Liter

TABLE 6–2
CHEMICALS OF POTENTIAL CONCERN
LANDFILL 3
OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

CHEMICAL	RANGE OF SQLS	FREQUENCY OF DETECTION	MINIMUM CONCENTRATION DETECTED	MAXIMUM CONCENTRATION DETECTED	AVERAGE	MCL [a] (ug.L)	MEG [b] (ug.L)	CPC?	NOTES

SOURCES:

[a] – U.S. Environmental Protection Agency (USEPA), 1992. Fact Sheet: Drinking Water Regulations and Health Advisories. Office of Water, Washington, DC, December, 1992.

[b] – State of Maine Department of Human Services, 1992. Revised Maximum Exposure Guidelines. September, 1992.

NOTES:

1 – Toxicity screening value (i.e., ratio of compound risk to total risk) was below 0.01. (See Tables J1 – J8)

2 – Concentration of lead below MEDEP criteria for soil of 125 mg/kg and below, MEG of 20 ug/L, and MCL of 15 ug/L for groundwater

3 – Essential human nutrient, present at low concentration, and toxic only at high concentrations

4 – Below background level

5 – No dose response information available

Potential human health effects associated with exposure to the CPCs were estimated quantitatively and qualitatively through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the sites. LF-2 and LF-3 are currently inactive, and the OU is not being used for any purpose. Thus, the only current land use scenario evaluated in the RA was for the older child/trespasser. The only future land use considered during the development of the RA was residential site use. The future residential scenario was used at direction of USEPA to represent an upper bound on the risk a nearby resident is likely to encounter. The following is a brief summary of the exposure pathways evaluated. A more thorough description can be found in the RI/FFS Report (ABB-ES, 1994a).

Under the current trespassing scenario, it was assumed that older children would be exposed to landfill constituents through four exposure pathways while trespassing on the site: 1) dermal contact with, incidental ingestion of, and inhalation of VOCs from surface water; 2) dermal contact with and incidental ingestion of sediment; 3) dermal contact with and ingestion of surface soil; and 4) inhalation of fugitive dusts while dirt biking.

Under the future residential scenario, it was assumed that residents would be exposed to landfill constituents through five exposure pathways: 1) ingestion of, dermal contact with, and inhalation of VOCs from groundwater used for domestic purposes; 2) dermal contact with, incidental ingestion of, and inhalation of particulates from surface soil; 3) dermal contact with, incidental ingestion of, and inhalation of VOCs from surface water; 4) dermal contact with and incidental ingestion of sediment; and 5) inhalation of fugitive dusts.

In the current land use scenario, dermal contact with, incidental ingestion of, and inhalation of VOCs from surface water was assumed to occur at a frequency of 48 days per year for 7 years, with an ingestion or contact rate of 0.05 liters per hour for 2 hours per day. Exposure was also assumed to occur through dermal contact with and incidental ingestion of sediment at a frequency of 48 days per year for 12 years, with a sediment ingestion rate of 100 mg per day and a sediment contact rate of 500 mg per day. Exposure was assumed to occur through dermal contact with and incidental ingestion of surface soil while exploring for 78 days per year for 11 years. A soil ingestion rate of 100 mg of soil per day and a soil contact rate of 500 mg of soil per day were assumed. Inhalation of fugitive dusts while dirt biking was assumed to occur 3 hours per day for 52 days per year for 5 years.

Under the future resident scenario, exposure was assumed to occur from ingestion of, dermal contact with, or inhalation of groundwater used for domestic purposes. It was assumed that for 350 days per year for 30 years, 2 liters per day was ingested or that dermal contact (showering) lasted for 12 minutes per day. Exposure through incidental ingestion of and dermal contact with surface soil was assumed to occur 130 days per year for 6 years for the child resident and for an additional 24 years for the adult resident, with a contact rate of 500 mg per day, and with an ingestion rate of 200 mg per day for the child and 100 mg per day for the adult resident. Dermal contact with, incidental ingestion of, and inhalation of VOCs from surface water was assumed to occur at a frequency of 48 days per year for 7 years, with an ingestion or contact rate of 0.05 liters per hour for 2 hours per day. Exposure was also assumed to occur thorough dermal contact with and incidental ingestion of sediment at a frequency of 48 days per year for 12 years, with a sediment ingestion rate of 100 mg per day and a sediment contact rate of 500 mg per day. Inhalation of fugitive dusts while dirt biking was assumed to occur 3 hours per day for 52 days per year for 5 years.

For each pathway and land use evaluated, an average and a reasonable maximum exposure (RME) estimate was generated for each CPC corresponding to exposure to the average and the maximum concentration detected in a particular medium.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying the exposure level by the chemical specific cancer slope factor (CSF). 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., $1x10^{-6}$ for 1/1,000,000) and indicate (using this example), that an average individual is not likely to have greater that a one in a million chance of developing cancer over 70 years as a result of site-related exposure 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.

A hazard index (HI) was also calculated for each pathway as USEPA's measure of the potential for noncarcinogenic health effects. A hazard quotient (HQ) is calculated by dividing the exposure level by the reference dose (RfD) or other suitable benchmark for noncarcinogenic 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 as defined 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 should only be considered additive for compounds that have the same or similar toxic endpoint (e.g., the hazard quotient for a compound known to produce liver damage should not be added to a second compound whose toxic endpoint is kidney damage) and the sum is referred to as the HI.

Tables 6-3 and 6-4 depict the risk summaries for LF-2 for data collected before 1993, and for data collected in 1993, respectively. Tables 6-5 and 6-6 depict the risk summaries for LF-3 for data collected before 1993, and for data collected in 1993, respectively. Tables 6-3 and 6-5 present the carcinogenic and noncarcinogenic risk summaries for the CPCs in surface soil, groundwater, surface water, and sediment evaluated to reflect present and potential future risks corresponding to the average and the RME scenarios for each landfill. Tables 6-4 and 6-6 present both the carcinogenic and noncarcinogenic risk summaries for the CPCs in perimeter groundwater and groundwater collected within the landfills (leachate) in 1993 to reflect present and potential future risks corresponding to the RME scenarios for each landfill.

6.1.1 Landfill 2

Carcinogenic and noncarcinogenic risks to human health at LF-2 are discussed below.

Carcinogenic Risks. Future use of groundwater was evaluated separately using both pre-1993 analytical data and data collected in 1993. The highest carcinogenic risks of any scenario at LF-2 were associated with the future adult residential scenario for groundwater using pre-1993 data. The carcinogenic risks (average concentration: 2×10^{-4}; RME concentration: 1×10^{-3}) associated with the future adult residential use of groundwater exceed the USEPA incremental carcinogenic risk range and exceed the MEDEP cancer risk guidance value of 1×10^{-5}. Arsenic is the only contaminant in the groundwater scenario that causes the cancer risk to be above the 1×10^{-4} level. In the evaluation of perimeter groundwater data collected in 1993, the carcinogenic risk (RME concentrations: 3×10^{-4}) associated with the residential use of perimeter groundwater for domestic purposes exceeded state and federal risk criteria, and was

TABLE 6-3
RISK SUMMARIES
LANDFILL 2

OU2 RECORD OF DECISION
LORING AIR FORCE BASE

	AVERAGE		MAXIMUM	
	TOTAL HAZARD INDEX	TOTAL CANCER RISK	TOTAL HAZARD INDEX	TOTAL CANCER RISK
CURRENT USE:				
Incidental Ingestion of Surface Soil: Older Child Trespassing	0.0003	2E-06	0.0006	6E-06
Dermal Contact with Surface Soil: Older Child Trespassing	0.00004	5E-07	0.00009	1E-06
TOTAL: TRESPASSING OLDER CHILD	0.0003	2E-06	0.0007	7E-06
FUTURE USE:				
Incidental Ingestion of Surface Soil: Residential Adult	0.0002	1E-05	0.0005	4E-05
Dermal Contact with Surface Soil: Residential Adult	0.00003	2E-06	0.00008	6E-06
Inhalation Exposure to Particulates: Residential Adult	0.000005	8E-08	0.00001	3E-07
TOTAL: RESIDENTIAL ADULT	0.0003	1E-05	0.0006	5E-05
Incidental Ingestion of Surface Soil: Residential Child	0.002	NA	0.005	NA
Dermal Contact with Surface Soil: Residential Child	0.0002	NA	0.0004	NA
Inhalation Exposure to Particulates: Residential Child	0.00003	NA	0.00006	NA
TOTAL: RESIDENTIAL CHILD	0.002	NA	0.006	NA
Ingestion of Groundwater: Adult Resident	4	2E-04	16	1E-03
Dermal Contact with Groundwater: Residential Adult	0.006	3E-07	0.02	2E-06
TOTAL: RESIDENTIAL ADULT	4	2E-04	16	1E-03
CURRENT/FUTURE USE:				
Incidental Ingestion of Sediment: Child Wading	0.02	5E-05	0.06	2E-04
Dermal Contact with Sediment: Child Wading	0.002	1E-05	0.007	4E-05
TOTAL: WADING CHILD	0.02	6E-05	0.07	2E-04
Incidental Ingestion of Surface Water: Child Wading	0.04	8E-06	0.1	1E-05
Dermal Contact with Surface Water: Child Wading	0.09	5E-04	0.1	6E-04
TOTAL: WADING CHILD	0.1	5E-04	0.2	6E-04
Inhalation Exposure to Particulates: Older Child Dirt Biking	0.00002	2E-08	0.00003	5E-08

NA - Not applicable.

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TABLE 6-4
RISK SUMMARIES FOR 1993 DATA
LANDFILL 2

OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

	MAXIMUM	
	TOTAL HAZARD INDEX	TOTAL CANCER RISK
Ingestion of Groundwater: Residential Adult	12	3E-04
Dermal Contact with Groundwater: Residential Adult	0.02	4E-07
TOTAL: RESIDENTIAL ADULT	12	3E-04
Ingestion of Leachate: Residential Adult	50	8E-04
Dermal Contact with Leachate: Residential Adult	0.08	2E-06
TOTAL: RESIDENTIAL ADULT	50	8E-04
Inhalation Exposure to Particulates: Older Child Dirt Biking	0.0000002	ND

ND = No carcinogenic compounds detected

TABLE 6-5
RISK SUMMARIES
LANDFILL 3

OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

	AVERAGE		MAXIMUM	
	TOTAL HAZARD INDEX	TOTAL CANCER RISK	TOTAL HAZARD INDEX	TOTAL CANCER RISK
CURRENT USE:				
Incidental Ingestion of Surface Soil: Older Child Trespassing	0.00003	8E-07	0.00006	1E-06
Dermal Contact with Surface Soil: Older Child Trespassing	0.000007	2E-07	0.00001	4E-07
TOTAL: TRESPASSING OLDER CHILD	0.00004	1E-06	0.00007	2E-06
FUTURE USE:				
Incidental Ingestion of Surface Soil: Residential Adult	0.0001	5E-06	0.0003	1E-05
Dermal Contact with Surface Soil: Residential Adult	0.00001	9E-07	0.000003	2E-06
Inhalation Exposure to Particulates: Residential Adult	0.000004	3E-08	0.00001	7E-08
TOTAL: RESIDENTIAL ADULT	0.0001	6E-06	0.0003	1E-05
Incidental Ingestion of Surface Soil: Residential Child	0.001	NA	0.003	NA
Dermal Contact with Surface Soil: Residential Child	0.00006	NA	0.0001	NA
Inhalation Exposure to Particulates: Residential Child	0.00003	NA	0.00006	NA
TOTAL: RESIDENTIAL CHILD	0.001	NA	0.003	NA
Ingestion of Groundwater: Adult Resident [1]	0.3	2E-06	19	3E-06
Dermal Contact with Groundwater: Residential Adult	0.0009	8E-08	0.04	8E-08
TOTAL: RESIDENTIAL ADULT	0.3	2E-06	19	3E-06
CURRENT/FUTURE USE:				
Incidental Ingestion of Sediment: Child Wading	0.01	1E-06	0.03	5E-06
Dermal Contact with Sediment: Child Wading	0.0005	2E-07	0.002	8E-07
TOTAL: WADING CHILD	0.01	1E-06	0.03	6E-06
Incidental Ingestion of Surface Water: Child Wading	0.2	1E-06	0.4	4E-06
Dermal Contact with Surface Water: Child Wading	0.02	1E-07	0.03	4E-07
TOTAL: WADING CHILD	0.2	1E-06	0.4	4E-06
Inhalation Exposure to Particulates: Older Child Dirt Biking	0.0008	9E-09	0.001	2E-08

NA - Not applicable.
[1] Ingestion intake for volatile compounds was multiplied by 2.3 to account for ingestion, inhalation, and dermal contact.

TABLE 6-6
RISK SUMMARIES FOR 1993 DATA
LANDFILL 3

OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

	MAXIMUM	
	TOTAL HAZARD INDEX	TOTAL CANCER RISK
Ingestion of Groundwater: Residential Adult	16	3E-04
Dermal Contact with Groundwater: Residential Adult	0.02	5E-07
TOTAL: RESIDENTIAL ADULT	16	3E-04
Ingestion of Leachate: Residential Adult	297	2E-03
Dermal Contact with Leachate: Residential Adult	0.5	4E-06
TOTAL: RESIDENTIAL ADULT	298	2E-03
Inhalation Exposure to Particulates: Older Child Dirt Biking	0.000003	1E-20

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due primarily to the presence of arsenic. Arsenic was detected in three out of five samples. The maximum concentration detected was below the federal Maximum Contaminant Level (MCL) (50 μg/L) and the Maine Department of Human Services Maximum Exposure Guidelines (MEG) (50 μg/L). This carcinogenic risk did not exceed the estimates using pre-1993 data. In the scenario involving residential use of leachate for domestic purposes, the carcinogenic risk (RME concentration: 8×10^{-4}) was primarily due to the presence of arsenic and beryllium, and does not exceed the previous estimate (RME = 1×10^{-3}).

The highest surface soil carcinogenic risks were associated with the future adult residential scenario (average concentration: 1×10^{-5}; RME concentration: 5×10^{-5}). These risks are within the USEPA incremental carcinogenic risk range of 1×10^{-4} to 1×10^{-6}, but exceed the MEDEP cancer risk guidance value of 1×10^{-5}. Because of the elevated concentrations of PAHs detected in surface soils in 1993, a qualitative evaluation of risk was developed. The risks associated with the 1993 data were 4.9 times greater using the RME scenario (2×10^{-4}) and 3.3 times greater (5×10^{-5}) using average concentrations. The elevated concentrations of PAHs may be due to the presence of trash in the samples. The cancer risk using average 1993 concentrations exceeds the MEDEP cancer risk guidance value. The RME scenario exceeds both USEPA and MEDEP target risk levels.

Current/future older child exposure carcinogenic risks (average concentration: 5×10^{-4}; RME concentration: 6×10^{-4}) for surface water and current/future wading child exposure carcinogenic risks (average concentrations: 6×10^{-5}; RME concentrations: 2×10^{-4}) for sediment exceed the USEPA incremental carcinogenic risk range and the MEDEP cancer risk guidance value. These risks are primarily due to the presence of PAHs in surface water and sediment.

Noncarcinogenic Risks The noncarcinogenic HIs associated with exposure under all scenarios, except for the future adult residential scenario for groundwater (pre-1993 perimeter and 1993 perimeter and leachate), were well below 1. The elevated groundwater HIs indicate possible noncarcinogenic hazards to human health.

The HIs for the future adult residential use of perimeter groundwater, based on pre-1993 data, were 4 using average concentrations and 16 using the RME concentrations. The compounds responsible for these elevated HIs in perimeter groundwater were arsenic (average HQ = 1; RME HQ = 5) and manganese (average HQ = 3; RME HQ = 11).

Using the 1993 perimeter groundwater data, the RME HI for perimeter groundwater was 12, due primarily to the presence of arsenic and manganese. Arsenic was detected in three out of five samples. The maximum concentration detected was below the MCL and MEG (50 μg/L) and the HI did not exceed estimates using pre-1993 data.

The RME HI for leachate was 50, due primarily to the presence of manganese (HQ = 37), antimony (HQ = 6), arsenic (HQ = 3), cadmium (HQ = 2), and chromium (HQ = 1), and exceeded federal and state risk criteria. Lead was also detected in the leachate (549 μg/L) at concentrations that greatly exceed federal and state drinking water standards. The groundwater is not currently used for drinking water and will be evaluated as part of OU 4.

Risks were also summed across both media and pathways, and are shown on Table 6-7. For current use (i.e., the child trespassing, wading, dirt biking on or near the landfill), the cancer risk to a child calculated using the RME concentration was 8×10^{-4} (average concentration: 6×10^{-4}). The majority of the risk was associated with the wading scenario. The risk estimated for future residential adult (exposure to soil and groundwater) was 2×10^{-4} using average concentration and 1×10^{-3} using the RME concentration. Both current and future cancer risk estimates exceed the MEDEP cancer risk guidance value. Most of the risk was due to ingestion/domestic use of groundwater.

6.1.2 Landfill 3

Carcinogenic and noncarcinogenic risks to human health at LF-3 are discussed below.

Carcinogenic Risks The highest carcinogenic risks of any scenario at LF-3 were associated with the future adult residential scenario for surface soil using pre-1993 data. These carcinogenic risks (average concentration: 6×10^{-6}; RME concentration: 1×10^{-5}) were within the USEPA incremental carcinogenic risk range of 1×10^{-4} to 1×10^{-6}, and the RME was equal to the MEDEP cancer target level of 1×10^{-5}. The risks associated with surface soil are due to the presence of carcinogenic PAHs. The carcinogenic risk values for all other scenarios using pre-1993 analytical data are within the USEPA incremental carcinogenic risk range and are less than the MEDEP cancer risk guidance value.

However, future use of groundwater was also evaluated using analytical data collected in 1993. The carcinogenic risk associated with residential use of the

TABLE 6-7
RISK SUMMARIES ACROSS PATHWAYS
LANDFILL 2

OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

	AVERAGE		MAXIMUM	
	TOTAL HAZARD INDEX	TOTAL CANCER RISK	TOTAL HAZARD INDEX	TOTAL CANCER RISK
CURRENT USE:				
Total for Trespassing Older Child – Surface Soil	0.0003	2E-06	0.0007	7E-06
Total for Child Wading – Sediment	0.03	6E-05	0.07	2E-04
Total for Child Wading – Surface Water	0.1	5E-04	0.2	6E-04
Total for Older Child Dirt Biking – Surface Soil	0.00002	2E-08	0.00003	5E-08
COMBINED TOTAL	0.1	6E-04	0.3	8E-04
FUTURE USE:				
Total for Residential Child – Surface Soil	0.002	NA	0.006	NA
Total for Child Wading – Sediment	0.03	6E-05	0.07	2E-04
Total for Child Wading – Surface Water	0.1	5E-04	0.2	6E-04
Total for Older Child Dirt Biking – Surface Soil	0.00002	2E-08	0.00003	5E-08
COMBINED TOTAL	0.1	6E-04	0.3	8E-04
Total for Residential Adult – Surface Soil	0.0003	1E-05	0.0006	5E-05
Total for Residential Adult Groundwater Exposure	4	2E-04	16	1E-03
COMBINED TOTAL	4	2E-04	16	1E-03

NA = Not Applicable
NOTE:
Summary table as requested by Maine Department of Environmental Protection

perimeter groundwater for domestic purposes (RME concentration: 3×10^{-4}) was primarily due to the presence of arsenic and exceeded state and federal risk criteria. Arsenic was detected in three out of seven samples. The maximum concentration was detected below the MCL and the MEG (50 μg/L). The carcinogenic risk exceeds the previous estimate using pre-1993 data (RME concentration: 3×10^{-6}). The previous carcinogenic risk estimates were due to the presence of methylene chloride, benzene, and bis-2(ethylhexyl)phthalate.

In the scenario involving the residential use of leachate for domestic purposes, the carcinogenic risk (RME concentration: 2×10^{-3}), primarily due to the presence of arsenic and beryllium, exceeded state and federal criteria and exceeded the previous estimates using pre-1993 data (RME concentration: 3×10^{-6}). Lead was also detected in the leachate (311 μg/L) at concentrations that greatly exceed federal and state standards. The groundwater is not currently used for drinking water and will be evaluated and remediated as part of a separate OU.

Noncarcinogenic Risks. The noncarcinogenic HIs associated with exposure under all scenarios, except for the future adult residential scenario for groundwater, were well below 1.

The RME HI for the future adult residential scenario was 19 using pre-1993 concentrations for perimeter groundwater, and exceeded state and federal risk criteria. Manganese (RME HQ =19) was the primary contributor to the HI for groundwater. This value exceeded the HI of 16 associated with the 1993 perimeter groundwater data, which was primarily due to the presence of manganese and arsenic. In the scenario involving the future residential use of leachate for domestic purposes, the RME HI of 298, primarily due to the presence of manganese (HQ = 280), arsenic (HQ = 9), chromium (HQ = 3), cis-1,2-dichloroethene (HQ = 2), and nickel (HQ = 1), exceeded state and federal criteria. These elevated HIs indicate possible noncarcinogenic hazards to human health.

Risks were also summarized across both media and pathways, and are shown on Table 6-8. Using both the MEDEP method of summing risks and the pre-1993 data, current RMEs to all media for a child and future RMEs to all media for both children and adults results in a cancer risk of 1×10^{-5}, which is equal to the MEDEP cancer risk guidance value and is within the USEPA cancer risk range.

TABLE 6-8
RISK SUMMARIES ACROSS MEDIA AND PATHWAYS
LANDFILL 3

OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

	AVERAGE		MAXIMUM	
	TOTAL HAZARD INDEX	TOTAL CANCER RISK	TOTAL HAZARD INDEX	TOTAL CANCER RISK
CURRENT USE:				
Total for Trespassing Older Child – Surface Soil	0.00004	1E–06	0.00007	2E–06
Total for Child Wading – Sediment	0.01	1E–06	0.03	6E–06
Total for Child Wading – Surface Water	0.2	2E–06	0.4	5E–06
Total for Older Child Dirt Biking – Surface Soil	0.0008	9E–09	0.001	2E–08
COMBINED TOTAL	0.2	4E–06	0.4	1E–05
FUTURE USE:				
Total for Residential Child – Surface Soil	0.001	NA	0.003	NA
Total for Child Wading – Sediment	0.01	1E–06	0.03	6E–06
Total for Child Wading – Surface Water	0.2	1E–06	0.4	4E–06
Total for Older Child Dirt Biking – Surface Soil	0.0008	9E–07	0.001	2E–06
COMBINED TOTAL	0.2	3E–06	0.4	1E–05
Total for Residential Adult – Surface Soil	0.0001	6E–06	0.0003	1E–05
Total for Residential Adult Groundwater Exposure	0.3	2E–06	19	3E–06
COMBINED TOTAL	0.3	8E–06	19	1E–05

ND = Not Applicable
NOTE:
Summary table as requested by Maine Department of Environmental Protection

6.2 ECOLOGICAL RISK ASSESSMENT

The ecological RA chose five terrestrial wildlife indicator species to represent the exposures for terrestrial organisms through ingestion of food and soil. The five indicator species are:

- Short-tailed Shrew (*Blarina brevicauda*), small mammal, omnivore
- 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

Consideration of these species in estimating ecological risk from CPCs that can bioaccumulate may be conservative, because the species are predominantly carnivorous, and therefore highly prone to exposure to CPCs via the food chain. Organisms with small home ranges, such as the shrew and garter snake, and those that ingest a high proportion of earthworms and other terrestrial invertebrates, are particularly susceptible to food chain exposures to such CPCs.

These organisms were chosen for the following reasons: 1) these species are all potential ecological receptors at LF-2 and LF-3; 2) the feeding strategies (e.g., omnivore, carnivore) are commonly present in a typical environmental community; and 3) these species were recommended for a conservative evaluation of ecological risk by USEPA and USFWS (USEPA, 1991a). The woodcock was also selected because it is commonly hunted in Maine and is of possible economic significance, and the fisher represents a species of concern because, although once common in New England, it has disappeared from some regions due to over-trapping.

It is assumed that each species chosen for food web evaluation is representative of other species at a similar trophic level occurring at LF-2 and LF-3. Modeling of exposures to rare and endangered species was not performed because no rare, threatened, or endangered species have been identified at LAFB.

6.2.1 Landfill 2

Ecological risks as they relate to terrestrial and aquatic receptors at LF-2 are discussed below.

Risks to Terrestrial Receptors. HI values from pre-1993 data indicate probable adverse effects related to short-term exposures to CPCs in LF-2 surface soils for the shrew and the woodcock. HIs exceed 10 for the shrew (HI = 16) and the woodcock (HI = 20), and are primarily attributable to benzo(a)pyrene (HQ = 10 for the shrew and 6 for the woodcock) and lead. Predicted HIs were below 1 for the snake, fisher, and hawk, and no adverse effects related to short-term exposure were indicated for these receptors based on data collected before 1993. However, higher concentrations of benzo(a)pyrene and lead were detected in 1993. These higher concentrations increase the HIs for all indicator species. Based on the new data, effects from short-term exposures are also possible for the garter snake, fisher, and broad-winged hawk.

HI values indicate probable adverse effects related to long-term exposures at LF-2 for small mammals, and possible effects to small birds and herptiles (HI = 82 for the shrew, HI = 9 for the woodcock, and HI = 3 for the snake). Lead is the greatest contributor to risks related to chronic exposures at LF-2 (HQ = 47 for the shrew and HQ = 4 for the woodcock). Benzo(a)pyrene also contributes to risk for the snake (HQ = 2). No adverse effects related to long-term exposures are indicated for the fisher or the hawk.

Risk to Aquatic Receptors. Risks to aquatic receptors from exposure to site-related contaminants in surface water and sediment at LF-2 may be probable. The overall HIs for surface water receptors at LF-2 indicate possible effects associated with short-term exposures (acute HI = 3.5) and probable effects associated with long-term exposures (chronic HI = 14). Acute exposure risks are attributable mainly to aluminum. Chronic exposure risks are attributable mainly to diethylphthalate and aluminum.

Chronic exposures to phthalate esters in aqueous media have been shown to cause effects such as reproductive impairment, increase in aborted young and growth impairment to various species including fathead minnows, bluegills, trout embryos, cladocerans, and algae (USEPA, 1980a).

Exposures to aluminum in aqueous media have been shown to cause harmful effects such as mortality and deformity of goldfish embryos, reduced growth and weight in trout, and reduced growth of diatoms and green algae (USEPA, 1988).

The overall HIs for aquatic receptors to sediment at LF-2 indicate probable effects associated with short-term and long-term exposures (acute HI = 110, chronic

HI = 35). Acute and chronic exposure risks are attributable mainly to cyanide (acute HQ = 83, chronic HQ = 24). Adverse effects related to short-term exposures to PAHs, nickel, zinc, cyanide, iron, and manganese in sediment may be possible, and risks may also be possible from long-term exposures to benzo(k)fluoranthene, nickel, iron, and manganese.

6.2.2 Landfill 3

Ecological risks as they relate to terrestrial and aquatic receptors at LF-3 are discussed below.

Risks to Terrestrial Receptors. HIs calculated from pre-1993 data for exposure of ecological receptors to site-related contaminants in surface soils at LF-3 indicate that risks may be possible. HI values for pre-1993 data for short-term exposures to CPCs in LF-3 surface soils exceed 1 for the short-tailed shrew and American woodcock. HIs for the shrew (HI = 4) and the woodcock (HI = 3) are attributable to benzo(a)pyrene (HQ = 3 for the shrew and HQ = 2 for the woodcock) and, to a minor extent, cobalt. However, detections of zinc, copper, and lead in 1993 at concentrations greater than background increased the estimated HI for all the indicator species. Based on the new data, probable adverse effects from short-term exposures to surface soil are indicated for the shrew and the woodcock. Evaluation of the new data also indicates possible impacts to the snake, fisher, and hawk; no adverse effects were indicated based in the pre-1993 data.

HI values indicate probable adverse effects related to long-term exposures at LF-3 for small mammals (HI = 21 for the shrew). Adverse effects are possible for the snake (HI = 1) and woodcock (HI = 5). Benzo(a)pyrene is the greatest contributor to risks related to chronic exposures at LF-3 (HQ = 15 for the shrew and HQ = 3 for the woodcock). Cobalt also contributes to risk. No adverse effects related to long-term exposures are predicted for the fisher or the hawk. Probable adverse effects from long-term exposure to contaminants via the food chain are indicated for the woodcock; possible adverse effects were indicated based on pre-1993 data.

Risk to Aquatic Receptors. Risks to aquatic receptors from exposure to site-related contaminants in surface water and sediment at LF-3 may be probable. The overall HIs for surface water receptors at LF-3 indicate probable effects may be associated with short-term and long-term exposures (acute HI = 15, chronic HI = 30). Acute exposure risks are attributable mainly to zinc and aluminum. Chronic exposure risks were attributable mainly to iron, zinc, and aluminum. Adverse effects related to long-term exposures to diethylphthalate, iron, zinc, and cyanide may be possible.

Exposures to zinc in aqueous media have been shown to cause deleterious effects such as mortality in algae, bluegill, salmon, and trout as well as chronic effects such as growth inhibition in algae, abnormal shell development in oysters, increased mortality in sea urchins, and equilibrium loss in starfish (USEPA, 1980b).

The overall sediment HIs for aquatic receptors at LF-3 indicate probable effects associated with short-term and long-term exposures (acute HI = 180, chronic HI = 66). Acute and chronic exposure risks are attributable mainly to zinc (acute HQ = 150, chronic HQ = 49) and lead (acute HQ = 13, chronic HQ = 4.9). Adverse effects related to short-term exposures to nickel, chromium, copper, iron, and manganese in sediment at LF-3 may be possible, and risks may also be possible from long-term exposure to nickel, iron, manganese, lead, and cyanide.

Exposures to zinc in sediments have been shown to cause mortality in cladocerans, low species richness among benthos, as well as behavioral effects on amphipods and shrimp, and reduced growth in nematodes (Long and Morgan, 1990).

6.3 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). The interpretation of risk estimates is subject to a number of uncertainties as a result of the multiple layers of conservative assumptions inherent in RAs. 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 RA methodology that might lead to an underestimation of true risks, most assumptions will bias the evaluation in the direction of overestimation of risk.

The possibility of underestimation of true risks may be caused by the exclusion from quantitative evaluation of pathways (e.g., ingestion of homegrown produce from backyard garden plots) or through the exclusion of compounds from the RA through the toxicity screening procedure. However, the possibility of a backyard garden plot is remote on a landfill and the toxicity screening procedure evaluated compounds that covered more than 99 percent of the risk; therefore it is unlikely that the risks will be underestimated by a substantial amount.

Because benzo(a)pyrene and naphthalene are the most toxic representatives of carcinogenic and noncarcinogenic PAHs, respectively, use of their 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 "hot spots" or visible contamination); the estimation of exposure concentrations by the use of maximum detections (while assuming no degradation or dilution); the use of the 95 percent (or upper-bound 90 percent) exposure parameter values such as contact rate and exposure frequency and duration; 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 (USEPA, 1989a,b) states that the carcinogenic risk estimate will generally be an upper-bound estimate, and the USEPA is reasonably confident that the "true risk" will not exceed the risk estimate derived through the use of this model and is likely to be less than predicted. Therefore, the true risk is likely not much more than the estimated risk, but could very well be considerably lower, even approaching zero.

6.4 CONCLUSION

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment. The objective of the selected remedial action is to provide containment and isolation of the landfill contents and control of leachate generation as a result of infiltration. Through this action, exposures to the landfill area will be limited and continued migration of contaminants leached from the waste materials located within the unsaturated zone into the groundwater will be minimized.

7.0 DEVELOPMENT AND SCREENING OF ALTERNATIVES

In accordance with USEPA guidance concerning presumptive remedies for municipal landfills, two alternatives were developed and screened in the FFS. This section describes the response objectives and the development and screening of alternatives.

7.1 STATUTORY REQUIREMENTS/RESPONSE OBJECTIVES

The Air Force is responsible for addressing environmental contamination at LAFB pursuant to Section 120 of the CERCLA and the FFA entered into by the Air Force, the USEPA, and the MEDEP. The Air Force's primary responsibility at this NPL site is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) establishes several other statutory requirements and preferences, including: a requirement that the remedial action, when complete, must comply with all federal and more stringent state environmental standards, requirements, criteria or limitations, unless a waiver is granted; a requirement that the selected remedial action be cost-effective and utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment that 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. These response objectives were:

Soils/Landfill Contents	Prevent dermal contact with and ingestion of, contaminated landfill contents and soils
Air/Dust	Prevent the migration and inhalation of fugitive dust and soil particles with adhering contaminants

Landfill Gas	Prevent inhalation and explosion of landfill gases
Surface Water and Sediment	Prevent ingestion, adsorption, and bioconcentration of contaminants in surface water
Leachate	Minimize formation and migration of leachate to groundwater and surface waters.

7.2 TECHNOLOGY AND ALTERNATIVE DEVELOPMENT AND SCREENING

CERCLA and the National Contingency Plan (NCP) set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a limited range of source control remedial alternatives were developed for the site. Other alternatives which address management of contaminant migration through groundwater will be evaluated in a separate operable unit, OU 4, upon completion of additional site investigations. The OU 4 ROD will be completed prior to completion of the OU 2 source control remedy.

Based on USEPA guidance, containment (i.e., landfill cover) is considered to be the appropriate response action or the "presumptive remedy" for the source areas of municipal landfill sites (USEPA, 1993b). Presumptive remedies are preferred technologies for sites with common or similar characteristics with other previous remedial actions. For this operable unit, USEPA Presumptive Remedy Guidance (USEPA, 1993a,b) supports the use of an FFS to develop the remedial action proposed by the Air Force.

With respect to source control, the RI/FFS developed a source control remedial alternative for LF-2 and LF-3 that provides protection through engineering or institutional controls to reduce the threat posed by the presence of the landfill. A no action alternative was also developed.

Because a focused feasibility study approach was used, no initial screening of alternatives was conducted. Subsection 9.4 of the RI/FFS presents the remedial alternatives that were developed by combining the technologies identified in the technology screening process. The two remedial alternatives evaluated were:

Alternative 1:	No Action
Alternative 2:	Containment Using a Cover System

8.0 DESCRIPTION OF ALTERNATIVES

This section provides a narrative summary of each alternative evaluated. The source control alternatives analyzed for OU 2 include No Action (Alternative 1) and Containment Using a Cover System (Alternative 2). Detailed assessments of each alternative can be found in Section 9.5 of the RI/FFS Report (ABB-ES, 1994).

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. This alternative does not involve remedial actions to treat source soils, and no effort would be made to restrict potential exposure to source area contaminants at LF-2 and LF-3. A physical review of the landfills would be conducted every five years. The cost of the site reviews associated with the No Action alternative have not been included. This alternative would not meet the remedial objectives.

ALTERNATIVE 2: CONTAINMENT USING A COVER SYSTEM

This alternative would consist of the following components:

- Site preparation, consolidation of LAFB soils for subgrade and grading to minimize erosion and manage runoff;
- Multi-layer cover system installation which will comply with RCRA Subtitle C and Maine hazardous waste requirements including landfill gas assessment and controls, and assessment of adjacent wetlands;
- Gates and warning signs installation;
- Deed restrictions on land in the vicinity of the landfills;
- Post closure monitoring and maintenance; and
- Five year site reviews.

Alternative 2 consists of installing a low-permeability composite cover system over the limits of the waste at LF-2 (approximately 9 acres) and LF-3 (approximately 17 acres). The purposes of the cover system are to minimize surface water infiltration through the landfilled wastes, promote drainage, minimize surface erosion, accommodate landfill settlement, isolate landfill wastes from direct contact, and control landfill gas. To achieve these goals, the proposed cover system would consist of the following components from bottom to top:

- gas-venting layer
- composite hydraulic barrier layer
- drainage layer
- filter layer
- vegetative layer

Estimated Time for Design and Construction: 2.5 years
Estimated Time of Operation: 30 years
Estimated Capital Cost: $22.7 million
Estimated Operation and Maintenance Costs (net present worth): $754,000
Estimated Total Cost (net present worth): $23.4 million

A detailed description of the cover system components can be found in Subsection 9.5.2 of the RI/FFS Report (ABB-ES, 1994a).

9.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that, at a minimum, the USAF 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 of the remedial alternatives was performed using the nine evaluation criteria to select a site remedy.

9.1 EVALUATION CRITERIA USED FOR DETAILED ANALYSIS

The nine criteria articulated in the NCP are grouped as Threshold, Balancing, and Modifying criteria according to their application in the remedial alternative selection process; these are summarized in the following subsections.

9.1.1 Threshold Criteria

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

- **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.

- **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** addresses whether or not a remedy will meet all of the ARARs or other federal and state environmental laws and/or provide grounds for invoking a waiver.

9.1.2 Balancing Criteria

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

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

- **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.

- **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 cleanup goals are achieved.

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

- **Cost** includes estimated capital costs (indirect and direct) and annual operation and maintenance (O&M) costs, as well as present-worth costs.

9.1.3 Modifying Criteria

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

- **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.

- **Community Acceptance** addresses the public's general response to the alternatives described in the Proposed Plan and RI/FFS report.

9.2 SUMMARY OF COMPARATIVE ANALYSIS

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. The following subsections present the nine criteria and a brief narrative summary of the alternatives and the strengths and weaknesses according to the comparative analysis. A detailed tabular assessment of each alternative according to the nine criteria can be found in Tables 9-8 and 9-9 of the RI/FFS (ABB-ES, 1994a).

9.2.1 Overall Protection of Human Health and the Environment

The preferred alternative, Containment Using a Cover System (Alternative 2), would be protective of human health and the environment because capping the landfill eliminates direct contact with soil and the landfill contents, windborne migration of dust, and incidental ingestion of soil, sediment, and surface water by humans and animals for a long time. The cover would be designed to control landfill gas, if generated. The cover system alternative minimizes, but would not eliminate, infiltration leading to leachate production and continued contamination of groundwater.

The No Action alternative would not be protective of human health or the environment because no protective action would be taken.

9.2.2 Compliance with Applicable or Relevant and Appropriate Requirements

Alternative 2 would be designed to comply with state and federal ARARs. The No Action alternative would not meet the applicable ARARs. ARARs are discussed in more detail in Section 11.

9.2.3 Long-term Effectiveness and Permanence

The Containment Using a Cover System alternative would provide more long-term effectiveness and permanence because the multi-layer cap design provides the greatest degree of protection against infiltration of precipitation and subsequent leachate generation. Specifically, the selected alternative would comply with location-specific ARARs, including wetlands requirements. If the landfill caps adversely affect adjacent wetlands, these areas will be delineated as part of OU 13 and addressed under the remedial action for OU 13 in accordance with Section 404 of the Clean Water Act and other state and federal requirements. With regard to action-specific ARARs, federal and state landfill closure requirements and ARARs applicable to the venting of landfill gases will be met by the selected alternative. The deed restrictions and the post-closure monitoring and maintenance program would maintain cover system integrity over the long-term, and groundwater monitoring would provide data to evaluate the effectiveness of the cover system for minimizing groundwater contamination.

The No Action alternative does not include remedial actions, and therefore provides no mechanism to reduce unacceptable risks from soil, sediment, and surface water contamination.

9.2.4 Reduction of Mobility, Toxicity, or Volume through Treatment

Neither of the two alternatives would reduce mobility, toxicity, or volume through treatment of source area contaminants. USEPA guidance on RI/FS activities for large landfills recognizes that it is almost always impractical to reduce mobility, toxicity, or volume of source area contaminants for these types of sites (USEPA, 1991b). The reduction of mobility, toxicity, or volume through treatment of contaminants in groundwater will be addressed in the OU 4 ROD. The implementation of a source control remedy should be consistent with the appropriate long-term remedy for the landfills.

9.2.5 Short-term Effectiveness

The preferred alternative involves a relatively long implementation period (2.5 years), but non-construction personnel would not have access to the site from the commencement of construction activities. Construction provisions would be implemented for this alternative to minimize potential adverse impacts on worker safety. Short-term (i.e., increased noise and vehicular traffic) impacts are unavoidable during construction. Long-term impacts from cover construction will not result. The No Action alternative does not include remedial actions and therefore, results in no increase in short-term risk. It does not, however, achieve remedial response objectives.

9.2.6 Implementability

Installation of the cover system for the preferred alternative also includes containment, an easily implementable, reliable, and available technology. Appropriate measures will be identified during the OU 4 ROD (i.e., monitoring well installation) to maintain the integrity of the installed cover system. The OU 4 ROD will be completed before the construction of this source control remedial action is complete. The No Action alternative does not include remedial actions.

9.2.7 Cost

The cost criterion includes the capital (i.e., up-front) cost of implementing an alternative, as well as the cost of operating and maintaining the alternative over the long term. The estimated total cost on a present-worth basis considers both initial capital costs and long-term O&M costs. The capital, O&M, and total costs for each alternative are discussed in the RI/FFS Report (ABB-ES, 1994a). The cost of the Containment Using a Cover System alternative does not include the potential costs of cover system redesign and modification based on the results of the ongoing OU 4 groundwater investigations.

9.2.8 State Acceptance

As party to the FFA, MEDEP has commented on the RI/FFS and Proposed Plan and concurs with the remedial action as stated in Section 13 of this ROD. Documentation of this concurrence is presented in Appendix C of this ROD.

9.2.9 Community Acceptance

Community acceptance of the Proposed Plan was evaluated based on 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. Based on public comments, the public is in agreement regarding the preferred Remedial Alternative for OU 2 as presented in the Proposed Plan.

10.0 THE SELECTED REMEDY

For OU 2, the selected remedy is Alternative 2, consisting of a low-permeability cover system which meets RCRA Subtitle C and Maine hazardous waste landfill cap requirements, and surface and institutional controls. The remedial action is a final source control remedy that permanently addresses the reduction of contamination leaching to groundwater, limits migration of liquids through the landfill, and maintains compatibility with the final remedial measures, while OU 2 groundwater, landfill gases and adjacent wetlands are evaluated and, if necessary, additional alternatives are studied.

10.1 CLEANUP LEVELS

A 1×10^{-6} excess cancer risk level for carcinogenic effects or a concentration corresponding to an HI of 1 for compounds with noncarcinogenic effects is typically used to set cleanup levels. No contaminant-specific cleanup levels have been developed for this source control remedial alternative since the alternative addresses the landfill area as a source of contamination and the landfill wastes were not sampled. Although soils/waste will not be removed or treated under the selected alternative, containment technologies are generally considered appropriate for landfills where treatment is impracticable because of the volume and heterogeneity of the waste. Therefore, no target cleanup levels have been set for soils at the sites. Cleanup levels and remedial alternatives applicable to groundwater/leachate will be developed as appropriate, within the management of migration operable unit for the site (i.e., OU 4).

10.2 DESCRIPTION OF THE REMEDIAL COMPONENTS

The following paragraphs describe the remedial alternative the USAF developed for OU 2: Containment Using a Cover System. Implementation of the selected alternative would include the following activities:

- Site preparation, consolidation of LAFB soils for subgrade and grading to minimize erosion and manage runoff;

- Multi-layer cover system installation which will comply with RCRA Subtitle C and Maine hazardous waste requirements including landfill gas assessment and controls, and assessment of adjacent wetlands;
- Gates and warning signs installation;
- Deed restrictions on land in the vicinity of the landfills;
- Post closure monitoring and maintenance; and
- Five year site reviews.

Site Preparation and Grading. Prior to installation of the proposed cover system, small trees and brush would be cleared from within the area to be covered. Subgrade soil consisting of common borrow available form local borrow pits and from other LAFB locations (e.g., excavated soil/sediment from OU 7) would then be placed to raise the existing grade of each landfill to allow for post-construction settlement and to provide for positive drainage. Silt fencing and hay bales would be used for erosion control purposes and would be maintained for the duration of the construction project. An interim drainage basin would also be constructed to control on-site drainage during construction.

At present, it is anticipated that these other areas will include:

- OU 7, the Quarry site, which is the subject of separate CERCLA ROD which is expected to be issued concurrently with this OU 2 ROD.
- OU 6, Railroad Maintenance Site, which was subject of a CERCLA ROD issued in April 1994, and for which an ESD relating to use of the material at OU 2 is expected to be issued concurrently with this OU 2 ROD.
- OU 2A, Coal Ash Pile, which is subject of a removal action planned for the Fall of 1994.

Before such material can be used as subgrade material at OU 2, the Air Force must comply with CERCLA and the NCP for any areas which are CERCLA sites. In addition, the Air Force must evaluate the material from these areas to determine if the material is hazardous and subject to the RCRA Land Disposal Restrictions

(LDR), 40 CFR Part 268, and must demonstrate that it has complied with the procedures set forth in the LDR Technical Memorandum, July 1994. If the material is non-hazardous, it may be used for subgrade fill at OU 2. If it is determined to be hazardous, it may not be used for subgrade fill at OU 2 unless it is treated in accordance with the LDR requirements prior to use as subgrade fill.

Multi Layer Cover System and Landfill Gas Management. The proposed cover system would be constructed after initial settlement occurs caused by the weight of the subgrade soil. Cap construction would begin one construction season after placement of the subgrade to allow sufficient time for settlement to occur. The caps will be designed to meet or exceed RCRA guidance as presented in Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments (USEPA, 1989) and Design and Construction of RCRA/CERCLA Final Covers (USEPA, 1991), Maine hazardous waste regulations, and in accordance with accepted engineering design practices. Site-specific factors will be evaluated in determining an effective cap design.

The proposed composite cover system would consist of the following components (Figure 10-1), from bottom to top:

- gas-venting layer
- composite hydraulic barrier layer
- drainage layer
- filter layer
- vegetative layer

A 12-inch gas-venting layer would be placed above the subgrade soil to allow for the collection and transfer of landfill gases to a passive gas-venting system. Passive gas-venting through the cover would occur using vertical gas-venting risers to vent gases to the atmosphere and, if necessary, to provide for the collection and treatment of landfill gases containing hazardous substances. To monitor the performance of this remedial action, testing of the landfill gases will be performed after completion of the landfill caps and installation of the landfill vents. A landfill gas evaluation against established criteria and a risk assessment will be provided by the Air Force to determine whether the concentrations of contaminants in air emissions and ambient air on- and off-site create an unacceptable risk of exposure, are protective of human health and the environment, and are in compliance with state and federal ARARs. After submission and review of the landfill gas evaluation and the risk assessment, a determination will be made whether the vented landfill gases require

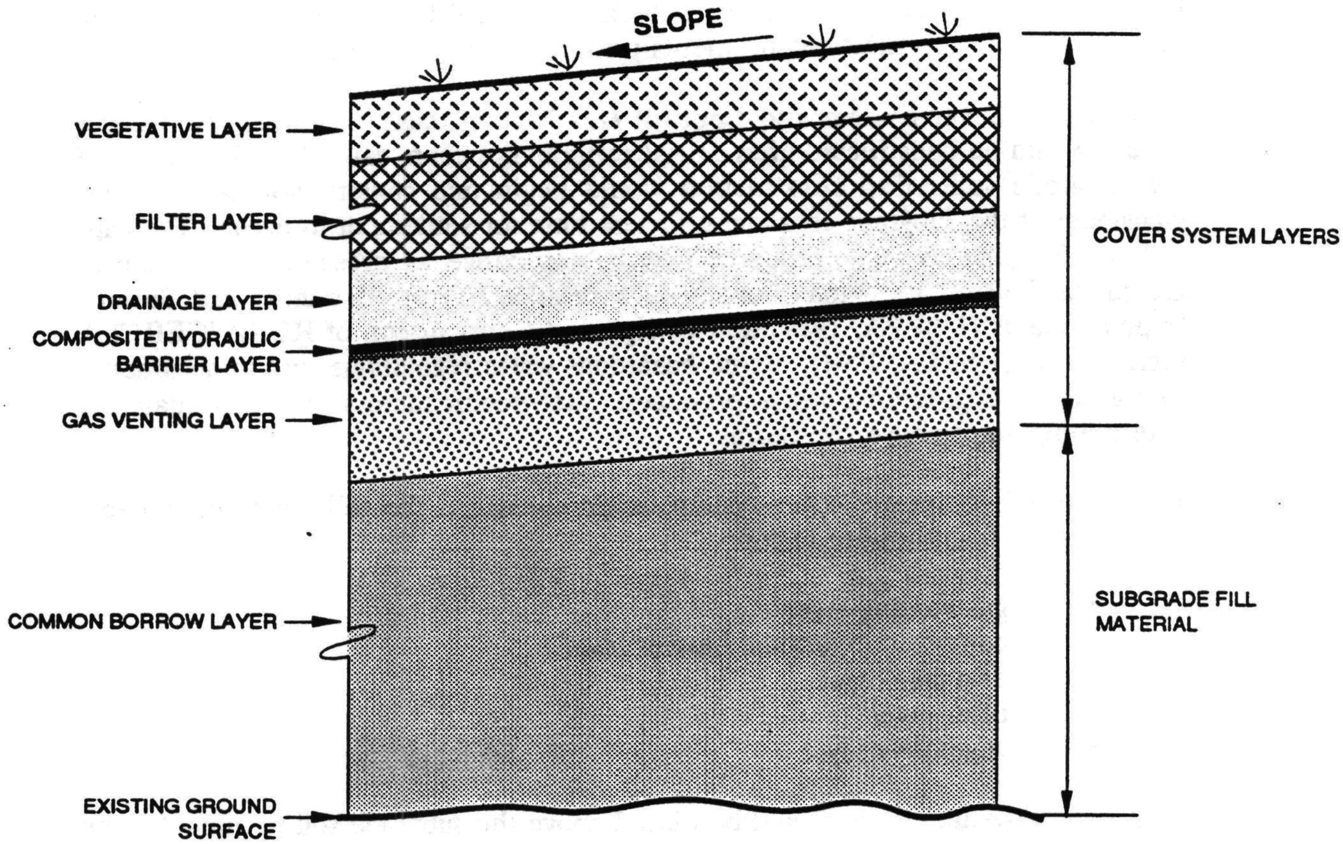

FIGURE 10-1

TYPICAL LANDFILL COVER SYSTEM

LORING AIR FORCE BASE
LIMESTONE, MAINE

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treatment to accomplish these objectives. Gas samples will be collected from the vents and analyzed, and the results used to establish a baseline. Follow-up sampling and analysis will be compared to the baseline so that evaluations and recommendations concerning active gas collection systems can be made.

A composite hydraulic barrier consisting of a geosynthetic clay liner overlain by a geomembrane layer (i.e., very low density polyethylene) would be placed above the gas-venting layer. The composite hydraulic barrier would minimize the infiltration of water to the landfilled waste. A 24-inch drainage layer of sand would be placed above the hydraulic barrier layer to facilitate water drainage from the top of the cover system. The drainage layer would contain collection pipes to divert water to a detention basin located downgradient of the landfills. A 12-inch filter layer of common borrow material would be placed above the drainage layer to prevent topsoil from entering the drainage layer. The filter layer will also retain moisture for the upper layers. A 12-inch layer of soil capable of supporting vegetation would be placed above the filter layer.

Gates and Warning Signs Installation. A 20-foot wide chain-link gate would be installed at the main entrance road into each landfill. Warning signs would be posted on the gates to alert people to the location of the landfill and cover system. The gates and warning signs would restrict vehicular access and discourage trespassers.

Deed Restrictions on Land in the Vicinity of the Landfills. Restrictions limiting subsurface development (excavation or drilling), use of the property, and excessive vehicular traffic (including off-road vehicles and dirt bikes) would be incorporated into the property deed.

Post-Closure Monitoring and Maintenance. A monitoring and maintenance program is proposed. The purposes of the program are to inspect the cover system and environmental monitoring systems and to maintain their integrity. The monitoring program is proposed to be conducted for a 30-year period following closure in accordance with RCRA Subtitle C standards. The program would include the following activities:

- inspection of the cover system including all environmental monitoring systems (i.e., groundwater monitoring and gas control), eight times during the first year, and semiannually during the following 29 years

- maintenance of the cover system, including making repairs to the cap as necessary to correct the effects of settling, subsidence, erosion, or other events.

- maintenance of gates and access roads.

- annual mowing of the grass cover (after ground-nesting migratory bird breeding season is over)

- quarterly monitoring (i.e., sampling and analysis) of groundwater monitoring wells for groundwater quality, and gas-venting risers for explosive gases, and visual inspection of the landfills

- quarterly inspection reports to regulatory agencies would include monitoring results and recommendations, and would document maintenance activities

Long-term groundwater monitoring and stormwater discharge monitoring will be conducted following capping of the landfills. The design of the monitoring systems will be defined following completion of additional OU 4 groundwater studies and the drainage design of the caps. The environmental monitoring program will be submitted for regulatory review and will identify sampling locations and sampling frequencies. At a minimum, the groundwater and stormwater environmental monitoring program will be conducted for a minimum of thirty years.

Five-Year Site Reviews. To the extent required by law, the USAF will review OU 2 monitoring program data at least once every five years after the initiation of remedial action because hazardous substances will remain on-site at levels that do not allow for unrestricted use. This review will be conducted in accordance with applicable USEPA guidance and will assure that the remedial action continues to protect human health and the environment, assessing site conditions and proposing further actions, if necessary.

Additional site investigations which support the evaluation and determination of additional remedial action(s) at OU 2 will be conducted. These additional studies will be designed to determine the following:

- If additional measures, beyond capping the landfill, must be taken to reduce the amount of groundwater in contact with the contaminated materials of the landfill (these studies will evaluate the potential for leachate generation due to contact between the landfill materials and groundwater).

- The nature and extent of groundwater contamination and whether additional measures, beyond capping the landfill, are necessary to meet federal or state groundwater standards and to reduce to acceptable levels any unacceptable risks to human health and the environment from groundwater contamination.

- If vented landfill gases require treatment to protect human health and the environment and to meet state and federal ARARs.

- If wetlands could be potentially impacted by the remedial action, and if so, an assessment of the approach and location for restoring wetlands affected by OU 2 remedial actions.

Studies concerning groundwater will be conducted in association with the OU 4 ROD. Studies concerning landfill gases will be conducted after completion of the landfill caps and gas vents. As part of IRP activities at LAFB, wetland areas located on the base which are or potentially could be impacted by remediation are being evaluated as part of OU 13. This evaluation will include an assessment of the approach and location for restoring/replacing wetlands impacted by remedial activities. To the extent appropriate, the Air Force will consider forms of mitigation which include restoration, replacement, enhancement, and creation of wetlands. Therefore, the final approach to wetland restoration for the entire base will be evaluated part of OU 13.

11.0 STATUTORY DETERMINATIONS

The remedial action for source control selected for the remedial action selected for implementation at OU 2 is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, attains ARARs, and is cost effective. However, the selected remedy does not satisfy the statutory preference for treatment which permanently and significantly reduces the mobility, toxicity or volume of hazardous substances as a principal element, nor does the selected remedy utilize alternate treatment technologies or resource recovery technologies.

11.1 THE SELECTED REMEDY IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT

The remedy at OU 2 will permanently reduce the risks posed to human health and the environment by eliminating, reducing or controlling exposures to human and environmental receptors through engineering controls and institutional controls. The placement of a composite cap will eliminate direct contact and incidental ingestion exposure to surface soil or waste contaminants, and the institutional controls will prevent exposure to contaminated soils and groundwater under future site use. The cap will effectively reduce infiltration of precipitation through unsaturated waste and the resultant generation of leachate. The selected remedy will comply with ARARs and to-be-considered (TBC) criteria. Finally, the implementation of the selected remedy will not pose unacceptable short-term risks or cross-media impacts.

11.2 THE SELECTED REMEDY ATTAINS ARARS

The selected remedy will attain all federal and state ARARs that apply to OU 2. ARARs for the Site, as well as policies, criteria, and guidance (TBCs) which will be considered during the implementation of the remedy were identified and discussed in the RI/FFS report. Tables 11-1 and 11-2 to this ROD present a tabular summary of the ARARs for the selected remedy, including the regulatory citation, a brief summary of the requirement, and how it will be attained. This remedy will attain the federal and state ARARs that apply to OU 2 and this remedial action. A discussion of why these requirements are applicable or relevant and appropriate is in the RI/FFS Report. Environmental laws from which ARARs for the selected remedial

TABLE 11-1
LOCATION-SPECIFIC ARARS CRITERIA, ADVISORIES, AND GUIDANCE
LANDFILL SOILS

OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

MEDIA	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENTS
WETLANDS				
Federal	Clean Water Act (CWA) Section 404(b)(l) - Guidelines for Specification of Disposal Sites for Dredged or Fill Materials (40 CFR 230)	Applicable	Section 404 of the CWA regulates the discharge of dredged or fill material into U.S. waters, including wetlands. The purpose of Section 404 is to ensure that proposed discharges are evaluated with respect to impact on the aquatic ecosystem. The guidelines maintain that no dredged or fill material discharge will be permitted if there is a practicable alternative with less impact to the aquatic ecosystem. Discharge will also not be permitted unless steps are taken to minimize potential adverse impacts, or if it will cause or contribute to significant degradation of U.S. waters.	Wet areas have been identified in LF-2 originating from landfill settlement. Based on the origin of these wet areas and because no practicable alternative exists, a decision has been made that in the event that these areas are adversely affected, they will not be restored or replaced. An accounting will be kept of all wetlands adjacent to LF-2 and LF-3. Any wetlands adversely affected by the LF-2 and LF-3 remedial action will be restored or replaced.
	Statement of Procedures on Floodplain Management and Wetlands Protection (40 CFR Part 6, Appendix A)	Applicable	Sets forth USEPA policy for carrying out the provisions of the Wetlands Executive Order (EO 11990). Under this order, federal agencies are required to minimize the destruction, loss, or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands.	Wet areas have been identified in LF-2 originating from landfill settlement. Based on the origin of these wet areas and because no practicable alternative exists, a decision has been made that in the event that these areas are adversely affected, they will not be restored or replaced. An accounting will be kept of all wetlands adjacent to LF-2 and LF-3. Any wetlands adversely affected by the LF-2 and LF-3 remedial action will be restored or replaced.
	Fish and Wildlife Coordination Act (16 USC 661)	Applicable	This act requires that any federal agency proposing to modify a body of water must consult with the U.S. Fish and Wildlife Service, National Marine Fisheries Services, and other related state agencies to develop measures to prevent, mitigate or compensate for project-related losses to fish and wildlife.	Actions will be taken to develop measures to prevent, mitigate or compensate for project-related impacts to wetlands and wildlife. Relevant agencies will be contacted to help analyze impact of remedial action on fish and wildlife.

continued

TABLE 11-1
LOCATION-SPECIFIC ARARs CRITERIA, ADVISORIES, AND GUIDANCE
LANDFILL SOILS

OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

MEDIA	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENTS
State	Natural Resources Protection Act Permit by Rule Standards (MEDEP Regulations, Chapter 305)	Relevant and Appropriate	This rule outlines prescribed standards for specific activities that may take place in or adjacent to wetlands and water bodies. Work which involves the disturbance of soil material adjacent to a wetland or water body must be performed in compliance with this rule.	Proposed activities involving disturbance of soil and discharge of treatment water, within 100 feet of the normal high water line will be designed to incorporate the applicable standards.
	Maine Site Location Regulations - No Adverse Environmental Effect Standard of the Site Location Law (38 MRSA Section 481 et seq.; MEDEP Regulations Chapter 375)	Relevant and Appropriate	These regulations prohibit any development from affecting existing uses, scenic character or existing natural resources in or near a community. Of particular concerns are adverse impacts upon air quality, drainage ways, and infiltration relationships, erosion and sedimentation controls, and surface water. The regulations also prohibit excessive noise from developments.	The standards outlined in the regulations will be considered in the remedial design.
WASTE MATERIAL				
Federal	Migratory Bird Treaty Act (16 USC 703 - 712)	Applicable	Prohibits hunting, possessing, killing or capturing of the listed migratory birds, birds in danger of extinction, and those birds' eggs or nests.	Long-term impacts will not result. Operation and maintenance activities (e.g., mowing) will be delayed until after the ground nesting migratory bird breeding season is over each year. The soil cover will be planted with native grasses.

Notes:

ARAR = Applicable or Relevant and Appropriate Requirements
CFR = Code of Federal Regulations
CWA = Clean Water Act
MEDEP = Maine Department of Environmental Protection
MRSA = Maine Revised Statues Annotated
USC = United States Code
USEPA = U.S. Environmental Protection Agency

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TABLE 11-2
ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE
LANDFILL, AIR, WETLANDS AND WASTE MATERIAL

OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

MEDIA	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENTS
AIR				
State	Maine Air Pollution Control Laws - Establishment of Air Quality Regions (38 MRSA, Section 583; MEDEP Regulations, Chapter 114)	Applicable	Loring AFB is in the Aroostook Air Quality Region.	Remedial actions will be designed in accordance with this standard. Air emissions from landfill waste will not result in the degradation of the area air quality classification.
	Maine Ambient Air Quality Standards (38 MRSA, Section 584; MEDEP Regulations, Chapter 110)	Relevant and Appropriate	This Chapter establishes ambient air quality standards that are maximum levels of a particular pollutant permitted in the ambient air. The standards for particulate matter is 150 $\mu g/m^3$. 24-hour average concentration.	This standard will be applied to excavation activities performed at the site as part of the remedial action. The remedial action will be performed in compliance with this standard.
	Maine Air Pollution Control Laws - Maine Emission License Regulations (38 MRSA Sections 585, 590; MEDEP Regulations, Chapter 115)	Relevant and Appropriate	Requires new sources of air emissions to demonstrate that its emissions do not violate ambient air quality standards. New sources must meet preconstruction monitoring and post-construction monitoring requirements.	Remedial action will be evaluated in accordance with monitoring requirements.
Federal Guidance and Criteria To Be Considered	Clean Air Act (40 CFR 60) New Source Performance Standards (NSPS) (Proposed Subpart WWW, 56 FR 24468 - 24528)	To Be Considered	Requires Best Demonstrated Technology (BDT) for new sources, and sets emissions limitations. Proposed Subpart WWW sets a performance standard for non-methane organic compounds (NMOC) emissions of 150 megagrams per year or 167 tons per year for existing municipal solid waste landfills.	These standards should be considered in the design of a landfill gas management system to monitor post-closure of landfill gases.
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 40 CFR Parts 124, 264, 265, 124, 270, and 271.	Analytical results were evaluated against the criteria and definitions of hazardous waste. The criteria and definition of hazardous waste will be referred to and utilized in development of remedial alternatives and during remedial actions.

continued

TABLE 11-2
ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE
LANDFILL, AIR, WETLANDS AND WASTE MATERIAL

OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

MEDIA	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENTS
	RCRA Subtitle C Requirements (40 CFR 264)	Relevant and Appropriate	Outlines specifications and standards for design, operation, closure and monitoring of performance for hazardous waste storage, treatment and disposal facilities.	Substantive RCRA requirements will be met and adhered to on-site.
	RCRA Subtitle C, Subpart B - General Facility Standards (40 CFR 264.10 - 264.18)	Relevant and Appropriate	General requirements regarding waste analysis, security, training, inspections, and location applicable to a facility which stores, treats or disposes of hazardous wastes (a TSDF facility).	This regulation may be applicable to remedial actions which address a waste which is a listed or characteristic waste under RCRA and constitute current treatment, storage, or disposal as defined by RCRA.
	RCRA Subtitle C, Subpart C - Preparedness and Preparation (40 CFR 264.30 - 264.37)	Relevant and Appropriate	Requirements applicable to the design and operation, equipment, and communications associated with a TSDF facility, and to arrangements with local response departments.	This regulations may be applicable to remedial actions which address a waste which is listed or characteristic waste under RCRA and constitute current treatment storage, or disposal as defined RCRA.
	RCRA Subtitle C, Subpart D - Contingency Plan and Emergency Procedures (40 CFR 264.50 - 264.56)	Relevant and Appropriate	Emergency planning procedures applicable to a TSDF facility.	This regulation may be applicable to remedial actions which address a waste which is a listed or characteristic waste under RCRA and constitute current treatment, storage, or disposal as defined by RCRA.
	RCRA Subtitle C, Subpart F - Releases from Subtitle C Solid Waste Management Units (40 CFR 264.90 - 264.109)	Relevant and Appropriate	This regulation details groundwater monitoring requirements for hazardous waste treatment facilities. The regulation outlines general groundwater monitoring standards, as well as standards for detection monitoring, compliance monitoring and corrective action monitoring.	Long-term groundwater monitoring is included as a component of remedial alternatives in a separate operable unit. Because the remedy at OU 2 is an interim action, groundwater monitoring requirements will not be complied with in the operable unit. At the conclusion of the entire remedial action for the Site, however, the action will comply with remedial requirements.
	RCRA Subtitle C, Subpart G - Closure and Post-Closure (40 CFR 264.110 - 264.120)	Relevant and Appropriate	This regulation details general requirements for closure and post-closure of hazardous waste facilities, including installation of a groundwater monitoring program.	Cap design, monitoring and maintenance will meet regulatory requirements.

continued

TABLE 11-2
ACTION-SPECIFIC ARARs, CRITERIA, ADVISORIES, AND GUIDANCE
LANDFILL, AIR, WETLANDS AND WASTE MATERIAL

OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

MEDIA	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENTS
	RCRA Land Disposal Restrictions (LDRs) (40 CFR Part 268)	Applicable	Land disposal of RCRA hazardous waste is restricted without specified treatment. For the LDRs to be applicable, it must be determined that the waste meets the definition of one of the specified restricted wastes and remedial action constitutes placement. For each hazardous waste, the LDRs specify that the waste must be treated either by a treatment technology or to a concentration level prior to disposal in a RCRA Subtitle C permitted facility.	Waste materials from separate operable units will be evaluated to determine whether the waste is hazardous. If so, the materials will not be placed under the OU 2 cover systems, or will be treated in accordance with LDRs prior to disposal at OU 2.
	RCRA Proposed Amendments for Landfill Closure (52 FR 8712)	To Be Considered	Provides an option for the application of alternate closure and post-closure requirements based on a consideration of site-specific conditions including exposure pathways of concern.	Cap and post-closure monitoring will be designed taking into account exposure pathways of concern.
State	Maine Hazardous Waste Management Rules - Identification and Listing of Hazardous Wastes (MEDEP Regulations, Chapters 800, 801)	Relevant and Appropriate	These rules set forth Maine's definitions and criteria for establishing whether waste materials are hazardous and subject to associated hazardous waste regulations.	These regulations supplement RCRA requirements. Those state criteria and definitions more stringent than RCRA take precedence over federal requirements.
	Maine Solid Waste Management Rules - Landfill Disposal Regulations (MEDEP Regulations, Chapters 400 and 401)	Relevant and Appropriate	Chapter 401 specifies closure and post-closure maintenance requirements for solid waste landfills. The landfill expansion requirements within these chapters are not ARARs relating to the use of excavated materials from other operable units as subgrade fill.	The design of the solid waste cover system will be constructed to meet the minimum standards and specifications of Section 401.7(c).

continued

TABLE 11-2
ACTION-SPECIFIC ARARs, CRITERIA, ADVISORIES, AND GUIDANCE
LANDFILL, AIR, WETLANDS AND WASTE MATERIAL

OU 2 RECORD OF DECISION
LORING AIR FORCE BASE

MEDIA	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENTS
	Maine Hazardous Waste Management Rules (MEDEP Regulations, Chapters 802, 850, 856, and 857)	Relevant and Appropriate	The rules provide a comprehensive program for handling, storage, and recordkeeping at hazardous waste facilities. They supplement the RCRA regulations. Regulations paralleling RCRA requirements identified above would pertain to the final remedy implemented at OU 2.	State requirements more stringent than federal requirements will take precedence. At the completion of the remedial action for this operable unit, these remedial standards will be met.
	Maine Hazardous Waste Management Rules (MEDEP Regulations, Chapter 854)	Relevant and Appropriate	This regulation details groundwater monitoring requirements for hazardous waste facilities. The regulation outlines general groundwater monitoring standards, as well as standards for detection monitoring, compliance monitoring, and corrective action monitoring.	Long-term groundwater monitoring is included as a component of remedial alternatives in a separate operable unit. Because the remedy at OU 2 is an interim action, groundwater monitoring requirements will not be complied with in this operable unit. At the conclusion of the entire remedial action for each landfill, however, the action will comply with remedial requirements.
STATE				
Guidance and Criteria To Be Considered	Maine Criteria and Clean-up Levels for Petroleum-Contaminated Soil	To Be Considered	This guidance sets forth soils cleanup levels for petroleum contaminated soils based on total petroleum hydrocarbon (TPH) content.	The current TPH standards for development of clean-up levels is 20 to 50 parts per million for contaminated soils.

Notes:

BDT Best Demonstrated Technology
CMR Code of Maine Regulations
CPR Code of Federal Regulations
CWA Clean Water Act
FR Federal Register
LDR Land Disposal Restrictions
MEDEP Maine Department of Environmental Protection
MRSA Maine Revised Statues Annotated
NMOC non-methane organic compounds
NSPS New Source Performance Standards
RCRA Resource Conservation and Recovery Act
TPH total petroleum hydrocarbon
TSDF Treatment, Storage or Disposal Facility
USC United States Code
USEPA U.S. Environmental Protection Agency

action are derived, and the specific ARARs are presented in Table 11-1. A brief summary of the ARARs and TBCs follows.

Chemical-Specific ARARs. These ARARs are numerical values or procedures that, when applied to a specific site, establish numerical limits for individual chemicals or groups of chemicals. Chemical-specific ARARs are generally health- or risk-based standards limiting the concentration of a chemical found in or discharged to the environment. Because there are no chemical-specific ARARs pertinent to the source control of LF-2 and LF-3, only location- and action-specific ARARs are listed. Chemical-specific ARARs for water will be included in the OU 4 RI/FS.

Location-Specific ARARs. These ARARs represent restrictions placed on the concentration of hazardous substances or the conduct of activities because of the location or characteristics of a site. Location-specific ARARs set restrictions relative to special locations such as wetlands, floodplains, sensitive ecosystems, as well as historic or archeological sites, and provide a basis for assessing existing site conditions. Location-specific ARARs for OU 2 are identified in Table 11-1.

Action-Specific ARARs. These ARARs, unlike location- and chemical-specific ARARs, are usually technology- or activity-based limitations that direct how remedial actions are conducted. The applicability of this set of requirements is directly related to the particular remedial activities selected for the site. Action-specific ARARs for OU 2 are presented in Table 11-2. It is noted that although the requirements, standards, and regulations of the Occupational Safety and Health Act of 1970 are not ARARs, they will be complied with during the remedial activities at OU 2 (USEPA, 1990).

The following is a summary of the key ARARs and material to be considered, and how they pertain to the selected remedy:

Excavated material from other areas on LAFB will be used at OU 2 for fill material to meet the subgrade design specifications for the OU 2 cap. At present, it is anticipated that these other areas will include:

- OU 7, the Quarry site, which is the subject of separate CERCLA ROD expected to be issued concurrently with this OU 2 ROD.
- The Railroad Maintenance Site, OU 6, which was subject of a CERCLA ROD issued in April 1994, and for which an ESD relating

to use of the material at OU 2 is expected to be issued concurrently with this OU 2 ROD.

- The Coal Ash Pile, OU 2A, which is the subject of a CERCLA removal action planned for the Fall of 1994.

Before such material can be used as subgrade material at OU 2, the Air Force must comply with CERCLA and the NCP for any areas which are CERCLA sites. In addition, the Air Force must evaluate the material from these areas to determine if the material is hazardous and subject to the RCRA LDR, 40 CFR Part 268, and must demonstrate that it has complied with the procedures set forth in the LDR Technical Memorandum (USAF, 1994). If the material is non-hazardous, it may be used for subgrade fill at OU 2. If it is determined to be hazardous, it may not be used for subgrade fill at OU 2 unless it is treated in accordance with the LDR requirements prior to use as subgrade fill.

Although OU 2 will be receiving waste material from OU 6, OU 7, and other CERCLA sites at LAFB, it is not necessary for federal or state permits to be obtained for this remedial action. These sites may be viewed as separate facilities as defined in CERCLA §101(9). Under the NCP, it is appropriate to aggregate noncontiguous facilities for the purpose of a response action if the sites are related based on the threat posed and based on geography (USEPA, 1990).

The Maine Solid Waste Management Regulations (MSWMR), Chapters 400 and 401 set forth requirements for alterations, including vertical and horizontal expansions, to and closure of solid waste disposal sites. The use of fill material from other operable units, including OU 7, to complete the remedial action at OU 2 does not constitute a horizontal or vertical expansion of a solid waste disposal site (USEPA, 1994).

Therefore, the requirements of MSWMR Chapters 400 and 401 which relate to the expansions of solid waste disposal sites (e.g., the bottom liner requirements of MSWMR §401.4(C) are not applicable to this action.

Although these requirements are not applicable, they may be relevant because they relate to the disposal of solid waste, including inert material and other solid waste materials from other operable units, including OU 7. However, even if these requirements are relevant, to be ARARs which must be complied with, they must also be determined to be appropriate. For the reasons discussed below, these regulations are not appropriate.

Two factors to be looked at in determining if a requirement is appropriate is (1) the purpose of the requirement, and (2) whether another requirement is available that more fully matches the circumstances of the site (USEPA, 1988b). The purpose of both the RCRA Subtitle C requirements, which are ARARs for the OU 2 remedial action, and the requirements of MSWMR Chapters 400 and 401 which relate to expansions of solid waste disposal sites, is to prevent hazardous wastes from other operable units from infiltrating into the groundwater.

Because RCRA Subtitle C requirements will be equal of greater protectiveness than the MSWMR Chapters 400 and 401 requirements concerning the expansion of solid waste disposal sites, the MSWMR expansion regulations are not appropriate.

11.3 The Selected Remedial Action is Cost-Effective

In the USAF'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 USAF identified alternatives that were protective of human health and the environment and that attain ARARs, the USAF evaluated the overall effectiveness of each alternative by assessing the relevant three criteria - long term effectiveness and permanence; reduction in toxicity, mobility, or 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 action are:

Estimated Capital Cost: $22.7 million
Estimated Operation and Maintenance Costs (net present worth): $754,000
Estimated Total Cost (net present worth): $23.4 million*

* The net present worth is based on a 10% discount rate and 30 years of operation; the estimated total cost includes a contingency factor.

The selection of this alternative represents a reasonable value in regard to the degree of protectiveness offered by the alternative in comparison with the other alternative evaluated. While the selected alternative is the most expensive alternative, it will be the most effective alternative in limiting future leachate generation as a result of infiltration of precipitation and in eliminating the direct contact exposure pathway. While the need for remediation of groundwater contamination will be evaluated on the basis of additional site investigations within OU 4, it is anticipated that if a remedial action is required under that operable unit, the overall effort and expense associated with the action will be reduced if infiltration is effectively removed as a source of leachate generation. Therefore, the capital costs associated with this alternative may be partially offset later by a decrease in the overall costs associated with the OU 4 remedial action.

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

Once the USAF identified those alternatives that attain or, as appropriate, allow a waiver of ARARs, and that protect human health and the environment, the USEPA 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 or 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. The selected remedy provides long-term protection of human health and the environment. Deed restrictions and the post closure monitoring and maintenance program would maintain cover system integrity over the long-term, and groundwater monitoring would evaluate the effectiveness of the cover system for minimizing groundwater contamination.

The selected remedy will not reduce mobility, toxicity, or volume through treatment of source area contaminants. However, USEPA guidance on RI/FS activities for landfills consisting of greater than 100,000 cubic yards of waste recognizes that it is almost always impractical to reduce mobility, toxicity, or volume of source area contaminants for these sites (USEPA, 1991b), and generally that containment is the most practical alternative for these landfills. The reduction of mobility, toxicity, or volume through treatment of contaminants in groundwater will be addressed in the OU 4 groundwater ROD. If necessary, the reduction of mobility, toxicity or volume through treatment of landfill gases will be addressed after construction of the LF-2 and LF-3 landfill caps. The implementation of a source control remedy should be consistent with the appropriate long-term remedy for the landfills.

The selected remedy involves a relatively long implementation period (2.5 years), but non-construction personnel would not have access to the site from the commencement of construction activities. Construction provisions would be implemented for this alternative to minimize potential adverse impacts on worker safety. Short-term impacts (i.e., increased noise and vehicular traffic) are unavoidable during construction. Long-term impacts from cover construction will not occur.

The selected remedy also involves containment, an easily implementable, reliable, and available technology. Appropriate measures will be taken during the OU 4 investigation (i.e., monitoring well installation) to maintain the integrity of the installed cover system.

The selected remedy is cost effective in that it provides a reasonable value relative to the degree of protectiveness it offers. While it is the most expensive alternative considered, it is the most effective alternative in limiting future leachate generation as a result of infiltration of precipitation.

The MEDEP has reviewed the selected remedy and concurs with its selection as the most appropriate remedy for OU 2.

Community acceptance of the selected remedy is evidenced by comments received during the public hearings and public comment period. This comments are addressed in the responsiveness summary attached as Appendix B.

11.5 THE SELECTED REMEDY DOES NOT SATISFY THE PREFERENCE FOR TREATMENT WHICH PERMANENTLY AND SIGNIFICANTLY REDUCES THE TOXICITY, MOBILITY OR VOLUME OF THE HAZARDOUS SUBSTANCES AS A PRINCIPAL ELEMENT

The selected remedy will not reduce mobility, toxicity, or volume through treatment of source area contaminants as its principal element. USEPA guidance on RI/FS activities for large landfills recognizes that it is almost always impractical to reduce mobility, toxicity, or volume of source area contaminants for these sites (USEPA, 1991b), and generally that containment is the most practical alternative for these landfills. The reduction of mobility, toxicity, or volume through treatment of contaminants in groundwater will be addressed in the OU 4 groundwater ROD. If necessary, the reduction of mobility, toxicity or volume through treatment of landfill gases will be addressed after construction of the LF-2 and LF-3 landfill caps. The implementation of a source control remedy should be consistent with the appropriate long-term remedy for the landfills.

12.0 DOCUMENTATION OF NO SIGNIFICANT CHANGES

The USAF presented a proposed plan (preferred alternative) for remediation of the Site on July 15, 1994. The Proposed Plan was presented to the public, and public comments were considered prior to the selection of the preferred alternative. The source control portion of the preferred alternative, Containment Using a Cover System, included: site preparation and grading; subgrade fill material placement; composite cover system installation; gates and warning signs installation; deed restrictions; post-closure monitoring and maintenance; and five-year site reviews.

The following are differences between the Proposed Plan and the ROD:

- The OU 2 Proposed Plan referred to this ROD as an interim ROD; however, it is a Final ROD for source control.
- Only passive gas venting was discussed in the Proposed Plan. As noted previously, testing and evaluation are required as part of this ROD to determine if treatment is necessary.
- The possible need for adjacent wetlands remediation was not discussed in the Proposed Plan. Wetlands will be addressed, as necessary, in accordance with the OU 13 Remedial Action.

13.0 STATE ROLE

The MEDEP has reviewed the various alternatives and has indicated its support for the selected remedy. The MEDEP has also reviewed the RI, RA, 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 OU 2. Documentation of this concurrence is attached as Appendix C.

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

ABB-ES	ABB Environmental Services, Inc.
ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPC	contaminant of potential concern
CSF	cancer slope factor
FFA	Federal Facilities Agreement
FFS	Focused Feasibility Study
HI	hazard index
HQ	hazard quotient
IRP	Installation Restoration Program
LAFB	Loring Air Force Base
LF-2	Landfill 2
LF-3	Landfill 3
MCL	Maximum Contaminant Level
MEDEP	Maine Department of Environmental Protection
MEG	Maximum Exposure Guideline
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MRSA	Maine Revised Statutes Annotated
MSWMR	Maine Solid Waste Management Regulations
NCP	National Contingency Plan
NPL	National Priorities List
O&M	operation and maintenance
OU	operable unit
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
RA	risk assessment

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

RfD	reference dose
RI	remedial investigation
RME	reasonable maximum exposure
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SOV	soil organic vapor
SQL	Sample Quantitation Limit
SVOC	semivolatile organic compound
TBC	criteria to be considered
TOC	total organic carbon
TPH	total petroleum hydrocarbons
TRC	Technical Review Committee
USAF	U.S. Air Force
USEPA	U.S. Environmental Protection Agency
μg/L	micrograms per liter
VOC	volatile organic compound

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TRANSCRIPT OF THE PUBLIC MEETING (JULY 26, 1994) AND COMMENT LETTERS ON OU 2 PROPOSED PLAN

File: [illegible]
P.F.

STATE OF MAINE

CARIBOU, MAINE

AROOSTOOK, ss.

PUBLIC INFORMATION MEETING & HEARING

ENVIRONMENTAL CLEANUP OF OPERABLE UNITS (OU) 2 & 7

CARIBOU CENTER FOR THE PERFORMING ARTS
410 SWEDEN STREET
CARIBOU, MAINE
JULY 26, 1994
6:10 P.M.

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

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PUBLIC INFORMATION MEETING

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July 26, 1994

6:10 P.M.

PETER FORBES: I think we're all set to begin, so if you could find a place down near the front here where you can see what's going on and we'll start the program. Some of the text that's going to be presented might be hard to read unless you're up close enough to see it, so that's--I'll just warn you. Or you could be happy just hearing things as they're presented.

Certainly glad that you all could come. The purpose of tonight's meeting, we've got two documents right now that we're presenting tonight that are in the middle of their thirty day public review and comment period. You have until the end of -- of course, we'll get into the details of how to comment on the reports a little bit later but you're free to comment at any time during the public comment period.

What we're going to be doing tonight is a little bit of a presentation to give you an outline of what is contained in the documents that are being reviewed. As you see in the first slide that's there--it's time for introductions. My name is Peter Forbes. I'm the project manager for the Installation Restoration Program at Loring Air Force Base.

Just briefly, the IRP, we call it, is tasked with investigating the sites of contamination around the base and with putting together the projects and actually restoring the base back to a useful purpose. Right now we have the purpose of restoring the property so that it can be transferred for public use as quickly as possible, due to the fact that we're in that closure status.

I'll just let you know how everybody fits together in this whole thing, the Air Force is the one that's in charge of the base and is in charge of the propert, and they're the ones that have hired me and other people like me to work at the base and to monitor the program. We have a small staff there. We're assisted by people that we've hired to help us because of their technical expertise. HAZWRAP is an acronym for the Hazardous Waste Remedial Actions Program, which is operated under the auspices of the Department of Energy. And in turn they have hired a local firm, local for us, they're only three hundred miles away, ABB in Portland, to conduct the investigations. The Maine Department of Environmental Protection assists us as well. They're a partner in communicating to us what the needs are of the State, what the regulations are and what the special concerns are of the State. They report directly to the governor and they're represented tonight by their project manager, Naji Akladiss. And the US EPA is a federal agency which is charged with environmental restoration at different sites around the country. And the way they've been assisting us is helping us to gain from their expertise and their experience in the clean up program, the Superfund Program, and they're quite an asset, really, to the whole program as well; bringing in the experience that they have and assisting us in technical reviews, the documents, and guidance as far as what their regulations are to comply with the federal mandates and requirements.

Tonight what we're going to do, I've got three or four points here I want to go over in the agenda. First, I'm just going to give you a scorecard of where we are in the overall investigation and clean up program. Then we'll present the proposed clean up plans for Operable Units Two and Seven and then we have some other sites which are not technically in the IRP but are impacted by the clean up that we're doing this summer and are also a part of our plan here. So these are sites that are contaminated with fuel and fuel by-products.

So let's go to the next slide. To understand the scorecard, a lot of you know the vocabulary but I wasn't really certain who the audience was going to be tonight. We've got ROD's, Sites, and Operable Units. Sites are the smallest unit that we manage, a discrete site, of which we have 53 sites. Operable Units is a management tool that we use to group sites and sources of contamination together that makes sense to be together because of the types of contaminants or where they're located on the base. These will be presented, in turn, to the public. There are fifteen Operable Units now. Each Operable Unit will lead to some sort of decision document, a Record of Decision, to be preceded by a proposed plan and-- similar to what we've got tonight.

Just to let you know, what we've got tonight are two proposed plans. Each of these lead to a ROD for two Operable Units and in these two Operable Units we'll be covering three sites. Previously we have completed one Record of Decision and that one Operable Unit covered six of the sites. So we're making some progress here. These are fairly significant and may be among the most expensive of our sites.

So, Operable Unit Two is our Landfills Operable Unit, with landfills two and three there. Operable

Unit Seven has the quarry site. And we'll just go right into the presentation here.

Just to get you--of course you can figure out what's going on, I'm speaking from an outline here that you can follow along. The slides that we're showing are actual photographs of the sites, some of them which were taken recently and some which were taken in the wintertime.

Landfill Two is located just outside of the West Gate on Nebraska Road. If you've traveled on that road, it's the road that leads directly into the West Gate. It previously, before it was used as a landfill, was a site of a gravel mining operation. Gravel was used for the construction of the base. It's approximately nine acres and the bottom of the waste may come in contact with groundwater at certain times of the year.

Go to the next slide. This is one of our older landfills. At any point in time we only operated a single landfill for our domestic waste. From '56 to '74, this did receive all of the domestic waste from the base as well as some construction debris from different projects that would have occurred during that time. And up until 1968, it would have also received the operations related waste. Some of these wastes would be like the fuels and the oils and solvents. Some of them, if they were flammable, may have been used in fire training exercises or they may have been taken to the landfill where they may have been burned or buried there. There's not a lot of records as to how the waste was handled there prior to 1968, except to know that it was accepted practice there as well as some of the other similar landfills or dumps around the area to burn what was burnable in order to consolidate your waste there. It was in '68 that we began a program where the hazardous materials from the shops were managed in such a way that they were not disposed of here at Landfill Two.

So we investigated Landfill Two. Just to lead right into what the results were, we did find that there are health risks associated with exposure to the surface soils and the sediments and the surface water that seeps out at different times of the year from the landfill. Our investigations have determined that the groundwater beneath the waste itself, actually within the confines of the landfill, has been affected and that we have determined that there are contaminants down-gradient of the landfill that are above the federal guidelines for safe drinking water.

We have investigated the nearest neighbors to the landfill and tested their drinking water and they are located less than a mile from the landfill on Nebraska Road. However, they are not directly down-gradient from the landfill, so it's not really anticipated that they would have had an impact, but we have tested their well water nevertheless as a precaution. As far as the groundwater investigation goes, this particular Operable Unit is focused only on eliminating the path-ways of exposure to the source of contaminants there at the landfill. The groundwater investigations have not been completed yet, but they will be completed in the OU4 Remedial Investigation Report, which is due in December. So we're not really too far away with that investigation.

Again moving to Landfill Three, when we closed Landfill Two, we began using Landfill Three which is located just a bit south and east of Landfill Two. It's on Sawyer Road just outside the West Gate, about a half a mile or so from the West Gate. That was operated from '74 to '91 and it also is in the same area that had been previously mined for gravel. It's a bit larger, seventeen acres in size, though not as deep. The ground water there has been found to come in contact with the bottom portions of the waste during different times of the year as well. Because we had ceased disposing of hazardous materials at the landfills there in '68, the bulk of the materials that are wastes that have been disposed of at Landfill Three are just the domestic wastes from around the base, and each of the shops will have a dumpster outside for emptying their garbage cans into; banana peels and all that, but it's not unreasonable to expect that there may be empty containers and whatnot or partially filled containers that may have been disposed of through that means, especially given the types of materials that we're--or substances that we're detecting in our investigations.

The result of the investigations are that we do -- the risk assessment does indicate that long-term exposure to the surface soils will result in a health risk. I didn't write that down here, but also there are ecological risks that are associated with the surface soils as well. We do know from measuring the ground-water that it has been impacted by the waste. We also know that there have been detections down-gradient of the landfills of contaminants above the safe drinking water levels, established both by the State and the Federal Guidelines.

Here we have neighbors that are a little bit closer in a different direction, just south of the landfill. They're about half a mile a way but, again, our indications are that they're not directly down-gradient and we have tested their wells as well and found them not to be impacted by our landfills.

And similarly the investigations of the groundwater are not yet complete, and they will be completely presented in this Remedial Investigation Report that's due in draft form in December. So those of you that are members of the Restoration Advisory Board will get some kind of a preview of that around the wintertime.

As a result of our investigations, we did determine that a clean up action was indicated. These being landfills, there are really not a lot of different options that are open to us. The alternatives that we considered were to take no action--this particular alternative is required by law for us to consider and to investigate. The other option that we considered was to cap the landfills with a cover system that would comply with the State of Maine and the Federal Guidelines.

Why I have italicized there the "Presumptive Remedy", there's a fairly recent approach that has been indicated by the Environmental Protection Agency as being an approach for streamlining or speeding up the decision-making process for Superfund Sites; by looking at a bunch of landfills and the number of

Landfill Records of Decision across the country, they found that the most frequent and most appropriate remedy is to cover the landfills with a cover system or cap them. So there's some advantages to following these presumptive remedy guidelines and this is what we've chosen to do in order to streamline the documentation and the time it requires to come to a decision at the site.

It is our recommendation that the remedy be the landfill cover system, that is the remedy that is recommended in the proposed plan that is under review right now. The reasons for that are that a cover system will prevent people from coming in direct contact with the waste, which was the primary exposure route for the risk at the site. It prevents any of these contaminants being washed into the surface water or ditch system and finding its way across in any of our surface waters in the area. And it also prevents the infiltration of surface water from rainfall or snow melt, which would and has had an impact on the groundwater quality beneath the landfills.

The essence of the cover system or what this remedy involves is -- I've just listed here what the major steps are in the construction project; is to prepare the site, move in some fill material in order to slope it and create a mound shape, put the gas collection system and cover over the waste, put the gates and warning signs on there. People need to be warned that there is a gas vent sticking up or something that they shouldn't be digging for worms into. A deed restriction, that is limit the development of the property. The future owners of the property should know that they shouldn't dig into the cover system or do any kind of activity which would limit its effectiveness. And to monitor and maintain the cover system and five years from now conduct a site review of the site. Some of these steps are mandatory and are required in order to close out the site.

What I've got next is a diagram of what some of the different layers are in the cover system. There's a diagram which is in the proposed plan, if you've had a chance to review it. If you haven't had a chance to review it, I do have extra copies here and you can pick one up or take it home or whatever you want to do with it. Basically just to give you an idea of what the landfill cover system will look like, it will be sloped so that surface water will run off. It's not a very steep slope, but just enough to control surface water. There will be grass, or native grasses, growing on it and the various layers are intended to control the runoff of the surface water and the collection of the landfill gasses and the prevention of water going through the cap into the waste. So whatever is inside there, whatever moisture is inside the waste when it gets covered, essentially will be the--as wet as it gets, I guess.

Let's look at the next slide, just to let you know when things are going to happen. Provided that this is the decision that is arrived at, the final decision for the site, the design for the cover system will begin here in the summer. The site will be prepared, or the mound shape will be prepared, and the subgrade constructed with this fill and placement--or fill material. We'll have to clear the trees off the site and prepare the site for construction and bring in these materials. It's intended that we'll bring in all of the materials that we need except for minus the cover system materials, just the sheer weight of this amount of materials is going to cause some settlement to occur and it's our plan to have that occur over the wintertime. So then the cover system itself will actually be installed next summer.

The estimated project cost is 23.4 million dollars. That's the cost that's published in the proposed plan. It is an estimate. It may or may not reflect the final cost of the project.

What I'd like to do is move right into the next proposed plan. That really concludes that presentation for that particular proposed plan and after I finish the presentation, I'll entertain any questions you might have. Just moving into the Quarry Site, which is Operable Unit Seven, the quarry is, as the name implies, a seven acre limestone quarry. It's located just outside the nose dock area, which is the main aircraft parking and refueling and operations area on the base. It is not on any of the main roads that are on the base, though, and if you haven't been given a tour, you are likely not to have actually been able to see the site because it would have been off limits to you. It's comprised of two different tiers. The history of the site, it had been mined at several different times throughout its history. The upper tier is a crescent shaped area which is pretty flat and rocky and doesn't have very much growing in it. About two and a half acres in size. And then the lower tier, which is a circular area. What you're looking at here in this is the lower tier, which is flooded, is about two acres in size. The upper tier--you probably have your laser torch, Mike? You know where the--there's the upper tier over there. A lot of you may have seen the site but if you haven't, that's pretty much what it looks like today.

The operation of the site is that it has been used as a quarry for construction materials on the base from the time the base construction began in '47 to the last major construction project in 1985. The reason it is an IRP Site is that in the mid eighties there were some one hundred--this is a rough number, I don't have the final tally of drums were observed to be there and they have been removed. Subsequently, our investigations have shown that they are the likely -- they were the likely source of the types of contaminants that we're seeing there. And what we've concentrated on are the soils that are in the upper tier and the lower tiers. The actual rocks themselves look pretty much like they've been unaffected. The result of the investigation is that we do expect there to be health effects from exposure to the soils as a result of conducting a risk assessment at the site. Both the upper tier and the lower tier soils have contaminants. What I mean by unevenly distributed, means that we have detections at different spots. Within the soils there, there may be spots that have very low levels of contaminants and some that exceed the risk guidelines, but because of their distribution, they're fairly widely distributed through the soils but in an uneven manner. What those contaminants are are semi-volatile organic compounds; the types of compounds that are found in oils and lubricants and so forth. Pesticides, PCB's, and inorganics. There's some metals which have been detected there as well at levels that would pose a risk to the environment.

The primary thing that we're worried about here is that it appears that contaminants are concentrated in that upper tier area and because of rainwater and snow melt, they're being washed down into the lower tier and in that lower tier, which as you can see there's nice little wetland growing in there, but it has an outlet there which goes into the Greenlaw Brook Wetland, which is a much larger wetland and considerably more valuable. And we've also discovered that groundwater beneath the site here has been contaminated with -- well, we've detected fuel, solvents and pesticides there.

So again we've seen the need to take an action here and so we assembled a study to evaluate the various clean up alternatives that were available to us. Just to go down through the list, the No Action Alternative, we here have termed it the Minimal No Action because it isn't completely no action but it does involve some monitoring of the site, periodic monitoring, environmental monitoring as well as chemical monitoring over the next thirty years or so. That estimated cost is nearly a million dollars for that program, most of which are future expenses when we expect the cost of the dollar to be, you know, --well, inflation goes into this. That's why the cost seems so high.

A cover system was also analyzed here. That would have involved excavation of the soils that are in the lower tier. Putting them up into the upper tier and putting a cover over them to prevent the erosion from the rainwater and the snow melt. Estimated cost there is 2.34 million dollars. The asphalt batching is another option, more of a treatment type option, where you would be picking up the soils, mixing them with asphalt and then you'd actually have a product that you could market; use for construction or market to the local community. The estimated cost there was over seven million dollars.

The other option that we considered was to use these quarry soils as a fill material in the landfill cover construction system. Here what would be involved is a little bit of timing, making sure that removal of the soils occurs at the time that the landfill construction is occurring but removing the soils from this particular site, placing them in the landfills that we have at the base and covering them with that landfill cover that was to be covering the landfill waste. I just have to say that this is an alternative which is being considered but it is contingent on the final decision to cover the landfills at Operable Unit Two. And the cost is nearly two million dollars estimated cost.

So our recommendation is, actually, to use these quarry soils as the fill material and the landfill cover system. The reason for that, you are going to be able to reduce the risks at the site, will be able to prevent direct contact with the waste. The waste and the contaminants will no longer be subject to erosion into the wetland. The migration of the contaminants into the groundwater system will also be eliminated by eliminating the source. It is a remedy which complies with all the Federal and State regulations. We need to make note, though, that the wetland that is in the quarry will have to be removed or destroyed in order to implement this remedy, as it would with all of the other remedies.

The schedule is right around the corner, that we would prepare the site for construction here this summer. First we'll take out the larger pieces of concrete and rubble and then we would remove the actual soils and sediments. We can use all of these materials that we're removing as fill in the landfill cover system. It's a little bit tricky for the designers, maybe, to handle the big pieces but it can be done. Restoration of the wetlands will occur at--at this point in time there isn't a schedule for that but we do have a plan for remediating of wetlands or restoring them as part of the overall base wetlands program. There would be monitoring of the system throughout the next five years to determine if the remedy has had the desired effect.

This leads to the last slide. I mentioned that there were some other sites that are impacted by these actions. To see how they all fit together, -- provided we are able to -- that the recommended decision becomes final to cover the landfills, and that we choose this particular remedy for our OU7, we see that in order to comply with the necessary regulations we need to make sure that -- for you that are up on your environmental regulations, we need to make sure that we don't violate the land disposal restrictions of RCRA. Does anyone need to know what RCRA is? Okay. The LDR, for short, states that you cannot remove soil from--that has hazardous characteristics as defined there by RCRA. You can't remove anything like that from a site and then put it back in the ground without some sort of treatment first. What we have decided to do is compare the soils that are at the site to the RCRA hazardous characteristics. For those soils that are not considered hazardous, we will treat them some other--we will--those will be eligible then for just excavation and used as sub-grade material at the landfills. These may be materials that may be required to be cleaned up under the IRP program, the CERCLA--which follows the CERCLA process or any of the--some of the State clean up programs like the underground storage tank programs. When we have removed tanks that are out of service and we find that there are soils that are contaminated according to the State of Maine, and it is determined that these soils do not exhibit hazardous characteristics, then these soils will be used in our landfill construction. As a matter of fact, they would be treated in a similar fashion by the State of Maine if we didn't have this particular landfill available to us at this point in time. So where it has an impact is, we had foreseen this opportunity and agreed to that with some of the sites that were in the OU6 Record of

Decision, an agreement that was made with the State of Maine for some of the sites there. And also where it has an impact is for the railroad maintenance site, which in the OU6 ROD, the decision there was made to remove the soils and dispose of them at a licensed disposal or treatment facility. This does result in a significant difference from the Record of Decision for OU6 for which we will be publishing an explanation of significant differences. We are planning to, subject to the OU2 ROD being issued, we are planning to have the OU6 soils from the railroad maintenance site disposed of here at the landfill.

Another site which is impacted is there's a site that's in Operable Unit 2A, adjacent to Landfill Three. The coal ash pile is what it was called and there we have coal ash and are planning to have it removed subject to it not violating the LDR, having that disposed of there and the landfill cover system. And we have additionally proposed with the State of Maine and the Environmental Protection Agency, that we have the same remedy with some of the petroleum contaminated soils from some of the different underground storage tank sites around the base. And actually I have a slide after this one where we list some of the different sites that are planned to have this similar treatment. Simply an excavation from the site.

LEO ROBICHAUD: Peter, on the previous slide at the bottom you said you're taking some contaminated soil from underground storage tanks and pipelines. Could you tell us which pipelines you're talking about?

PETER FORBES: Actually, now that I've looked at my list, Dave, are any of these from pipeline projects?

DAVID STRAINGE: The only-- the pipelines are just some of the pipes associated with the hydrant(sic)system. There was some pipes come up when we yanked some tanks a couple of summers ago.

PETER FORBES: Or when we had--.

DAVID STRAINGE: (Un-intellig2ble)--just a little bit of distribution out to the -- .

PETER FORBES: That consolidated stockpile there, a lot of those soils were from a construction project in which a lot of the pipes were removed there too. So, anyway, there's a list of a number of the sites that are being proposed for this action as well. These are sites that contain petroleum compounds only and that's one of the reasons that they are found not to pose a risk as far as the LDR is concerned or for CERCLA. Actually, this concludes the presentation that I had prepared for tonight. I know that there may be people that have questions and certainly I'll either answer the question or refer you to a more appropriate expert. One thing I will let you know, too, though is that if you have come with prepared formal comments, you should give them at the time we're prepared to receive the comments. Which I don't know if we can accelerate that or not. Yes, Mr. St. Peter.

MAYNARD ST. PETER: (Away from any microphone) I have a couple of questions, Peter. The pile of rubble out on the end of Pennsylvania Avenue, will that be added to this OU?

PETER FORBES: Is it a pile of rubble approximately --

MAYNARD ST. PETER: Yeah.

PETER FORBES:--twenty or thirty feet tall with a tarp over it?

MAYNARD ST. PETER: Yeah.

PETER FORBES: Yes. Did I neglect to mention that one?

MAYNARD ST. PETER: Well, I haven't seen it posted any place and it wasn't either of those two--.

PETER FORBES: Okay. Well, it's not--.

MAYNARD ST. PETER: (Unintelligible)--would be included in this --.

PETER FORBES: In the sub-grade fill, you're right. We do plan to have that used there in the sub-grade fill.

MAYNARD ST. PETER: (Unintelligible).

PETER FORBES: These are petroleum compounds as well, similar to our underground storage tank. This was a result of that construction project when we changed the refueling system out in the nose dock area in the eighties. Mid eighties. And they were tested for volatile organic compounds and if they exceeded a certain level, then they would have -- they were stockpiled in this area. They have been tested since they were piled up there and it's found that a lot of--as you might expect, a lot of the organics have decreased in concentration. What we're seeing is still some of the heavier fraction of the fuels that is still remaining there.

MAYNARD ST. PETER: Can you give me the approximate cubic yards of that dirt?

PETER FORBES: We're estimating around forty thousand cubic yards. Can everyone hear your questions? I think so.

MAYNARD ST. PETER: On OU2, the gas venting system, how many pipes are we going to have sticking out of the ground?

PETER FORBES: How many? That's a good question. I don't know if I--.

DENIS ST. PETER: The number will be proppposed in the remedial design.

PETER FORBES: The design will specify that. I know that we have a minimum distance or maximum distance, rather, that there will be. Actually, we have someone here that's reviewed the design, don't we? Do you remember how many there are, Harrison?

HARRISON BISPHAM: No, I--.

PETER FORBES: No?

HARRISON BISPHAM: It's changed a lot since I reviewed the design.

DENIS ST. PETER: They're under design right now, Maynard. And it's ten to twenty.

MAYNARD ST. PETER: All I'm wondering is how high above the ground they will be and will they be protected from somebody running into it on a snowmobile, let's say. If somebody does hit that? Will it come up to that (unintelligible).

(UNKNOWN PERSON): I don't think so. I think that they'll be obvious features of the terrain. And it would be like hitting a tree.

MAYNARD ST. PETER: Well, you know, snowmobiles have been known to do that.

(UNKNOWN PERSON): Yes, I know.

DENIS ST. PETER: I think that's a detail that will be worked out apparently in the--when we finalize the design. And in the feasibility study, the design does not actually get down to that level.

DAVID STRAINGE: Maynard, we hear exactly what you're saying and we will talk to the design engineers about that issue.

MAYNARD ST. PETER: I had one more question on the material that you'll be hauling in there this summer to put on OU2 is going to weigh quite a bit and we had discussed that, --

PETER FORBES: That's right.

MAYNARD ST. PETER:--the

water coming up through to meet it and you were going to elevate it high enough so that it wouldn't.

PETER FORBES: Right.

MAYNARD ST. PETER: Will there be enough settling of that material so that it might reach that? (Unintelligible)

PETER FORBES: That's a good observation, I think. There is certainly going to be some settling that will occur and some of the settling will be because of the wastes that are there now will have a lot more weight on top of them and will get compressed. I don't think -- well, of course, we have people that are modeling that sort of thing but it's been our instruction to the designers that we need to have any of this soil that comes in in areas that are not going to settle so much that they would come in contact with the water. The investigation of water system as well shows that, yes, there is water coming into the very bottom of the waste also but I don't think it's coming anywhere near the--even to the lowest parts of the landfill right now. So, no, I don't think--I understand your concern but I think that we're taking the necessary steps to prevent that from occurring. If you want more detail or anything, Mr. Bispham here is an engineer working with the State of Maine and has had a chance to look at our design and has looked at designs, a lot of different landfill cover systems, as well. Has offered to discuss anything with you.

Well, if there aren't any other questions, we can take a break and we'll prepare the area for the public hearing portion and you're welcome to mingle and then reassemble at 7:15 sharp.

DAVID STRAINGE: Let's take at least five minutes here. After consulting with my legal staff, we can open the hearing early. We'll have to maintain it open after the 7:15 period but I know some of you have brought statements and we don't need to keep you here until 7:15 just to--so why don't we all stand up, stretch for five minutes and then perhaps as early as 7:00 o'clock we'll open the formal hearing portion, take any statements, if some of you want to get home.

RECESS

PUBLIC HEARING

7:10 P.M.

DANA COLEMAN: Good evening. My name is Dana Coleman and I will be the presiding officer for tonight's meeting. This hearing is being held in accordance with the provisions of the

Comprehensive Environmental Response Compensation and Liability Act as amended in 1986. The Act requires federal agencies on the EPA's National Priority List to present clean up proposals to the local community for comment and consideration before any final clean up decisions are made.

The purpose of tonight's hearing is to receive your comments, suggestions and criticisms on either or both plans. Those of you who have not had an opportunity to review the plans may do so at the Robert Frost Memorial Library in Limestone or obtain a copy from Mr. Peter Forbes before you leave tonight. We also have a fact sheet that provides a brief overview of the plan that we handed out earlier tonight.

The meeting held earlier and this hearing are intended to provide a continuing public forum for two-way communications about the clean up of these Operable Units in particular and the base's clean up program in general. If you are not prepared to make a statement tonight, you may submit written comments from now until August 13th to the address that is listed on the back of the fact sheet that was handed out earlier.

We have Mr. Phil Bennett from Aroostook Legal Reporters serving as the court reporter here tonight who will take down verbatim everything that is said.

The verbatim record will become a part of the final clean up plan. The court reporter will be able to make a complete record only if he can hear and understand what you say. With that in mind, please help enforce the following ground rules. First, please speak only after I recognize you and please address your remarks to me. If you have a written statement, you may place it in the box next to the podium. You may read it out loud or you may do both. Please speak clearly and slowly into the microphone; starting with your name, address, and the capacity in which you appear for. For example; a public official or a designated representative of a group or a concerned citizen. This will help our court reporter prepare a professional transcript.

Before we move on to the hearing portion, one thing I can't stress enough, you may have information about these two operable units that is unknown to us and is of great interest to our planners. You have experience that comes from living in this area, so the second part of today's communication, the part that flows from you to us, is important. Don't hesitate to be a part of these proceedings. With that, is there anyone who would like to make a presentation tonight? Mr. Robichaud, would you like to please come up to the.

podium?

LEO ROBICHAUD: Thank you, Dana. My name is Leo Robichaud. I'm the Chairman of the Environmental Committee of the Leaders Encouraging Aroostook Development, who is a TAG recipient for the Superfund Site at Loring Air Force Base. This committee also is a consultant to the Loring Development Authority. The Loring Development Authority will review these comments at their next meeting and approve them and submit them also. I already have given you a copy of my comments in the box but I will read them for you now. We will start with the OU2 proposed plan.

Most of this information I'm reading was developed by our TAG grant consultant, Mr. Craig Gendron. I've paraphrased it and put it under Leaders Encouraging Aroostook Development letterhead.

OU2 is comprised of Landfills Two and Three. Two soils/source control remedial alternatives were evaluated for OU2. The two remedies were no action and containment via a cover system.

Only the capping alternative was shown to address the remedial action objectives and is therefore proposed for installation at OU2. The five main components of the capping alternative are shown below.

Site preparation and grading, placement of subgrade fill material, installation of cover system, installation of gates and warning signs, deed restrictions, post-closure monitoring and maintenance, site reviews.

From a soil perspective, the capping alternative does seem to be consistent with the risks posed by the landfill soils as identified in the RI/FFS. While the Air Force has chosen to approach soil and groundwater remediation separately, the Air Force should consider the following groundwater issues when completing OU4 field investigations and prior to finalizing the design of the landfill cap.

Saturated refuse. From a groundwater remediation perspective, saturated refuse is a key technical issue. Therefore, the characterization of this condition and its implications to remedial system design should be fully addressed in the OU4 RI. Should saturated refuse be encountered or anticipated, the Air Force may wish to consider installing wells capable of groundwater recovery through the refuse or perhaps modifying existing wells for this purpose as part of the design of the landfill cap. Once capped, installation of groundwater recovery wells through the refuse, if required, may involve difficult engineering techniques.

Groundwater recharge basins. As the recharge of collected precipitation from the capped areas through recharge basins will certainly impact groundwater hydraulics, their location may become an important design consideration for groundwater remediation. Therefore, proposed recharge basin areas should be sufficiently characterized prior to completing the design of the landfill cap such that they are not located in areas which may deleteriously affect groundwater remediation.

Compliance boundary. As part of the design for OU2, the Air Force should identify the compliance boundary for groundwater beneath each landfill. Should the groundwater compliance boundary coincide with the limits of the landfill cap as described in the final RI/FFS, the installation of an active groundwater remediation system within the compliance boundary may be difficult. The Air Force may wish to seek approval for a groundwater compliance boundary some reasonable distance from the limits of the cap to accommodate an active groundwater remediation system in the event that one is required.

That's all I have on OU2. I have a short one on OU7.

In summary, the proposed plan for the Quarry Site includes removal of contaminated soil from the lower and upper tier, use of that soil for capping materials at OU2, wetland restoration, groundwater use restrictions and long term environmental monitoring. The soil removed from the upper and lower tier and drainage ditch would be used for subgrade material for the cap on the OU2 Landfills.

In general, we concur with this approach with the cautions outlined below.

In addition to being productive environments for plant and animal species, wetlands provide a natural bio-remediation system for attenuation and remediation of many contaminants. Wherever possible, these systems should be minimally disturbed.

During soil removal in all areas, attention to erosion and runoff must be strictly watched to avoid excessive siltation of the remaining wetland area.

The delineation soil sampling task will be very important as only those soils that must be removed should be removed. Due to the sensitivity of wetland environments to alteration, excavation should be limited to create as little disturbance as possible.

The soil removal/wetland restoration tasks must be dovetailed so that only minimal hiatus remains between excavation and wetland creation. Seasonal considerations suggest an early spring or late fall timing for these events.

That's all I have tonight, and thank you very much.

DANA COLEMAN: Thank you, Mr. Robichaud. Are there any other commentors for tonight? There's one thing that I forgot to mention and that is that everything tonight will be formally responded to and will be part of the final plan, as I said earlier, but it will be a formal response. Mr. Forbes?

PETER FORBES: Yes. Ms. Coleman, I'm Peter Forbes, working with the Air Forc Base Conversion Agency and I have a statement that I want to enter into the public record, after which I will place a written copy of the statement into this box that's down in front here.

The use of excavated soils and sediments from OU7 as fill material for the landfill cover system (OU2) is subject to: (one) the Air Force's issuance of a Record of Decision for OU2 which meets the requirements of CERCLA and the NCP; and demonstration by the US Air Force that the excavated soils from OU7 comply with the procedures specified within the LDR Technical Memorandum dated 13 July, 1994. And (two) the LDR Technical Memorandum is available for review in the Administrative Record file for OU7.

DANA COLEMAN: Thank you, Mr. Forbes. If there are no more commentors, we will keep the hearing open until 7:35 and take a brief recess. Correction, the hearing will stay open until 7:45.

RECESS

DANA COLEMAN: It is now 7:45 and the hearing is officially closed.

END OF HEARING

SF-AZ-13 PENGAD

CERTIFICATION

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

LORING AIR FORCE BASE
OU2 & OU7 PUBLIC INFORMATION MEETING AND HEARING
CARIBOU CENTER FOR THE PERFORMING ARTS
CARIBOU, MAINE
JULY 26, 1994

PENGAD-Bayonne, N.J. [redacted]
EXHIBIT
#1
7-26-94 P.R.B.

OU2/OU7 Proposed Plans
Public Meetings
26 July 1994

Introduction
- Installation Restoration Program (IRP)
- Role of Air Force, Maine DEP, EPA, HAZWRAP, ABB, Public
- Agenda
  - Scorecard
  - OU 2 Proposed Plan presentation
  - OU 7 Proposed Plan presentation
  - Sites with fuel contamination

Scorecard
- RODs, Sites and OUs
- Record of Decision (ROD) for 6 of 53 sites and 1 of 15 OUs
- Proposed Plans will lead to RODs for 3 sites in two OUs
  - OU 2 - Landfill 2 and Landfill 3
  - OU 7 - Quarry

Landfill 2 Description
- Located on Nebraska Road outside the West Gate
- Previously mined for gravel
- Approximately 9 acres in size
- Groundwater may come into contact with bottom portions of the waste

Landfill 2 Operations
- Operated from 1956 to 1974
- Domestic waste
- Construction debris
- Operations related waste (e.g., fuels, oils, solvents, lubricants, paint)
- Wastes were burned and buried prior until 1968
- Disposal of hazardous materials terminated in 1968

Landfill 2 Investigation
- Health risks expected from exposure to surface soils, seeps and sediments
- Groundwater beneath the waste is affected
- Contaminants detected above safe drinking water levels in down-gradient monitoring wells (north and west)
- Nearest drinking water well is within one mile and is not down-gradient
- Groundwater investigations will be evaluated in the OU 4 report due December 1994

Landfill 3 Description
- Operated from 1974 to 1991
- Located on Sawyer Road outside the West Gate
- Previously mined for gravel
- Approximately 17 acres in size
- Groundwater seasonally contacts bottom portions of the waste

Landfill 3 Operations
- Domestic waste
- Small quantities of maintenance shop wastes

Landfill 3 Investigation
- Health risks expected from long term exposure to surface soils
- Groundwater beneath the waste is affected
- Contaminants above safe drinking water levels have been detected down-gradient
- Nearest drinking water wells are within one-half mile and are not down-gradient
- Groundwater investigations will be evaluated in the OU 4 report due December 1994

Cleanup Alternatives Considered
- No Action
  - Legally required to be considered
- Landfill cover system (cap)
  - *Presumptive remedy* of the EPA
  - Consistent with current Maine landfill closure guidelines

Air Force recommends Landfill Cover System alternative
- Direct contact with the waste is prevented
- Migration of contaminants to surface water is prevented
- Infiltration of surface water (from rain and snow melt) is prevented, which minimizes impacts on groundwater quality

Landfill Cover System Design
- Prepare the site for construction
- Place fill material to create a mound shape
- Install the cover and gas venting system
- Install gates and warning signs
- Limit development of the property (deed restriction)
- Monitor and maintain the property
- Conduct a site review in five years

Figure - Cross Section of Cover System

Landfill Cover System Construction Schedule

- Design in summer 1994
- Site preparation in summer 1994
- Fill material placement in summer/fall 1994
- Settlement of fill material in winter 1994/1995
- Installation of cover system in summer 1995
- Estimated total project cost: $23.4 million

Quarry Description

- Seven acre limestone quarry
- Located north-west of the main aircraft operations area
- Cresent shaped upper tier
  - Approximately 2.5 acres in size
  - Flat, dry, rocky, sparse vegetation
  - Seasonally flooded prior to 1985
- Circular lower tier
  - Approximately 2 acres in size
  - Approximately 30 below the upper tier
  - Seasonally flooded wetland area

Quarry Operation

- Mined intermittently from 1947 to 1985
- Approximately 100 drums were observed and removed in mid 1980's from upper tier

Quarry Investigation

- Human health and ecological risks are expected from exposure to soils
- Contaminants are unevenly distributed throughout soils in upper and lower tiers at concentrations exceeding risk based limits
- Soil contaminants are: semi-volatile organic compounds, pesticides, PCBs, inorganics
- Contaminants are being eroded from the upper tier to the lower tier and into the Greenlaw Brook wetland by rain and melting snow
- Groundwater beneath the Quarry is contaminated with fuel, solvents and pesticides

Cleanup Alternatives Considered

- Minimal No-Action
  - Includes environmental monitoring and site reviews for thirty years
  - Estimated total project cost: $928,000
- Cover System
  - Estimated total project cost: $2.34 million
- Asphalt Batching
  - Estimated total project cost: $7.59 million
- Use of Quarry Soils as Fill for Landfill Cover System
  - Estimated total project cost: $1.85 million
  - Contingent on decision to cover landfills (OU 2 ROD)

Air Force Recommends Use of Quarry Soils as Fill for Landfill Cover System

- Direct contact with waste is prevented after removal
- Migration of contaminants to surface water and wetlands is eliminated
- Migration of contaminants to groundwater is eliminated
- Complies with state and federal regulations (subject to OU 2 ROD)
- Destruction of Quarry wetland is necessary to prevent impacts to the larger Greenlaw Brook wetland

Quarry Cleanup Schedule

- Prepare the site in summer1994
- Remove large pieces of concrete and rubble in summer 1994
- Remove upper and lower tier soils and drainage ditch sediments in summer 1994
- Use concrete, rubble, soils and sediments as fill in landfill cover system construction
- Wetlands restoration within five years
- Environmental monitoring for five years

Other Sources of Fill Material for Landfill Cover System

- Use of soil as fill material must not violate the Land Disposal Restrictions of RCRA
  - LDR states that soils with hazardous characteristics as defined by RCRA may not be placed in the ground without treatment
  - Soils that remain on-site may pose an enviromental or health risk without exhibiting hazardous characteristics
  - LDR technical memorandum is available for review in the Admin Record
- Soils from OU 6 ROD previously agreed with the state of Maine
- Soil from the Railroad Maintenance Site (OU 6)
  - Requires an Explanation of Significant Differences to the OU 6 ROD
- Soil and Coal Ash from the area adjacent to Landfill 3
- Petroleum contaminated soil from UST and pipeline removals

Chart of Fill Material Descriptions and Quantities

File:
P.F.

TO: AFBCA/OL-M
PO BOX 523
LIMESTONE ME 04750-0523

FROM: LEO J ROBICHAUD
CHAIRMAN ENVIRONMENTAL COMMITTEE OF L.E.A.D.
T.A.G. Recipient

DATE: July 26, 1994

RE: REVIEW OF FINAL O.U. 2 PROPOSED PLAN

OU 2 (Landfill Soils/Source Control) is comprised of Landfills 2 and 3, or LF-2 and LF-3, respectively. Two soils/source control remedial alternatives were evaluated for OU 2. The two remedies were:

* No action; and
* Containment via a cover system (i.e., capping).

Only the capping alternative was shown to address the remedial action objectives and is therefore proposed for installation at OU 2. The five main components of the capping alternative are shown below.

* Site Preparation and Grading
* Placement of Subgrade Fill Material
* Installation of Cover System
* Installation of Gates and Warning Signs
* Deed Restrictions
* Post-Closure Monitoring and Maintenance
* Site Reviews

From a soil perspective, the capping alternative does seem to be consistent with the risks posed by the landfill soils as identified in the RI/FFS. While the Air Force has chosen to approach soil and groundwater remediation separately, the Air Force should consider the following groundwater issues when completing OU 4 field investigations and prior to finalizing the design of the landfill cap:

* Saturated Refuse

From a groundwater remediation perspective, saturated refuse is a key technical issue. Therefore, the characterization of this condition and its implications to remedial system design should be fully addressed in the OU 4 RI. Should saturated refuse be encountered or anticipated, the Air Force may wish to consider installing wells capable of groundwater recovery (for water table depression) through the refuse or perhaps modifying existing wells for this purpose as part of the design of the landfill cap. Once capped, installation of groundwater recovery wells through the refuse, if required, may involve difficult engineering techniques.

* Groundwater Recharge Basins

As the recharge of collected precipitation from the capped areas through recharge basins will certainly impact groundwater hydraulics, their location may become an important design consideration for groundwater remediation. Therefore, proposed recharge basin areas should be sufficiently characterized prior to completing the design of the landfill cap such that they are not located in areas which may deleteriously affect groundwater remediation.

* Compliance Boundary

As part of the design for OU 2, the Air Force should identify the compliance boundary for groundwater beneath each landfill (LF-2 and LF-3). Should the groundwater compliance boundary coincide with the limits of the landfill cap as described in the Final RI/FFS (i.e., the limits of waste), the installation of an active groundwater remediation system (if required) within the compliance boundary may be difficult. The Air Force may wish to seek approval for a groundwater compliance boundary some reasonable distance from the limits of the cap to accommodate an active groundwater remediation system (i.e., groundwater recovery and treatment) in the event that one is required.

File:
P.F.

TO: AFBCA/OL-M
PO BOX 523
LIMESTONE ME 04750-0523

FROM: LEO J ROBICHAUD
CHAIRMAN ENVIRONMENTAL COMMITTEE OF L.E.A.D.
T.A.G. Recipient

DATE: July 26, 1994

RE: REVIEW OF FINAL O.U. 7 PROPOSED PLAN

In summary, the proposed plan for the Quarry site includes removal of contaminated soil from the lower and upper tier, use of that soil for capping materials at OU-2, wetland restoration, groundwater use restrictions and long term environmental monitoring. The soil removed from the upper and lower tier and drainage ditch would be used for subgrade material for the cap on the OU-2 Landfills.

In general, we concur with this approach with the cautions outlined below.

* In addition to being productive environments for plant and animal species, wetlands provide a natural bio-remediation system for attenuation and remediation of many contaminants. Wherever possible, these systems should be minimally disturbed.

* During soil removal in all areas, attention to erosion and runoff must be strictly watched to avoid excessive siltation of the remaining wetland area.

* The delineation soil sampling task will be very important as only those soil that must be removed should be removed. Due to the sensitivity of wetland environments to alteration, excavation should be limited to create as little disturbance as possible.

* The soil removal/wetland restoration tasks must be dovetailed so that only minimal hiatus remains between excavation and wetland creation. Seasonal considerations suggest an early spring or late fall timing for these events.

File:
P.F.

Statement for the Record by the US Air Force

1. The use of excavated soils and sediments from OU 7 as fill material for the Landfill cover system (OU 2) is subject to:

   a. the Air Force's issuance of a Record of Decision for OU 2 which meets the requirements of CERCLA and the NCP; and

   b. demonstration by the Air Force that the excavated soils from OU 7 comply with the procedures specified within the LDR technical memorandum dated 13 July 1994.

2. The LDR technical memorandum is available for review in the Administrative Record file for OU 7.

RESPONSIVENESS SUMMARY

FINAL

Loring Air Force Base

OU 2 AND OU 7 RESPONSIVENESS SUMMARY

SEPTEMBER 1994

Prepared for:

Air Force Base Conversion Agency
Loring Air Force Base, Maine
(207) 328-7109

Prepared by:

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

Contractor: ABB Environmental Services, Inc.
Portland, Maine

Project No. 7626-09/15

OU 2 AND OU 7 RESPONSIVENESS SUMMARY
LORING AIR FORCE BASE

TABLE OF CONTENTS

The U.S. Air Force (USAF) held a 30-day comment period from July 15 to August 15, 1994, to provide an opportunity for the public to comment on the Proposed Plans and other documents developed for Operable Unit No. 2 (OU 2) source control and OU 7 source control at Loring Air Force Base, Maine. These Proposed Plans are the documents that identify remedial action objectives, evaluate remedial alternatives, and recommend the alternatives that best meet the evaluation criteria for these OUs. The USAF made preliminary recommendations of its preferred alternatives for remedial actions at both OUs in Section 6.0 of the respective Proposed Plans, which were both issued on July 14, 1994. All documents on which the preferred alternatives were 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 actions for the OU 2 and OU 7 source areas. It is available to the public at the following locations:

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

Air Force Base Conversion Agency
5100 Texas Road
Loring AFB, ME 04751
(207) 328-7109

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 2 and OU 7 source controls. The USAF considered all comments in this document before selecting a final remedial alternative to address soil contamination from OU 2 and soil and sediment contamination from OU 7.

Although OU 2 and OU 7 are separate sites at Loring Air Force Base and each will have a separate CERCLA Record of Decision (ROD) which selects a remedial action for each OU, the public comment periods and public meetings for these two OUs were held concurrently because the preferred remedial actions for the two concurrently because the preferred remedial actions for the two OUs were related. A copy of this responsiveness summary will be included as Appendix B in the RODs for both OU 2 and OU 7.

This Responsiveness Summary is organized into the following sections:

1.0 **Overview of Remedial Alternatives Considered in Proposed Plans, including the Selected Remedies.** This section briefly outlines the remedial alternatives evaluated in the Proposed Plans, including the USAF's selected remedies for OU 2 and OU 7.

2.0 **Background on Community Involvement and Concerns.** This section provides a brief history of community interest in OU 2 and OU 7 and concerns regarding these areas.

3.0 **Summary of Comments Received During the Public Comment Period and USAF Responses.** This section summarizes and provides the 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 PLANS INCLUDING THE SELECTED REMEDIES

The following subsections outline the selected final source control remedial alternatives evaluated in the Proposed Plans for OU 2 and OU 7, respectively. The Final Remedy for OU 2 and OU 7 are set forth in their respective Records of Decision.

1.1 OU 2

Using information gathered during field investigations, the USAF identified remedial response objectives for the source control actions at LF-2 and LF-3:

Soils/Landfill Contents	Prevent dermal contact with and ingestion of, contaminated landfill contents and soils
Air/Dust	Prevent the migration and inhalation of fugitive dust and soil particles with adhering contaminants
Landfill Gas	Prevent inhalation and explosion of landfill gases
Surface Water and Sediment	Prevent ingestion, adsorption, and bioconcentration of contaminants in surface water
Leachate	Minimize formation and migration of leachate to groundwater and surface waters.

Target clean-up levels for soil are set at levels that the USAF and the U.S. Environmental Protection Agency (USEPA) 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 at LF-2 and LF-3, Containment Using a Cover System, includes:

- site preparation and grading;
- installation of a composite cover system;
- installation of fences, gates and warning signs;
- deed restrictions for the land in the vicinity of the landfills;
- post-closure monitoring and maintenance; and
- five-year site reviews

The selected final source control remedy consists of installing a low-permeability composite cover system over the limits of the waste at LF-2 (approximately 9 acres) and LF-3 (approximately 17 acres). The purposes of the cover system are to minimize surface water infiltration through the landfilled wastes, promote drainage, minimize surface erosion, accommodate landfill settlement, isolate landfill wastes from direct contact, and control landfill gas. To achieve these goals, the proposed cover system would consist of the following components from bottom to top:

- gas-venting layer
- composite hydraulic barrier layer
- drainage layer
- filter layer
- vegetative layer

The remedial alternatives identified for implementation for the LF-2 and LF-3 source area are described in the Remedial Investigation/Focused Feasibility Study (RI/FFS) and the Proposed Plan for OU 2.

1.2 OU 7

Using information gathered during field investigations, the USAF identified remedial response objectives for the final source control actions at OU 7:

- to prevent ingestion of and dermal contact with soil by human and ecological receptors.
- to minimize migration of soil contaminants to groundwater.
- to minimize migration of soil contaminants to adjacent surface waters and sediment.

The final source control remedial action selected by the USAF to address remedial objectives at the Quarry Site, Excavation and Use as Subgrade Material for On-base Landfill Cap Construction, includes:

- site preparation;
- excavation of lower and upper tier soil and drainage ditch sediment;
- use as subgrade material for on-base landfill cap construction;
- wetlands restoration of the lower tier;
- environmental monitoring, and;
- five-year site reviews.

The remedial alternatives identified for implementation for the Quarry Site source area are described in the Feasibility Study (FS) and the Proposed Plan for OU 7.

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, Technical Review Committee (TRC) and Restoration Advisory Board (RAB) meetings. The RAB replaced the TRC in February 1994, and is chaired by USAF and community representatives.

A Federal Facilities Agreement (FFA) between USEPA Region I, the Maine Department of Environmental Protection (MEDEP), and the USAF 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. The FFA was amended in December 1993 to address base closure-related issues such as transfer of real property.

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 Technical Review Committee (TRC) meeting was held on September 30, 1993, to review and comment on the proposed remedy for OU 2. USAF published a notice and brief analysis of the Proposed Plans for OU 2 and OU 7 on July 13, 1994, and made the plans available to the public at the Robert A. Frost Public Library. The administrative record was updated on July 14, 1994 to include OU 2 and OU 7 information.

From July 15 through August 15, 1994, the USAF held a 30-day public comment period to accept public input on the alternatives presented in the RI/FFS and the

Proposed Plan for OU 2, and the FS and Proposed Plan for OU 7, and on any other documents previously released to the public. On July 26, 1993, LAFB held an informational meeting to discuss the results of the OU 2 and OU 7 RIs and the cleanup alternatives presented in the OU 2 FFS and the OU 7 FS, and to present the Air Force's Proposed Plans for OU 2 and OU 7. 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. Based on public comments, the public is in agreement regarding the preferred remedial alternatives for OU 2 and OU 7 as presented in the Proposed Plans.

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 15 to August 15, 1994 relative to the Proposed Plans for both OU 2 and OU 7 at LAFB. Comments include those received verbally during the public hearing and letters from Leaders Encouraging Aroostook Development (LEAD) and Caswell, Eichler & Hill. The comments and corresponding responses are included herein.

3.1 Comments and Responses Applicable to OU 2

1. Comment: One commenter requested that the Air Force characterize the condition of the refuse in the OU 2 landfills to determine whether it is saturated or not, or to what extent it is saturated.

   USAF Response: Test pitting and drilling were performed in the OU 2 landfills to determine the depth of waste and groundwater levels within the waste limits. The measurements indicate that in most locations, the waste is above the groundwater table. Other measurements made in February and March 1993 in the deeper parts of the landfill found groundwater up to 6 feet into the waste. After the caps are installed, the groundwater levels under the landfills should decrease. Piezometers are planned and groundwater levels will be monitored both within and outside the landfills after the caps are installed. Groundwater remediation will be addressed in a separate operable unit, OU 4.

2. Comment: One commenter requested that the Air Force select the location for the groundwater recharge basins at OU 2 and sufficiently characterize the selected areas prior to completing the design of the landfill cap such that they are not located in areas that may deleteriously affect groundwater remediation.

   USAF Response: Groundwater recharge basins are no longer part of the proposed plan. Storm water runoff will flow through earthen channels away from the landfill caps and will flow through a detention basin to a drainage ditch along Nebraska Road. The storm water will eventually discharge to Wolverton Brook about a half mile northwest of the landfills.

3. Comment: One commenter requested that the Air Force identify the compliance boundary for groundwater beneath each landfill and perhaps seek approval for a compliance boundary some reasonable distance from the limits of the landfill cap. In the event that a groundwater remediation system is required, a compliance boundary coinciding with the limits of the landfills may make it difficult to install a groundwater remediation system.

   USAF Response: Groundwater compliance boundaries for Landfills 2 and 3 will be addressed by the OU 4 Groundwater Study in a more appropriate manner than the OU 2 source control plan. The limits of the proposed cover system for Landfills 2 and 3 will not be impacted by the choice of a location for a groundwater compliance boundary, nor will the proposed cover system for Landfills 2 and 3 restrict the installation of a groundwater remediation system should one be required in the future.

3.2 COMMENTS AND RESPONSES APPLICABLE TO OU 7

4. Comment: One commenter requested of the Air Force that the wetlands associated with OU 7 be minimally disturbed as they provide productive environments for plant and animal species.

   USAF Response: The Air Force will take care in locating a mobilization and staging area that will avoid impacting nearby wetlands. However, remedial excavations for the Quarry Site will remove the emergent marsh within the lower tier and drainage ditch areas. The lost wetlands will be replaced or restored in accordance with a basewide restoration program that is being evaluated as part of OU 13.

5. Comment: One commenter requested that the Air Force pay close attention to erosion and runoff to avoid excessive siltation in the remaining wetland area.

   USAF Response: Erosion and sediment control measures, such as silt fencing, will be installed prior to initiating excavation activities. The Air

Force will perform oversight for monitoring the maintenance of erosion and sediment control measures.

6. Comment: One commenter requested that the Air Force conduct a careful soil delineation sampling assessment, so that only those soils that must be removed are removed, thus minimizing wetland disturbance.

   USAF Response: To minimize wetland disturbance, the Air Force will require soil and sediment confirmation sampling as part of the excavation process. Samples will be analyzed to confirm that no soil which exceeds target cleanup levels is left behind.

7. Comment: One commenter requested that the Air Force coordinate soil removal and wetland restoration tasks as much as possible so that only a minimal hiatus remains between excavation and wetland creation.

   USAF Response: The Air Force acknowledges the desire to expedite wetland restoration following excavation. The basewide restoration program that is being evaluated as part of OU 13 includes consideration of minimizing the time to restore wetlands.

LETTER OF CONCURRENCE

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JOHN R. McKERNAN, JR.
GOVERNOR

DEBRAH J. RICHARD
ACTING COMMISSIONER

September 6, 1994

Peter Forbes
AFBCA/OL-M
P.O. Box 523
Limestone, Maine 04750-0523

RE: Loring Air Force Base Superfund Site, Limestone, Maine

Dear Mr. Forbes:

The Maine Department of Environmental Protection (MEDEP) has reviewed the August 1994 Draft Record of Decision (ROD) regarding Landfills 2 & 3 for the Loring Air Force Base Superfund Site located in Limestone, Maine.

Based on that draft the MEDEP concurs with the selected remedial action. The selected remedy for OU 2 as described in Section 10 of the ROD consists of a low-permeability cover system which meets RCRA Subtitle C hazardous waste landfill cap requirements, and surface and institutional controls. The remedial action is an interim remedy that addresses source control to reduce contamination leaching to groundwater, limit migration of liquids through the landfill, and maintain compatibility with the final remedial measures, while OU 2 groundwater is evaluated and final remedial alternatives are studied. The selected remedy includes the following:

Cleanup Levels

A 1×10^{-6} excess cancer risk level for carcinogenic effects or a concentration corresponding to an HI of 1 for compounds with noncarcinogenic effects is typically used to set cleanup levels. No contaminant-specific cleanup levels have been developed for this source control remedial alternative since the alternative addresses the landfill area as a source of contamination and the landfill wastes were not sampled. Although soils/waste will not be removed or treated under the selected alternative, containment technologies are generally considered appropriate for landfills where treatment is impracticable because of the volume and heterogeneity of the waste. Therefore, no target cleanup levels have been set for soils at the sites. Cleanup levels and remedial alternatives applicable to groundwater/leachate will be developed as appropriate, within the management of migration operable unit for the site (i.e., OU 4).

Description of the Remedial Components

The following paragraphs describe the remedial alternative the USAF developed for OU 2: Containment using Cover a System. Implementation of the Selected alternative would include the following activities:

- Site preparation and grading;
- Composite cover system installation;
- Gates and warning signs installation;
- Deed restrictions on land in the vicinity of the landfills;
- Post-closure monitoring and maintenance; and
- Five-year site reviews.

Site Preparation and Grading

Prior to installation of the proposed cover system, small trees and brush would be cleared from within the area to be covered. Subgrade soil consisting of common borrow available form local borrow pits and from other LAFB locations (e.g., excavated soil/sediment from OU 7) would then be placed to raise the existing grade of each landfill to allow for post-construction settlement and to provide for positive drainage. Silt fencing would be used for erosion control purposes after placement of the subgrade material.

Composite Cover System Installation

The proposed cover system would be constructed after initial settlement occurs caused by the weight of the subgrade soil. Cap construction would begin one construction season after placement of the subgrade to allow sufficient time for settlement to occur.

The proposed composite cover system would consist of the following components (Figure 10-1), from bottom to top:

- gas-venting layer
- composite hydraulic barrier layer
- drainage layer
- filter layer
- vegetative layer

A 12-inch gas-venting layer would be placed above the subgrade soil to allow for the collection and transfer of landfill gases to a passive gas-venting system. Passive gas-venting through the cover would occur using vertical gas-venting risers to vent gases to the atmosphere. Gas samples will be collected from the vents and analyzed, and the results used to establish a baseline. Follow-up sampling and analysis will be compared to the baseline so that evaluation and recommendations concerning active gas collection systems can be made.

A composite hydraulic barrier consisting of a geosynthetic clay liner overlain by a geomembrane layer (i.e., very low density polyethylene) would be placed above the gas-venting layer. The composite hydraulic barrier would minimize the infiltration of water to the landfilled waste. A 24-inch drainage layer of sand would be placed above the hydraulic barrier layer to facilitate water drainage from the top of the cover system. The drainage layer would contain collection pipes to divert water to a detention basin located downgradient of the landfills. A 12-inch filter layer of common borrow material would be placed above the drainage layer to prevent topsoil from entering the drainage layer. The filter layer will also retain moisture for the upper layers. A 12-inch layer of soil capable of supporting vegetation would be placed above the filter layer.

Gates and Warning Signs Installation

A 20-foot wide chain-link gate would be installed at the main entrance road into each landfill. Warning signs would be posted on the gates to alert people to the location of the landfill and cover system. The gates and warning signs would restrict vehicular access and discourage trespassers.

Deed Restrictions on Land in the Vicinity of the Landfills

Restrictions limiting subsurface development (excavation or drilling), use of the property, and excessive vehicular traffic (including off-road vehicles and dirt bikes) would be incorporated into the property deed.

Post-Closure Monitoring and Maintenance

A monitoring and maintenance program is proposed. The purposes of the program are to inspect the cover system and environmental monitoring systems and to maintain their integrity. The monitoring program is proposed to be conducted for a 30-year period following closure in accordance with RCRA Subtitle C standards. The program would include the following activities:

- inspection of the cover system, including all environmental monitoring systems, eight times during the first year, and semiannually during the following 29 years;
- maintenance of the cover system, groundwater monitoring wells, gates, and access road;

- annual mowing of the grass cover (after ground-nesting migratory bird breeding season is over)

- quarterly monitoring (i.e., sampling and analysis) of groundwater monitoring wells for groundwater quality, and gas-venting risers for explosive gases, and visual inspection of the landfills; and

- quarterly inspection reports to regulatory agencies would include monitoring results and recommendations, and would document maintenance activities.

Five-Year Site Review

The USAF will review OU 2 monitoring program data at least once every five years after the initiation of remedial action because hazardous substances will remain on-site at levels that do not allow for unrestricted use. This review will assure that the remedial action continues to protect human health and the environment, assessing site condition and proposing further actions, if necessary.

The states concurrence in the selected remedy, as described above, should not be construed as the State's concurrence with any conclusions of law or findings of fact which may be set forth in the Record of Decision (Explanation of Significant Difference). The State reserves any and all rights to challenge any such finding of fact or conclusion of law in any other context. This concurrence is based upon the State's understanding that the MEDEP will continue to participate in the Federal Facilities Agreement and in the review and approval of operational, design, and monitoring plans.

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

Sincerely,

Deborah N. Garrett

Deborah N. Garrett, Acting Commissioner
Department of Environmental Protection

pc: Mark Hyland, MEDEP
Mike Nalipinski, EPA
Hank Lowman, BCA

ONASUPER/djp