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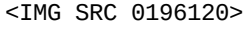
EPA Superfund
Record of Decision:

LORING AIR FORCE BASE
EPA ID: ME9570024522
OU 14
LIMESTONE, ME
03/31/1996

FINAL

OPERABLE UNIT 2A (OU 2A)
RECORD OF DECISION

MARCH 1996



Installation Restoration Program
Loring Air Force Base, Maine

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SITE NAME AND LOCATION

Loring Air Force Base (LAFB) Operable Unit (OU) 2A consists of source control (surface and subsurface soils, and source areas) at Landfill 1 and the Coal Ash Pile (CAP).

STATEMENT OF BASIS AND PURPOSE

This decision document was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and to the extent practicable, the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) (USEPA, 1990). It is based on the Administrative Record for the site, which was developed in accordance with Section 113(k) of CERCLA and is available for public review at the Air Force Base Closure Agency, 5100 Texas Road, Limestone, Maine. It presents the selected No Action under CERCLA
decision for OU 2A at LAFB.

The State of Maine Department of Environmental Protection (MEDEP) concurs with the No Action under CERCLA remedy for OU 2A. In a separate action which is not part of this Record of Decision (ROD), the U.S. Air Force has undertaken a time-critical removal action at the CAP consistent with the criteria set forth under Section 300.415 (b)(2) of the NCP. The objectives established in the "Time Critical Removal Action Memorandum, Operable Unit 2A, Coal Ash Pile," (Air Force Center for Environmental Excellence [AFCEE] 1994), have been met as a result of the removal action and, therefore, no further action under CERCLA is necessary at the CAP.

DESCRIPTION OF THE SELECTED REMEDY

The U.S. Air Force and U.S. Environmental Protection Agency (USEPA), with concurrence of the MEDEP, have determined that no action under CERCLA is necessary to address contamination at OU 2A, which comprises Landfill 1 and the CAP. It is recommended that Landfill 1 be classified as a construction debris landfill with no CERCLA requirement for action.

<IMG SRC 0196120A>

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Completion of the time critical removal action of the coal ash at the CAP constitutes closure of the source at the CAP. The surface water and groundwater media at the OU 2A sites will be addressed in OU 13 and OU 4, respectively.

DECLARATION

The U.S. Air Force and USEPA, with concurrence of the MEDEP, have determined that no remedial action under CERCLA is necessary at OU 2A. As this is a decision for No Action under CERCLA, the statutory requirements of CERCLA Section 121 for remedial actions are not applicable, and no five-year review will be undertaken.

Department of the Air Force

<IMG SRC 0196120B>

1.0 SITE NAME, LOCATION, AND DESCRIPTION

Loring Air Force Base (LAFB) is a National Priorities List (NPL) site. There are currently several area of concern within LAFB that are under investigation. The area of concern at LAFB have been organized into Operable Units (OUs) for investigation and remediation purposes. This Record of Decision (ROD) relates to the Source Control Remedial Action for OU 2A, which is composed of Landfill 1 and Coal Ash Pile (CAP) (Figure 1). The CAP includes the Coal Ash Disposal Area (CADA), the Paint Can Disposal Area (PCDA), and the Drum Disposal Area (DDA).

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 east by the City of Caribou. The base is approximately three miles west of the United States/Canadian border and covers approximately 9,00 acres. Base operations gradually decreased until base closure in September 1994.

Because of its primary mission, LAFB personnel were engaged in various operations, a number of which required the use, handling, storage, or disposal of hazardous materials and substances. In the past, these materials entered the environment through accidental spills, leaks in supply piping, landfilling operations, burning of liquid wastes during fire-training exercises, and the cumulative effects of operations conducted at the base's flightline and industrial areas. As part of the Department of Defense's (DOD) Installation Restoration Program (IRP), the Air Force 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's) NPL of sites and will be remediated according to the Federal Facility Agreement (FFA), an agreement under Section 120 of CERCLA signed by the Air Force, the USEPA, and the Maine Department of Environmental Protection (MEDEP) on January 30, 1991 as amended.

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2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

In accordance with Section 117(a) of Comprehensive Environmental Response. Compensation and Liability Act (CERCLA), the Air Force is publishing this ROD to address public comment on the selected No-Action under CERCLA alternative, considered for OU 2A as the final remedy. This section summarizes the uses, response history, and investigation activities at the OU 2A sites: Landfill 1 and the CAP.

2.1 LAND USE AND RESPONSE HISTORY

Landfill 1. Landfill 1 is located on the southwestern portion of LAFB and covers approximately 3.3 acres (Figure 2). This area is a former gravel excavation pit located in a sand and gravel deposit. In 1952, the Base reportedly began using this area for general waste disposal; the practice continued until 1956. No documentation could be located on the varieties and quantities of wastes disposed of at the landfill. Wastes from flightline activities were suspected to have been disposed of in Landfill 1 during the landfill's operation; however, wastes other than construction debris was not found during test pitting and soil boring activities. Disposed materials found at the landfill during investigation activities include concrete, asphalt, concrete reinforcement bar (rebar), and general construction debris. Some construction debris visibly protrudes from the landfill surface. The landfill has no liner, nor is it equipped with a leachate collection system.

An effective, stable, and constructable soil cover system consistent with applicable MEDEP Solid Waste Regulations has been designed and will be constructed on Landfill 1. The landfill will be graded, then covered with 18 inches of well-graded soil. A minimum of 6 inches of topsoil will be placed over the 18 inch layer, then seeded with grass for erosion control.

Coal Ash. The CAP is located immediately northeast of Landfill 3 in the southwestern portion of the Base (Figure 3). The CAP was mined for gravel during Base construction. When the gravel deposit was exhausted, the excavation was used primarily for coal ash disposal. The CAP area encompasses three separate areas where uniform types of waste have been identified. These areas have been given unofficial names to allow them to be distinguished from one-another. They are the CADA, the DDA, and the PCDA. The term CAP is used to describe all three areas. The three disposal areas cover approximately 5 acres: the CADA constitutes 4.0 acres; the DDA 0.9 acres, and the PCDA approximately 0.1 acres.

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The area which was comprised primarily of coal ash is referred to as the CADA. Construction and other debris also were disposed of in this area. The types of debris found are described in the Final

Remedial Investigation (RI) report (Advanced Sciences, Inc.[ASI], 1995), and consist primarily of coal ash from the Base heating plant. In order to mitigate and prevent the release or threatened release of hazardous substances, particularly polychlorinated biphenyls (PCBs) and polynuclear aromatic hydrocarbons (PAHs), into the environment, removal actions began at the CAP site during the week of August 22, 1994 and ended the week of October 3, 1994. Approximately 140,000 cubic yards of coal ash were removed from the CAP and transported to Landfill 2 and 3 for use as subgrade fill for construction of the landfill caps as the remedial action for OU 2 (AFCEE, 1995). In addition approximately 44,000 cubic yards of contaminated soil and concrete rubble were removed from the PCDA and DDA and incorporated into the subgrade for capping Landfill 3 (AFCEE, 1996). The "Time Critical Removal Action Memorandum, Operable Unit 2A, Coal Ash Pile Site," (AFCEE, 1994), the "Remedial Action Report/Project Closeout Report, OU2A, OU2, OU6, OU7, and Other Sites" (AFCEE, 1995), and the "Remedial Action Report/Project Closeout Report for the PCDA and DDA" (AFCEE, 1996) document the decision to perform the removal action. Removal of the contaminated CAP soil and incorporation of this soil into the subgrade for capping Landfills 2 and 3 is consistent with removal action criteria described in the National Contingency Plan (NCP), which describes capping as an acceptable removal action for contaminated soil to reduce migration of hazardous substances.

2.2 INVESTIGATION AND RESPONSE HISTORY

The investigation process began at LAFB in 1983 as part of the DOD IRP process, but was revised in 1988 in favor of a process that more closely followed the NCP used by the USEPA. Investigations performed to date include a 1983 Preliminary Assessment (CH2M Hill, 1984) to investigate records of past activities at LAFB. Unconfirmed quantities of hazardous substances were suspected of being buried at Landfill 1. There was no record of activities at the CAP.

A Site Investigation was initiated in June 1985 to confirm the presence or absence of contaminants at Landfill 1. A final report was issued in 1988 (R.F. Weston, Inc., 1988), which reported demolition debris, primarily concrete, asphalt, lumber, and metal scrap was visible at scattered locations. Exploratory borings and test pits identified the area of landfilling activities. No industrial or hazardous waste was observed. The final report concluded that analytical results indicated no significant contamination in groundwater or surface water. The only reported parameter identified as contamination was a single sample of elevated chemical oxygen demand from one surface water location that was explained as the result of natural decay of organic materials.

In addition, RI activities were conducted from 1988 through 1994. The purpose of the RI was to collect data from environmental media at Landfill 1 and to evaluate human health and ecological risk at the site. Additional surface and subsurface soils, surface water, groundwater and sediment samples were collected. Although a variety of contaminants (primarily pesticides and concentrations of inorganics above background) were detected sporadically; no incremental risk was identified relative to site-related contaminants (ABB-ES, 1990; ASI, 1995). Surface water and sediment contamination will be addressed in OU 13.

LAFB was added to the NPL in February 1990. The Air Force entered into a FFA in 1991 with the USEPA and MEDEP regarding the cleanup of environmental contamination at LAFB. The FFA was modified in December 1993 to address base closure-related issues, such as real property transfer and a revised schedule. The FAA was modified in January 1995 to allow the Remedial Project Managers to make minor modifications to the FFA, such as schedule adjustments or removal of petroleum-contaminated sites from the agreement.

Preliminary Remediation Goals (PRGs) were developed for OU 2A (ABB-ES, 1995a). Removal actions have taken place at the CADA (AFCEE, 1995) and at the DDA and PCDA (AFCEE, 1996). The removal actions were consistent with the NCP, met the objectives of the Action Memorandum, and mitigated site risks.

A cover system consistent with the MEDDEP Solid Waste Regulations has been designed and is scheduled to be constructed over Landfill 1 in 1996.

3.0 COMMUNITY PARTICIPATION

Throughout LAFB's history, the community has been active and involved to a high level in base activities. The Air Force, USEPA, and MEDEP 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 Restoration Advisory Board (RAB) meetings. Membership of the RAB is composed of Air Force, USEPA, MEDDEP, and local officials, and community representatives.

The LAFB community relations plan (CRP) was released in August 1991 and revised in May 1995. The CRP outlined a program to address community concerns and keep citizens informed and involved during remedial activities. The CRP can be found in the Administrative Record.

On June 24, 1992, the Air Force made the Administrative Record available for public review. The Administrative Record is currently available for public review at the office of the Air Force Base Conversion Agency Office, 5100 Texas Road, Limestone, Maine.

The Air Force published a notice and brief analysis of the OU 2A Proposed Plan with no further action under CERCLA in the Bangor Daily News, the Aroostook Republican, the Fort Fairfield Review and the Star Herald on January 10, 1996.

From January 16 through February 14, 1996, the Air Force held a 30-day public comment period to accept public input on the information presented in the RI/Baseline Risk Assessment, Time Critical Removal Memorandum, and the Proposed Plan, and on any other documents previously released to the public. On January 24, 1996, LAFB personnel and regulatory representatives held a public meeting to discuss the removal action at the Coal Ash Pile and the Proposed Plan and to accept any oral comments. A transcript of this meeting is included in Appendix A, and the comments received during the comment period and the Air Force's response to these comments are included in the Responsiveness Summary in Appendix B.

4.0 SCOPE AND ROLE OF RESPONSE ACTION

The Air Force and USEPA have determined that no further CERCLA action is required at OU 2A. Remaining closure activities for Landfill 1 will be completed in accordance with Maine Solid Waste Management Regulation. Post-closure activities will be performed at Landfill 1 for a minimum of ten years. Operation and maintenance (O&M) requirements are minimum. Periodic site inspections and maintenance of the cover (e.g., mowing) are the primary components of O&M for Landfill 1.

The time critical removal action performed at the CAP, as described in the "Time Critical Removal Action Memorandum, Operable Unit 2A, Coal Ash Pile Site," (AFCEE, 1994), provides closure at the CAP.

USEPA has the authority to revisit the No-Action under CERCLA decision even if the LAFB is removed from the NPL. This could occur if future conditions indicate that an unacceptable risk to human health or the environment would result from exposure to contaminants at Landfill 1 or from the CAP.

5.0 SUMMARY OF SITE CHARACTERISTICS

Site investigations were conducted from June 1985 through 1994 to characterize the nature and distribution of contaminants at OU 2A. Detailed descriptions of the data are presented in the OU 2A Final RI Report (ASI, 1995). The significant findings of these contamination assessments are summarized in the following subsections.

5.1 LANDFILL 1

Investigations were conducted between 1985 and 1994 to assess if contamination was present, and if present, characterize the nature and extent of surface soil contamination at Landfill 1. Samples were collected and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/PCBs, and Target Analyte List (TAL) inorganic elements/compounds using Contract Laboratory Program (CLP) methodology.

No clear contaminant sources were identified at Landfill 1, although the RI investigations at Landfill 1 have intermittently detected limited concentrations of inorganics, VOCs, SVOCs, pesticides, and the PCB Aroclor-1260 in the various environmental media samples.

Inorganics were intermittently detected above background concentrations in surface soils, groundwater, surface water, and sediment. While several inorganics were detected slightly above background levels in surface and subsurface soils, only cadmium, and lead were detected above background in more than one sample from each media. Inorganics in overburden and bedrock groundwater were evaluated at four selected monitoring wells. The evaluation was conducted in accordance with the consensus statement, "Inorganic Contaminants in Overburden Groundwater", approved by the Air Force, USEPA and MEDEP in August 1995 for OU 12 and OU 13. No inorganic contaminants of concern were found at LF-1. Inorganics were the only group of analytes detected above background concentrations in surface water. However, these inorganics are not uncommon to natural geologic systems similar to those found at LAFB.

VOCs and SVOCs were not detected in significant quantities in any media. No VOCs were detected in surface soils or surface water. VOCs detected in subsurface soils were below Contract Required Quantitation Limits (CRQLs). The limited VOCs detected in groundwater samples were also below CRQLs. Several SVOCs were detected above CRQLs in surface soil, while SVOCs were not detected above CRQLs in subsurface soil. No SVOCs were detected above CRQls in groundwater. No SVOCs were detected in surface water or sediment samples.

Pesticides were detected at concentrations less than background in surface and shallow subsurface soils within the landfill and adjacent surface disposal areas. PCBs were detected at low concentrations in surface and shallow subsurface soils but were not evaluated in the risk assessment because the risk screening indicated that associated risks were relatively insignificant. Pesticides and PCBs were also infrequently detected. Pesticides and PCBs were detected above background in sediments from Green Pond. The presence of pesticides (DDT) is consistent with the widespread historical usage of the pesticide in this area prior to the ban on its use. Pesticides and PCBs are not present in groundwater or surface water.

The groundwater and surface water investigations have not been completed at this time; these investigations will be evaluated separately in the OU 4 and OU 13 RI reports. Surface water and sediment contamination will be addressed in OU 13.

5.2 COAL ASH PILE

Between 1991 and 1993, surface and subsurface soil/waste sample were collected and analyzed from the CAP site. In general, analytical data indicate surface soil/waste contained more inorganics, SVOCs, and pesticides than subsurface soil/waste.

Inorganics detected substantially above background levels in surface soils included barium, copper, iron, lead, and zinc. Inorganics that slightly exceeded the background levels in subsurface soils include beryllium, cadmium, calcium, cyanide, and selenium. Lead and zinc were detected in two CAP site borings at concentrations well above background levels.

The only VOC detected was acetone, which was found in surface and subsurface soil/waste samples from the CAP site.

Surface and subsurface samples collected from the CAP site contained SVOCs ranging from 44 to 14,000 micrograms per kilogram (µg/kg) (benzo-(b)-fluoranthene), with the greatest number of detected SVOCs at approximately of 10 feet below ground surface.

Pesticides were detected in subsurface soil/waste samples from the CAP site at concentrations ranging from 0.18 to 52 µg/kg. There was no apparent vertical pattern of distribution. Additionally, one PCB (i.e., Aroclor-1260) was detected in five of the 12 surface soil samples, at concentrations ranging from 60 µg/kg to 43,000 µg/kg. Aroclor-1269 was also detected in subsurface soils, ranging in concentrations from 20 to 75 µg/kg.

Monitoring wells have been installed and screened within the bedrock in the vicinity of the CAP site. Groundwater samples were collected and analyzed for inorganics, VOCs, SVOCs, pesticides/PCBs, and miscellaneous parameters. Results of these data are presented in the OU 4 RI report (ABB-ES, 1995b).

Surface water samples were collected from a wet area southeast of the CADA and from an area to the northwest that holds water after rainfall. Samples collected were analyzed for inorganics, VOCs, SVOCs, pesticides/PCBs, and miscellaneous parameters. Results of these data are presented in the OU 13 Interim RI report (ABB-ES, 1994).

6.0 SUMMARY OF SITE RISKS

A risk assessment was conducted to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with surface and subsurface soils at OU 2A. The risk assessments followed a four-step process:

- contaminant identification, which identified those hazardous substances that, given the specifics of the site, were of significant concern;
- exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure;
- toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances; and
- risk characterization, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the site, including carcinogenic and non-carcinogenic risks.

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

The Hazard Quotient (HQ) was also calculated for each pathway as USEPA's measure of the potential for noncarcinogenic effects. The HQ is calculated by dividing the exposure level by the reference dose (RfD) or other suitable benchmark for noncarcinogenic health effects. RfDs have been developed by USEPA to protect sensitive individuals over the course of a lifetime, and reflect a daily exposure level that is likely to be without an appreciable risk of an adverse health effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. The HQ is often expressed as a single value (e.g., 0.3) indicating the ratio of the stated exposure to the RfD value (in this example, the exposure is approximately one-third of an acceptable exposure level for the given compound). HQs are summed, resulting in a Hazard Index (HI) for each pathway. If the HI is greater than 1, the predicted intake could potentially cause adverse health effects. This determination is necessarily imprecise because the derivation of dose-response values (i.e., RfDs) involves the use of multiple safety and uncertainty factors. In addition, the HQs for individual compounds should be summed only if their target organs or mechanisms of action are identical. Therefore, the potential for adverse effects from a mixture having an HI in excess of 1 must be assessed on a case-by-case basis.

The results of the human health risk assessments are discussed below, followed by a discussion of the ecological risk assessment for both Landfill 1 and the CAP.

6.1 SUMMARY OF RISKS AT LANDFILL 1

The Final RI conducted at Landfill 1 provided data that were used to support the Baseline Risk Assessment. The Final RI focused on the source areas, although potentially affected media (groundwater, surface water, and sediments) were also investigated and evaluated. (Groundwater and surface water/sediments were the focus of RIs conducted for OU 4 and OU 13, respectively.) Investigations revealed no distinct source within the contents of Landfill 1 that would indicate the presence of hazardous substances in the investigated media. SVOCs present in surface soils at Landfill 1 may be caused by asphalt found at or near the surface or by unburned fuels emitted by vehicles during site activities. The relative lack of SVOCs in subsurface materials from Landfill 1 indicates that the landfill contents are not a likely source. Pesticides were detected at very low concentrations in groundwater, and were present at concentrations below background in soils and surface water, suggesting that their presence at Landfill 1 is caused by the widespread use of pesticides at LAFB. Only arsenic, cadmium, and lead were detected above published background values within and adjacent to the landfill, but these detections may be a result of natural variations of background concentrations. Table 1 presents a summary of potential contaminants detected at Landfill 1.

In the human health risk evaluation, site-related contaminants in the soil at the landfill were not found to pose an increased human carcinogenic risk in excess of the USEPA target risk range (1.0x10-4 to 1.0x10-6) to receptors participating in recreational activities in the vicinity of the landfill. The risks were recalculated based on recent guidance on relative toxicity for carcinogenic PAHs and on dermal absorption efficiencies (HAZWRAP, 1994), and are presented in Appendix P of the Final RI (ASI, 1994). There was one analyte, arsenic, which is not considered site-related, which had carcinogenic risk above the USEPA target risk range.

Table 2 presents human health risk assessment exposure parameters for Landfill 1. Table 3 presents the total site risks under current land use.

Arsenic was the only analyte identified to present risks in exceedance of the USEPA target risk range. These risks are based on an older child/teenager receptor inhaling dust during dirt biking activities. However, arsenic was detected only once above background, at a concentration of 22.7 milligrams per kilogram, which is less than 1.5 times the background concentration. Therefore, it is not considered to be a site-related in the region.

Table 1
SUMMARY OF POTENTIAL CONTAMINANTS OF CONCERN
SURFACE SOIL
FROM 1990 TO 1994 RI SAMPLING DATA

OU 2A LANDFILL 1
LORING AIR FORCE BASE

CONTAMINANT	FREQUENCY OF DETECTION	RANGE OF DETECTION	MEANa	MAXIMUMb BACKGROUND
METALS (µg/kg):				
Aluminum	10/10	12,500 - 17,700	14,460	25,400
Arsenic	10/10	5.1 - 22.7	8.33	16.2
Barium	10/10	33.4 - 55.1	43.84	93.3
Beryllium	8/10	0.43 - 0.69	0.50	1.8
Cadmium	2/10	1.0-1.4	0.66	0.21
Calcium	10/10	2,020 - 107,000	24,682	69,700
Chromium	10/10	24.6 - 35.6	28.79	56.9
Cobalt	10/10	9.8 - 15.0	11.53	18.5
Copper	10/10	19.2 - 27.5	21.87	65.6
Iron	10/10	24,900 - 33,700	27,965	47,100
Lead	10/10	15.4 - 123	33.59	22.6
Magnesium	10/10	6,950 - 9,730	8,244	12,700
Manganese	10/10	537 - 755	660.95	1,400
Mercury	1/10	0.51	0.104	0.17
Nickel	10/10	32.4 - 46.2	38.55	73
Potassium	10/10	794 - 1,530	1,048	2,900
Selenium	2/10	0.58 - 0.67	0.38	0.71
Sodium	6/10	145 - 179	123.3	110
Vanadium	10/10	21.8 - 41.2	27.2	40
Zinc	10/10	55.4 - 119	66.73	83.9
SEMIVOLATILE ORGANICS (µg/kg):				
Acenaphtene*	1/11	40	179.32	c
Anthracene*	1/11	61	181.23	c

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SUMMARY OF POTENTIAL CONTAMINANTS OF CONCERN
SURFACE SOIL
FROM 1990 TO 1994 RI SAMPLING DATA

OU 2A LANDFILL 1
LORING AIR FORCE BASE

CONTAMINANT	FREQUENCY OF DETECTION	RANGE OF DETECTION	MEANa	MAXIMUMb BACKGROUND
Benzo(a)anthracene*	6/11	41 - 280	165.41	c
Benzo(a)pyrene*	3/11	68 - 220	185.59	c
Benzo(b)fluoranthene(1)*	6/11	71 - 710	337.45	c
Benzo(g,h,i)perylene*	3/11	49 - 220	183.82	c
bis(2-ethylhexyl)phthalate	9/11	42 - 170	115.05	c
Carbazole	1/9	45	166.94	c
Chrysene*	6/11	46 - 300	161.45	c
Dibenzo(a,h)anthracene*	1/11	54	180.59	c
Di-n-octylphthalate	3/11	73 - 220	177.77	c
Fluoranthene*	7/11	58 - 670	228.27	c
Indeno(1,2,3-cd)pyrene*	3/11	44 - 200	183.59	c
Napthalene*	1/11	69	181.05	c
Pentachlorophenol	2/8	40 - 180	506.56	c
Phenanthrene*	3/11	120 - 360	201.59	c
Pyrene*	7/11	65 - 460	192.18	c
PESTICIDES/PCBs(d) (µg/kg):				
Aroclor-1260	3/10	23 - 52	41.6	240
alpha-Chlordane	5/10	0.39 - 3.3	10.73	c
gamma-Chlordane	5/10	0.39 - 2.9	10.72	c
4,4'-DDD	3/10	0.66 - 1.50	3.23	470
4,4'-DDE	8/10	0.79 - 6.60	4.76	160
4,4'-DDT	9/10	4.30 - 28.0	13.75	940
Endosulfan II	2/10	0.43 - 4.0	3.56	c

Table 1
SUMMARY OF POTENTIAL CONTAMINANTS OF CONCERN
SURFACE SOIL
FROM 1990 TO 1994 RI SAMPLING DATA

OU 2A LANDFILL 1
LORING AIR FORCE BASE

CONTAMINANT	FREQUENCY OF DETECTION	RANGE OF DETECTION	MEANa	MAXIMUMb BACKGROUND
Endrin Ketone	2/10	1.2 - 3.5	3.61	3
Heptachlor	1/10	0.17	1.70	0.2
Methoxychlor	1/10	4.8	17.16	c
MISCELLANEOUS (mg/kg):				
Total Recoverable - Petroleum Hydrocarbons	6/6	51 - 2,800	1,058.5	c

Notes:
a The mean value represents the arithmetic average of all the samples; in the case of non-detects, a value of one-half the SOL (or CRQLs if SOL cannot be obtained) is assigned for each non-detected result.
b Surface soil background concentrations data obtained form the Consensus Statement - Background Concentrations for Soils, Surface Water, Sediments (LAFB, 1994).
c Background data are not available.
d PCB/pesticides will not be removed from risk assessment data based on background comparisons.

(1) = Includes benzo(k)fluoranthene
* = Polynuclear aromatic hydrocarbon

Table 2
HUMAN HEALTH RISK ASSESSMENT EXPOSURE PARAMETERS

OU 2A LANDFILL 1
LORING AIR FORCE BASE

PARAMETERS	CHILD (1-6 YES.)	TEENAGER (7-16 YES.)	ADULT (17-30 YES.)	UNITS	SOURCE
		Surface Soil - Ingestion and Dermal Absorption			
Soil Ingestion Rate	200	100	100	µg/kg	EPA, 1991b
Soil Adherence Factor	1.0 - max. 0.6 - mean	1.0 - max 0.6 - mean	1.0 - max. 0.6 - mean	µg/cm2 µg/cm2	EPA, 1989a EPA, 1989a
Surface Area Exposed	2,295 - max. 1,983 - mean	5,400 - max. 4,400 - mean	5,800 - max 5,000 - mean	cm2	EPA, 1992
Fraction Ingested	100%	100%	100%		Assumption
Exposure Frequency	110	110	110	day/yr	Assumption
Exposure Duration	6	11	6	yr	EPA, 1991b
Body Weight	16	40	70	kg	EPA, 1991b
Averaging Time:					
Cancer	70	70	70	yr	yr
Noncancer	6	11	6	yr	

OLDER CHILD/

Table 3
TOTAL SITE RISKS UNDER CURRENT LAND USE

OU 2A LANDFILL 1
LORING AIR FORCE BASE

RECEPTOR	EXPOSURE RATE	MEAN CONCENTRATIONS TOTAL CANCER RISK	MAXIMUM CONCENTRATIONS TOTAL CANCER RISK
Child	Soil Ingestion	8.3x10-7	1.1x10-6
	Soil Dermal Absorption	1.2x10-7	3.0x10-7
	Total Soil	9.5x10-7	1.4x10-6
Older Child/Teenager	Soil Ingestion	3.0x10-7	3.9x10-7
	Soil Dermal Absorption	2.0x10-7	5.1x10-7
	Total Soil	5.0x10-7	9.0x10-7
	Dust Inhalation	6.8x10-5	1.8x10-4
Adult	Soil Ingestion	6.5x10-7	6.0x10-7
	Soil Dermal Absorption	3.5x10-7	8.6x10-7
	Total Soil	1.0x10-6	1.5x10-6

TABLE 4
SUMMARY OF ECOLOGICAL RISK ASSESSMENT FOR TERRESTRIAL ORGANISMS

OU 2A LANDFILL 1
LORING AIR FORCE BASE

SUMMARY HAZARD INDICES

INDICATOR SPECIES	REASONABLE MAXIMUM	MOST PROBABLE	EXPECTED EFFECT
Short tailed Shrew	1.4	6.6	Effects Possible
American Woodcock	<1	<1	Effects Unlikely
Garter Snake	<1	<1	Effects Unlikely
Fisher	<1	<1	Effects Unlikely
Broad-winged Hawk	<1	<1	Effects Unlikely

In the evaluation of risks to ecological receptors, lead is the only soil contaminant of concern (COC) exceeding a hazard quotient of 1. Because average lead concentrations were only 1.5 times greater than those of background lead concentrations, risks to terrestrial receptors from soil contamination at Landfill 1 appear to be minimal. Short-tailed shrews ingesting soil or soil invertebrates from an area with average soil concentrations may receive a daily dose of lead that exceeds a conservative toxicological threshold be a factor of 4.8, but no other COCs exceeded levels of concern. Adverse effects are unlikely (HI < 1) for the garter snake, American woodcock, fisher, and broad-winged hawk. Although this evaluation identified Aroclor-1260, SVOCs and some inorganics as potential ecological risk drivers in Green Pond sediment, the sources of these contaminants and their impact on ecological receptors will be evaluated in depth in the investigation of OU 13, the surface water and sediment operable unit. Table 4 presents a summary of ecological risk for terrestrial organisms.

Based on the evaluations, cadmium is not a risk to either human health or ecological receptors at the reported concentrations within and adjacent to Landfill 1.

All media at Landfill 1 have been investigated to assess the nature and distribution of contamination and to estimate risks to human and ecological receptors from landfill contents and affected media at the landfill. The investigation indicates that detected SVOCs and inorganics are attributable to scattered placement of construction debris, combined with transport of contaminants from other area or activities not necessarily related to Landfill 1.

In summary, the human health and ecological risks associated with site-related contaminants in surface soil and shallow subsurface soil at Landfill 1 and in the adjacent area do not exceed the USEPA target risk range. The risks associated with surface water and sediments in Green Pond will be further evaluated in the investigation of the surface water/sediment operable unit (OU 13). A removal action has been completed for the CAP and the residual risks presented in the Removal Completion Report do not exceed the USEPA target risk range.

6.2 SUMMARY OF RISKS AT THE CAP

The Final RI conducted at the CAP provided data that were used to support the baseline risk assessment. The Final RI is focused on the source area, although potentially affected media (groundwater, surface water, and sediments) were also investigated and evaluated to determine if any contamination has migrated from the source area. OU 4 addresses groundwater associated with the landfills and Chapman Pit included under OU 2 and OU 2A, while OU 13 addresses basewide surface water and sediments, including wetlands. The potential source of contaminants at the CAP is the materials disposed there (coal ash, unburned coal, and miscellaneous debris).

Several elevated detections of Aroclor-1260 in surface soils, subsurface soils, and sediments indicate that PCB-containing wastes may have been disposed in the CAP. Pesticide detections in surface and subsurface soils were at relatively low concentrations or were below background, which is consistent with the widespread use of pesticides at LAFB.

Inorganics were found in excess of background in all media. In general, mean concentrations calculated for each metal detected in surface and subsurface soils were below LAFB background values, indicating detected concentrations can most likely be attributed to naturally-occurring concentrations in the overburden material. Inorganic analysis of surface soil sample CSS-0008, a sample of the coal ash, indicates that concentrations of metals detected in the coal ash are not significantly different from the metal concentrations detected in the overburden material.

Table 5 presents the summary of potential contaminants in surface soil identified during the RI. Table 6 presents human health risk assessment exposure parameters for the CAP.

Contaminants from the soils/waster were found to pose potential human carcinogenic risks to receptors participating in recreational activities in the vicinity of the CAP in excess of the MEDEP target risk level (1x10-5) and the USEPA target risk range upper limit (1x10-4). Maximum carcinogenic risk to a child from dermal contact with and incidental ingestion of soils/waste at the CAP was 2.4x10-3, Carcinogenic risk to a teenager inhaling dust while dirt biking was 5.5x10-4. The greatest HI or noncarcinogenic risk from dermal contact and incidental ingestion of soils/waste was 6.4, which exceeded the USEPA HI target risk level of 1. Table 7 presents a summary of human health risk at the CAP.

TABLE 5
SUMMARY OF POTENTIAL CONTAMINANTS IN SURFACE SOIL
1993 RI SAMPLING DATA

COAL ASH PILE
LORING AIR FORCE BASE

CONSTITUENTS	FREQUENCY OF DETECTION	RANGE OF DETECTION	MEAN(a)	MAXIMUM BACKGROUND(b)
METALS (µg/KG):				
Aluminum	12 of 12	6950 - 16850	14083	25400
Arsenic	12 of 12	49 - 15.1	8.38	16.2
Barium	12 of 12	38 - 366	95.63	93.3
Beryllium	1 of 12	3.4	0.85	1.8
Cadmium	5 of 12	1.3 - 29.1	3.59	0.21
Calcium	12 of 12	2180 - 53700	16032	69700
Chromium	12 of 12	9.9 - 69.1	33.7	56.9
Cobalt	12 of 12	6.4 - 28.9	11.64	18.9
Copper	12 of 12	22.9 - 381	67.99	65.6
Iron	12 of 12	5130 - 154000	36523	47100
Lead	12 of 12	13.3 - 864	153	22.6
Magnesium	12 of 12	674 - 8060	6504	12700
Manganese	12 of 12	63.5 - 1121	649	1400
Mercury	6 of 12	0.15 - 1.6	0.43	0.17
Nickel	12 of 12	15.2 - 90.9	38.81	73
Potassium	12 of 12	806 - 1610	1269	2900
Selenium	1 of 12	4.0	0.86	<0.71
Silver	12 of 12	2.3 -2.5	1.14	0.09
Sodium	2 of 12	614 - 1230	245	110
Vanadium	12 of 12	16.6 - 40	27.69	40.0
Zinc	12 of 12	38.4 - 5230	631.7	83.9
SEMIVOLATILE ORGANICS (µg/kg):				
1,2,4-Trichlorobenzne	1 of 12	200	322.5	c
Acenaphthene*	2 of 12	78 - 210	315.7	c
Anthracene*	3 of 12	57 - 580	330.6	c
Benzo(a)anthracene*	8 of 12	47 - 7450	908.5	c
Benzo(a)pyrene*	5 of 12	130 - 5200	695	c
Benzo(b)fluoranthene	8 of 12	65 - 13950	1493.75	c
Benzo(g,h,i)perylene*	2 of 12	320 - 3900	558.0	c

TABLE 5
SUMMARY OF POTENTIAL CONTAMINANTS IN SURFACE SOIL
1993 RI SAMPLING DATA

COAL ASH PILE
LORING AIR FORCE BASE

CONSTITUENTS	FREQUENCY OF DETECTION	RANGE OF DETECTION	MEAN(a)	MAXIMUM BACKGROUND(b)
Bis(2-ethylhexyl)phtl	9 of 12	46 - 2800	448.5	c
Butylbenzlphthalate	2 of 12	82 - 100	294.3	c
Carbazole	1 of 12	220	329.2	c
Chrysene*	7 of 12	54 - 8450	950.75	c
Di-n-butylphthalate	2 of 12	73 - 980	366.1	c
Dibenz(a,h)anthracen	2 of 12	100 - 1115	307.5	c
Dibenzofuran	1 of 12	100	320.8	c
Fluoranthene*	9 of 12	45 - 7450	964.1	c
Fluorene*	1 of 12	240	332.5	c
Indeno(1,2,3-c,d)pyn	2 of 12	400 - 4500	614.6	c
N-Nitrosodiphenylan	1 of 12	88	319.8	c
Naphthalene*	1 of 12	46	316.3	c
Pentachlorophenol	1 of 12	470	770	c
Phenanthrene*	8 of 12	54 - 2200	389.7	c
Pyrene*	9 of 12	53 - 10050	1179.2	c
PESTICIDES/PCBs(d) (ug/kg):				
4,4'-DDD	8 of 12	0.26 - 26	4.86	470
4,4'-DDE	10 of 12	0.68 - 62.5	12.21	160
4,4'-DDT	7 of 12	1.5 - 225	27.39	940
alpha-BHC	2 of 12	0.096 - 0.43	2.15	c
beta-BHC	1 of 12	0.93	2.25	c
delta-BHC	2 of 12	0.21 - 0.66	2.11	0.23
gamma-BHC (Linda	3 of 12	0.18 - 0.24	2.13	c
Aldrin	2 of 12	0.17 - 0.18	2.17	c
alpha-Chlordane	6 of 12	0.41 - 22	3.80	c
gamma-Chlordane	9 of 12	0.68 - 22	2.80	c
Dieldrin	3 of 12	0.61 - 2.7	4.23	0.24
Endosulfan I	2 of 12	0.59 - 1.3	2.19	c
Endosulfan sulfate	4 of 12	0.81 - 4.7	4.63	6.2
Endrin	2 of 12	0.87 - 6.95	4.67	0.28
Endrin aldehyde	2 of 12	1.75 - 10	5.07	0.75
Endrin ketone	1 of 12	0.77	4.35	3

TABLE 5
SUMMARY OF POTENTIAL CONTAMINANTS IN SURFACE SOIL
1993 RI SAMPLING DATA

COAL ASH PILE
LORING AIR FORCE BASE

CONSTITUENTS	FREQUENCY OF DETECTION	RANGE OF DETECTION	MEAN(a)	MAXIMUM BACKGROUND(b)
Heptachlor	6 of 12	0.12 - 2.3	1.97	0.2
Heptachlor epoxide	6 of 12	0.18 - 21	3.83	0.11
Methoxychlor	7 of 12	1.04 - 89	25.57	c
Aroclor-1254	1 of 12	190	57.3	c
Aroclor-1260	5 of 12	60 - 43000	3973	240

NOTES:

(a) The mean value represents the arithmetic average of all the samples; in the case of non-detects, a value of one-half the SQL (or CRQLs if SQL cannot be obtained) is assigned for each non-detected result.

(b) Surface soil background concentration data was obtained from the Consensus Statement Background Concentrations for Soils, Surface Water, Sediment (LAFB, 1994).

(c) Background data are either not available or are inappropriate if the constituent is not naturally occurring.

(d) Pesticides/PCBs will not be removed from risk assessment data based on background comparisons.

(1) Includes benzo(k)fluoranthene
* Polynuclear aromatic hydrocarbon

TABLE 6
HUMAN HEALTH RISK ASSESSMENT EXPOSURE PARAMETERS
COAL ASH PILE

OU 2A LANDFILL 1
LORING AIR FORCE BASE

PARAMETERS	CHILD (1-6 YES)	OLDER CHILD/ TEENAGER (7-16 YES)	ADULT (17-30 YES)	UNITS	SOURCE
Surface Soil - Ingestion and Dermal Absorption					
Soil Ingestion Rate	200	100	100	mg/kg	EPA, 1991b
Soil Adherence Factor	1.0 - max.	1.0 - max.	1.0 - max.	mg/cm2	EPA, 1989a
	0.6 - mean	0.6 - mean	0.6 - mean	mg/cm2	EPA, 1989a
Surface Area Exposed	2,295 - max.	5,400 - max.	5,800 - max.	cm2	EPA, 1992
	1,983 - mean	4,400 - mean	5,000 - mean		
Fraction Ingested	100%	100%	100%		Assumption
Exposure Frequency	110	110	110	day/yr	Assumption
Exposure Duration	6	11	6	yr	EPA, 1991b
Body Weight	16	40	70	kg	EPA, 1991b
Averaging Time:					
Cancer	70	70	70	yr	yr
Noncancer	6	11	6	yr	

TABLE 7
SUMMARY OF HUMAN HEALTH RISK

OU 2A COAL ASH PILE
LORING AIR FORCE BASE

	HAZARD INDEX						CANCER RISK					
	CHILD		OLDER CHILD TEENAGER		ADULT		CHILD		OLDER CHILD TEENAGER		ADULT	
SCENARIO	MAX	MEAN	MAX	MEAN	MAX	MEAN	MAX	MEAN	MAX	MEAN	MAX	MEAN
RECREATIONAL (current and future)												
Soil Ingestion	4.1E-1	7.9E-2	8.4E-02	1.64E-2		4.8E-2	9.1E-3	2.8E-4	2.4E-5	1.0E-4	8.6E-6	1.6E-4	1.3E-5
Soil Dermal Absorption	4.7E-2	6.3E-3	4.4E-2	5.6E-3	2.7E-2	3.6E-3	2.2E-3	3.0E-5	1.2E-3	4.9E-5	2.0E-3	8.7E-5
TOTAL SOIL	4.6E-1	8.6E-2	1.3E-1	2.1E-2	7.5E-2	1.3E-2	2.4E-3	5.4E-5	1.3E-3	5.8E-5	2.2E-3	1.0E-4
Dust Inhalation			6.4E+0	1.7E+0					5.5E-4	2.5E-4		

TABLE 8

SUMMARY OF ECOLOGICAL RISK ASSESSMENT FOR TERRESTRIAL ORGANISMS
COAL ASH PILE

OU 2A LANDFILL 1
LORING AIR FORCE BASE

SUMMARY HAZARD INDICES

INDICATOR SPECIES	REASONABLE MAXIMUM	MOST PROBABLE	EXPECTED EFFECT
Short-tailed Shrew	28	34	Effects Probable
American Woodcock	3.2	2.1	Effects Possible
Garter Snake	3.4	2.9	Effects Possible
Fisher	<0.2	<0.2	Effects Unlikely
Broad-winged Hawk	<0.2	<0.2	Effects Unlikely

Risk are most likely overestimated for PAHs and the dermal pathway because of the use of conservative surrogates and absorption efficiencies. Benzo(a)pyrene, considered to be the most toxic of the PAHs, was used as a surrogate for all carcinogenic PAHs lacking toxicity values. Dermal exposures to soils were also calculated risk estimate most likely overestimates the risk to potential receptors. However, with risk estimates on the order of 1.0x10-3 for soils, remedial action was warranted.

Calculated HIs indicate that adverse ecological effects to terrestrial wildlife exposed to contaminants in soil and aquatic organisms exposed to contaminants in surface water or sediment are probable at the CAP. Ecological risks as result of ingestion of soil, food, and water from the CAP were found to be probable for the short-tailed shrew (HIs of 28 and 34 for maximum and average exposures, respectively) and possible for the American woodcock (HIs of 3.2 and 2.1) and garter snake (HIs of 3.4 and 2.9). Risks to the shrew are primarily associated with zinc, lead, cadmium, and selenium; risks to the woodcock and snake are associated with zinc and lead, respectively. Adverse effects on the fisher and broad-winged hawk were unlikely. Table 8 presents a summary of ecological risk for terrestrial organisms at the CAP.

Waster received at the CAP included coal ash, construction debris, and municipal wastes. Contaminants produced by these wastes contributed to elevated levels of human and ecological risk that exceeded MEDEP and/or USEPA target risk levels. Results from previous investigations indicated petroleum-contaminated material and PCB-containing waste might have been disposed in the CAP.

Removal of materials from within the CAP has been conducted as part of a time-critical removal action in accordance with 40 CFR 300.415. Approximately 140,000 cubic yards of material from the CADA has been excavated and used as subgrade material for covers associated with Landfills 2 and 3 (AFCEE, 1995). Approximately 44,000 cubic yards of soil were removed from the DDA and PCDA in 1995 (AFCEE, 1996). Removal of the CAP material is part of an on-going program to consolidate contaminated soils/materials from various locations around LAFB for use as subgrade material under landfill covers associated with OU 2. A comparison of materials from the CAP to the Toxicity Characteristic Leaching Procedure Levels (55 Federal Register, March 19, 1980) has been performed. Results of this evaluation indicated that the CAP material was below these levels; therefore, the material is suitable, without further treatment, for use as subgrade material for the OU 2 landfill cover. Completion of the planned removal actions at the CAP has mitigated additional risks associated with exposure to materials within the CAP. Because there are no residual risks, no further action under CERCLA is necessary.

After removal actions at the CADA and DDA, confirmation sampling and analyses of soils at the bottom and sides of the excavations detected some chemicals above PRGs. Residual risk assessments were performed for both of these areas and the results are described in the following paragraphs.

At the CADA, silver was detected in concentrations up to 5 mg/kg, far below a human health PRG, but in excess of a 2 mg/kg PRG based on a plant receptor. However, the plant toxicity benchmark for silver is considered to be conservative and has a low level of confidence associated with it. In addition, soil cover over the area will mitigate the remote potential for adverse effects due to exposure. Also at the CADA, Aroclor-1260 was detected at concentrations which were below an ecological PRG but exceeded a human health PRG by a small margin. The human health risk calculated for the Aroclor-1260 concentration is within the USEPA target risk range. A Technical Memorandum containing additional details on the residual risk assessment performed for the CADA is included as an attachment to Appendix B.

At the DDA, both benzo(a)pyrene and zinc were detected above PRGs in confirmation samples. For human health, both compounds were within or below the USEPA target risk range. Benzo(a)pyrene concentrations were well below an ecological PRG, but zinc contributes to a HQ above 1 for ecological receptors. However, only one sample location had a concentration of zinc greater than two times the background level, resulting in, at most, the potential for very localized effects to plants and invertebrates. Risk for ecological receptors is further mitigated and minimized by covering the excavated area with at least one foot of clean soil. A technical Memorandum containing additional details on the residual risk assessment performed for the DDA is also included as an attachment to Appendix B.

7.0 DESCRIPTION OF THE NO ACTION ALTERNATIVE

Based on the results of the RI and Baseline Risk Assessment, no further remedial action under CERCLA in necessary for OU 2A LAFB. No five-year site reviews will be conducted.

Although not required under CERCLA, it is recommended that Landfill 1 be classified as a construction debris landfill. The remaining closure activities should be completed in accordance with the Maine Solid Waste Regulations.

To close the landfill in accordance with the State of Maine Solid Waste Regulations, Chapter 401.6 and 404.5 (effective date May 24, 1989), a soil landfill cover system has been designed. Permits will not be

required for cover construction. The proposed cover for Landfill 1 will consist of the following:

- 18 inches of well-graded soil with at least 35 percent fines;
- A final cover of 6 inches of soil suitable to support vegetative cover.

The primary objective of a construction debris landfill cover is to mitigate surface physical hazards. A secondary objective is to reduce the impact on groundwater from infiltration through the landfill. Additionally, the soil landfill cover system will mitigate any potential risk to ecological receptors associated with surface soils at the site.

Post-closure activities would be performed at Landfill 1 for a minimum of ten years. O&M requirements are minimal. Periodic site inspections and maintenance of the cover (e.g., mowing) are the primary components of O&M for Landfill 1.

Contaminants identified to present or have the potential to present risk to human health and the environment have been removed from the CAP under a time critical removal action. The rationale for this removal action was described in the "Time Critical Removal Action Memorandum, Operable Unit 2A, Coal Ash Pile Site," (AFCEE, 1994). Closure was documented in the "Remedial Action Report/Project Closeout Report, OU 2, OU 2A, OU 6, OU 7, and Other Sites," (AFCEE, 1995), and in the "Removal Action Report/Project Closeout Report for the PCDA and DDA", (AFCEE, 1996), satisfying the requirements under Section 19.1 of the FFA.

Some chemicals detected in the soil after removal actions are above PRGs, but do not pose a risk to human health. Zinc and silver exhibit localized ecological risk to plant receptors; however, this risk is mitigated by covering the area with clean soil.

8.0 DOCUMENTATION OF NO SIGNIFICANT CHANGES

The Air Force prepared a Proposed Plan for OU 2A (ABB-ES, 1996). The Proposed Plan described the Air Force's decision to pursue no further action under CERCLA at OU 2A. There have been no significant changes made to the No Action under CERCLA decision stated in the Proposed Plan.

9.0 STATE ROLE

MEDEP, on behalf of the State of Maine, reviewed the Final RI Report and Proposed Plan and indicated its support for the selected remedy. MEDEP concurs with the selected remedy for OU 2A. A copy of the declaration of concurrence is in Appendix C.

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

ABB-ES	ABB Environmental Services, Inc.
AFCEE	Air Force Center for Environmental Excellence
CADA	Coal Ash Disposal Area
CAP	Coal Ash Pile
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CPC	Contaminant of Potential Concern
CRP	Community Relations Plan
CRQL	Contract Required Quantitation Limits
CLP	Contract Laboratory Program
DDA	Drum Disposal Area
DOD	Department of Defense
FFA	Federal Facility Agreement
HI	Hazard Index
HQ	Hazard Quotient
IRP	Installation Restoration Program
LAFB	Loring Air Force Base
MEDEP	Maine Department of Environmental Protection
mg/kg	milligrams per kilogram
NCP	National Contingency Plan
NPL	National Priority List
O&M	Operation and Maintenance
OU	Operable Unit
PAHs	Polynuclear Aromatic Hydrocarbons
PCBs	polychlorinated biphenyls
PCDA	Paint Can Disposal Area
PRGs	Preliminary Remediation Goals
RAB	Restoration Advisory Board
RfD	reference dose
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SVOC	semivolatile organic compound
TAL	Target Analyte List
USAF	U.S. Air Force
USEPA	U.S. Environmental Protection Agency
µg/kg	micrograms per kilogram
VOC	volatile organic compound

REFERENCES

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

ABB Environmental Services, Inc. (ABB-ES), 1994. "Base wide Surface Water/Sediment Operable Unit (OU 13) Interim Remedial Investigation Report"; Installation Restoration Program; prepared for HAZWRAP; June 1994.

ABB Environmental Services, Inc. (ABB-ES) 1995a. "Preliminary Remediation Goals for Operable Unit 2A; Internal Technical Memorandum"; March 1995.

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U.S. Environmental Protection Agency (USEPA), 1990a. "National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan)"; Code of Federal Regulations, Title 40, Part 300; Federal Register, Volume 55, Number 46, pp. 8666 et seq.; March 8, 1990.

U.S. Environmental Protection Agency (USEPA), 1990b. "Toxicity Characteristics Leaching Procedures Final Rule"; Code of Federal Regulations; 55 FR page 11798, March 29, 1990.

APPENDIX A

TRANSCRIPT OF PUBLIC MEETING

STATE OF MAINE CARIBOU, MAINE

AROOSTOOK, ss.

PUBLIC HEARING

LORING AIR FORCE BASE
OPERABLE UNIT 2A PUBLIC HEARING

<IMG SRC 0196120F>

CARIBOU MUNICIPAL BUILDING
HIGH STREET
CARIBOU, MAINE
JANUARY 24, 1996
7:15 P.M.

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

OPERABLE UNIT 2A PUBLIC HEARING

7:15 P.M.

MR. FORBES: Good evening and welcome to the public hearing to receive comments on the removal action at the Coal Ash Pile and the proposed plan for Operable Unit 2A at Loring Air Force Base. Today's date is January 24th, 1996. My name is Peter Forbes, the Remedial Project Manager for the Installation Restoration Program at Loring. Seated with me are Michael Nalipinski, Remedial Project Manager at the US Environmental Protection Agency and Naji Akladiss, remedial Project Manager for the Maine Department of Environmental Protection. They will be assisting me in receiving your comments.

This hearing is being held in accordance with the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended in 1986, also known as Superfund . The act requires federal facilities on the National Priorities List to present clean up proposals to the local community for comment and consideration before the final clean up decisions are made. The purpose of this hearing is to receive

<IMG SRC 0196120G>

comments on the Proposed Plan for Operable Unit 2A, and the removal action at the Coal Ash Pile.

Mr. Philip Bennett from Aroostook Legal Reporters will serve as the court reporter tonight, preparing a verbatim record of the proceedings. 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 is able to hear and understand what you say. With that in mind, please follow these ground rules. Speak only after I recognize you and please address your remarks to me. State your name and the organization you represent and present your statement. Please do not state your address or any other personal information which you do not wish to become a matter of public record. Do not begin speaking until you have reached the microphone and speak slowly and clearly into the microphone. If you have prepared your statement beforehand, you may read it aloud or you may paraphrase it and place it on this table.

Are there any individuals wishing to make a comment or a statement at this time?

Ladies and gentlemen, it is 7:20 p.m., January 24, 1996 and I declare the public hearing to receive

comments on the removal action at the Coal Ash Pile and the Proposed Plan for Operable Unit 2A at Loring Air Force Base closed.

END OF HEARING

<IMG SRC 0196120I>

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

I HEREBY CERTIFY THAT the foregoing is a true and correct transcript of my stenographic notes taken at the Operable Unit 2A Public Hearing on the 24th day of January, 1996 at Caribou, Maine.

<IMG SRC 0196120K>

STATE OF MAINE CARIBOU

AROOSTOOK, ss.

<IMG SRC 0196120J>

APPENDIX B
FINAL

Loring Air Force Base

OU 2A RESPONSIVENESS SUMMARY

MARCH 1996

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. 9043-16

TABLE OF CONTENTS

The U.S. Force (USAF) held a 30-day comment period from January 16 through February 14, 1996, to provide an opportunity for the public to comment on the Proposed Plan and other documents developed for Operable Unit No. 2A (OU 2A) source control at Loring Air Force Base (LAFB), Maine. The Proposed Plan is the document that identities remedial action objective, evaluates remedial alternatives, and recommends the alternatives that best meet the evaluation critical for OU 2A. The Air Force made preliminary recommendations of its preferred alternative for remedial action at OU 2A in Section 6.0 of the Proposed Plan, which was issued on January 12, 1996. All documents on which the preferred alternative was based are in the administrative record for review. The administrative record is a collection of the documents considered by the Air Force while choosing the remedial actions for the OU 2A source areas. It is available to the public at the following location:

Air Force Base Conversion Agency Office
5100 Texas Road
Limestone, ME
(207) 328-7109

The purpose of this Responsiveness Summary is to document Air Force responses to the questions and comments raised during the public comment period regarding the proposed OU 2A source controls. The Air Force considered all comments in this document before selecting a final remedial alternative to address contamination from OU 2A.

A copy of this responsiveness summary will be included as Appendix B in the Record of Decision (ROD) for OU 2A.

This Responsiveness Summary is organized into the following sections:

1.0 Overview of Preferred Alternative. This section briefly outlines the preferred alternative presented in the Proposed Plan for OU 2A.

2.0 Background on Community Involvement and Concerns. This section provides a brief history of community interest and concerns in OU 2A.

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 PREFERRED ALTERNATIVE

The following paragraphs outline the preferred final source control remedial alternative presented in the Proposed Plan for OU 2A. The Final Remedy for Ou 2A is set forth in the Record of Decision.

Based on the results of the Final Remedial Investigation (RI), Draft Feasibility Study, Removal Action Reports and Action Memorandum, and time-critical removal actions at the Coal Ash Pile (CAP) site, no remedial action under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is considered necessary for OU 2A at LAFB. Although the Draft Feasibility Study revealed a number of alternatives the Air Force's preferred alternative is no action for the reasons set forth in the transmittal memorandum (January 5, 1996) for the "Removal Action Report/Project Closeout Report for the Paint Can Disposal Area (PCDA) and Drum Disposal Area (DDA)" (AFCEE, 1996).

Although not required by CERCLA, a soil landfill cover system has been designed consistent with the State of Maine Solid Waste Management Regulations, Chapter 401.6 and 404.5, effective date May 24, 1989. Permits will not be required for cover construction. The proposed cover for Landfill 1 will consist of the following:

- 18 inches of soil with at least 35 percent fines; and
- a final cover of 6 inches of soil suitable to support vegetative cover.

The primary objective of a construction debris landfill cover is to mitigate surface physical hazards. A secondary objective is to reduce the impact on groundwater quality from infiltration through the landfill.

No further action under CERCLA is recommended at the CAP site. About 140,000 cubic yards of coal ash was excavated from Coal Ash Disposal Area (CADA) in 1994, and about 44,000 cubic yards of soil was excavated from DDA and PCDA in 1995. Residual risks at the site do not exceed the U.S. Environmental Protection Agency (USEPA) target risk range. Removal of the contaminated CAP soil and incorporation of this soil into the subgrade for capping Landfills 2 and 3 is consistent with removal action criteria described in the NCP, which describes capping as an acceptable removal action for contaminated soil in order to reduce migration of hazardous substances.

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, USEPA, and MEDEP have kept the community and other interested parties apprised of LAFB activities through informational meeting, fact sheets, press releases, public meetings, site tours, and open houses, and Restoration Advisory Board (RAB) meeting. Membership of the RAB is composed of Air Force, USEPA, MEDEP, and local officials, and community representatives.

The LAFB community relations plan (CRP) was released in August 1991 and revised in May 1995. The CRP outlined a program to address community concerns and keep citizens informed and involved during remedial activities. The CRP can be found in the Administrative Record.

On June 24, 1992, the Air Force made the Administrative Record available for public review. The Administrative Record is currently available for public review at the office of the Air Force Base Conversion Agency Office, 5100 Texas Road, Limestone, Maine. The Air Force published a notice and brief analysis of the Proposed Plan in the Bangor Daily News, the Aroostook Republican, the Fort Fair Field Review and the Star Herald on January 10, 1996.

From January 16 through February 14, 1996, the Air Force held a 30-day public comment period to accept public input on the information presented in the RI/Baseline Risk Assessment and the Proposed Plan, and on any other documents previously released to the public. On January 24, 1996, LAFB personnel and regulatory representatives held a public meeting to discuss the Proposed Plan and to accept any oral comments. A transcript of this meeting is included in Appendix A, and the comments received during the comment period and the Air Force's response to these comments are included in the Responsiveness Summary in Appendix B.

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 January 16 through February 14, 1996 relative to the Proposed Plan for OU 2A at LAFB. Comments include those received from Caswell, Eichler & Hill dated January 24, 1996. No verbal comments were received at the public hearing. The comments and corresponding responses are included herein.

Comment 1: Para. 4, p. 4-1; para. 4, p. 5-1. While the statements regarding risks at the CADA, DDA and PCDA are not inconsistent with referenced residual risk analyses, the statement seem incomplete and may be misleading. For instance, silver concentrations in soil remaining at the CADA exceeded Preliminary Remediation Goals (PRGs) and general ecological exposure guidelines (i.e., hazard quotients exceeded 1). The Air Force offered several points to consider when evaluation the silver exceedances. One suggested that the exceedances did not warrant further consideration due to their magnitude. Others suggested that the PRG was overly conservative due to the low confidence in the toxicological benchmark and naturally high background concentrations of silver. And another suggested that removal action activities may have partially mitigated the risks. We do believe that an estimate of residual risk from the silver at the CADA is warranted at this time, the results of which should be referenced in the Proposed Plan. If the PRG is overly conservative, as the Air Force contends, it should be corrected so that the calculated risks can be used directly without a number of caveats. And, if removal action activities (i.e., the placement of clean fill on the excavation site) have in some way affected the exposure scenario, this should be factored into the risk calculation.

Further, zinc concentrations in soil remaining at the DDA exceeded PRGs and general ecological exposure guidelines (i.e., hazard quotients exceeded 1). Again, the Air Force offered several points to consider when evaluating the exceedances. One suggested that further consideration was not warranted due to the magnitude and extent of the exceedances. One suggested that the toxicity benchmark was overly conservative. And another suggested that removal action activities may have partially mitigated the risks. We believe that the estimate of residual risk from the zinc at the DDA should be referenced in the Proposed Plan. If the PRG is overly conservative, as the Air Force contends, it should be corrected so that the calculated risks can be used directly without a number of caveats. If removal action activities (i.e., the placement of clean fill on the excavation site) have in some way affected the exposure scenario, this should be factored into the risk calculation. Additionally, if complete soil removal has been affected to the bedrock (i.e., at sample location DD004, reference Table 3-2 of the Removal Action Report for the DDA and PCDA), it may be appropriate to eliminate these areas from further consideration. Finally, we are inclined to agree with the Air Force's recommendation that further soil removal or sampling is not warranted at the DDA but, would like to reserve our final comment until we receive responses to the issues contained in this paragraph from the Air Force.

USAF Response: The Air Force will add to Section 6 of the OU2A ROD an explanation that some chemicals exceeding PRGs remained in the soil at the CADA and the DDA. The following paragraphs explain the strategy for addressing residual concentrations after performing a removal or remedial action.

Preliminary remediation goals (PRGs) are developed prior to any removal action. Risk based PRGs are developed using approved methods and benchmark values presented in the Loring Air Force Base Risk Assessment Methodology (HAZWRAP 1994). In general, the approach at Loring AFB has been one grounded in conservatism, so that decisions can be made definitively if concentrations are near the PRGs. After the removal action, confirmatory sampling is done to ascertain if PRGs2 have been met. Any compound that exceeds the PRG is carried into the residual risk assessment screening.

For human health, the maximum detected concentration from the confirmatory sampling is put into the most conservation exposure scenario that would be expected at the site. If risk is within or below the U.S. Environmental Protection Agency (EPA) target risk range and below the Maine Department of Environmental Protection (MEDEP) target risk level, then the removal action is determined to be successful.

For ecological risk assessment, residual risk calculations simply consist of comparing the maximum detected concentration to the PRG or appropriate toxicological benchmark to obtain a hazard quotient for the compound. Ecological risk assessment is inherently a more qualitative process when interpretation is

done. There is no standard data base for toxicity values as there is for human health; therefore, benchmarks are chosen based on literature searches. The benchmarks selected for Loring AFB have purposefully been chosen to be conservative so that risk is more likely to be overestimated than underestimated. In addition, because most studies are done in laboratory conditions, the natural or background conditions of an area may also be taken into account when interpreting risk to ecological receptors. It is unlikely that a background concentration of an inorganic would cause adverse effects to a native ecological population.

The maximum detected concentration is used as a conservative residual risk screen as well. If risks are significantly above the target risk level, other factors are considered in order to determine if further removal actions are required. These factors included the distribution of detections, the frequency of detection, and the number of compounds detected above the PRG.

In response to the comment that "If the PRG is overly conservative...it should be corrected...", literature searches were performed and benchmark values selected in accordance with the agreed upon approach to use conservative toxicity values in order to make decisions definitively. In the case of the CADA, the compound under consideration is silver. Information on the toxicity of silver to ecological receptor is sparse. The benchmark that was used was found in Will and Suter (1994), which stated, "There were no primary reference data showing toxicity of silver to plants grown in soil." The benchmark is a secondary reference, with no primary reference given, and is based on general adverse effects. Therefore, the benchmark cannot be revised. It is standard and necessary practice in ecological risk assessment to consider factors such as the certainty of the toxicity value, the concentration relative to background, and the localization of the detections when interpreting ecological risk assessments.

At the CADA, silver and Aroclor-1260 exceeded PRGs and are discussed in the Technical Memorandum (Attachment 1) entitled "Residual Risk Screening for the Coal Ash Pile Disposal Area Removal at Loring Air Force Base" June 8, 1995. A residual risk assessment was performed, but an estimate of the human health risk from silver was not provided because the human health PRG calculated (1327.27 mg/kg) for comparison purposes was far above concentrations detected in confirmation sampling. The conclusion of the Technical Memorandum is that silver and Aroclor-1260 do not present a risk to human health or the environment at the CADA.

At the DDA the chemicals benzo(a)pyrene and zinc exceeded PRGs and are discussed in correspondence (Attachment 2) from HAZWRAP to the Air Force dated January 4, 1996. The letter reports on a residual risk analyses with a finding that neither chemical contributes to a human health risk above regulatory guidelines. Only zinc contributed to a HQ above 1 for ecological receptors. The letter concludes further soil removal is not warranted at the DDA.

The following paragraphs will be added to Section 6.2 of the ROD.

"After removal actions at the CADA and DDA, confirmation sampling and analyses of soils at the bottom and sides of the excavations detected some chemicals above PRGs. Residual risk assessments were performed for both of these areas and the results are described in the following paragraphs.

At the CADA, silver was detected in concentrations up to 5 mg/kg, far below a human health PRG, but in excess of a 2 mg/kg PRG based on a plant receptor. However, the plant toxicity benchmark for silver is considered to be conservative and has a low level of confidence associated with it. In addition, soil cover over the area will mitigate the remote potential for diverse effects due to exposure. Also at the CADA, Aroclor-1260 was detected at concentrations which were below an ecological PRG but exceeded a human health PRG by a small margin. The human health risk calculated for the Aroclor-1260 concentration is within the USEPA target risk range. A Technical Memorandum containing additional details on the residual risk assessment performed for the CADA is included as an attachment to Appendix B of the ROD.

At the DDA, both benzo(a)pyrene and zinc were detected above PRGs in confirmation samples. For human health, both compounds were within or below the USEPA target risk range. Benzo(a)pyrene concentrations were well below an ecological PRG, but zinc contributes to a HQ above 1 for ecological receptors. However, only one sample location had a concentration of zinc greater than 2 times the background level, resulting in, at most, the potential for very localized effects to plants and invertebrates. Risk for ecological receptors if further mitigated and minimized by covering the excavated area with at least one foot of clean soil. A Technical Memorandum containing additional details on the residual risk assessment performed for the DDA is also included as an attachment to Appendix B of the ROD."

Comment 2: Para. 2, p. 6-2. There is no mention of the residual risks at the CADA and the DDA. For completeness, a reference should be made to paragraphs listed in Comment 1 above.

USAF Response: The following sentence will be added to Section 7.0 of the ROD. The proposed plan will not be revised.

"Some chemicals detected in the soil after removal actions are above PRGs, but do not pose a risk to human health. Zinc and silver exhibit localized ecological risk to plant receptor; however, this risk is mitigated by covering the area with clean soil."

ATTACHMENT 1
TECHNICAL MEMORANDUM JUNE 8, 1995

<IMG SRC 0196120L>

MEMORANDUM FOR Michael Nalipinski
US Environmental Protection Agency
JFK Federal Building
Mail Code HAN CAN-2
Boston MA 02203-2211

Naji Akladiss
Maine Department of Environmental Protection
State House Station 17
Augusta ME 04333-0017

<IMG SRC 0196120M>

FROM: AFBCA/OL-M
RR 1, Box 1719
Limestone ME 04750-9743

SUBJECT: Residual Risk Screening for the Coal Ash Disposal Area (CADA) within Operable Unit (OU) 2A

1. A Technical Memorandum entitled Residual Risk Screening for the Coal Ash Pile Disposal Area at Loring Air Force Base has been prepared to evaluate the confirmation sampling data collected during the removal action at the Coal Ash Pile site. The Technical Memorandum has been attached for your review. Based on our analysis, the current concentrations that exist at the CADA do not present a risk to human health or the environment. A similar evaluation will be performed on the confirmation sampling data collected from the Drum Disposal Area (DDA) and the Paint Can Disposal Area (PCDA) once these areas have been excavated and disposed of at Landfill 3.

2. Distribution of the subject document is as follows:
   a. U.S. Environmental Protection Agency (USEPA), three (3) copies to Region I. five copies (5) to Hailliburton-NUS;
   b. Maine Department of Environmental Protection (MDEP), four (4) copies to Augusta;
   c. AFBCA/NE, one (1) copy;
   d. U.S. Fish and Wildlife Service, one (1) copy;
   e. Air Force Center for Environmental Excellence (AFCEE), for (4) copies;
   f. Loring Development Authority of Maine, one (1) copy to Limestone, one (1) copy to the Technical Advisor.

3. If you have any questions, please call me or Denis St. Peters at (207) 328-7109.

<IMG SRC 0196120N>

Attachment:
Technical Memorandum

TECHNICAL MEMORANDUM

Residual Risk Screening for the Coal Ash Pile Disposal Area Removal
at Loring Air Force Base
June 8, 1995

The analytical results from the Coal Ash Disposal Area (CADA) removal confirmation sampling were compared with the preliminary remediation goals (PRGs) developed for the Coal Ash Pile site. The analytical results were taken from the Remedial Action Report Report/Project Closeout Report, OU2, OU 2A, OU 6, OU7, and Other Sites (AFCEE, January 1995) and the PRGs were taken from the PRGs for the Coal Ash Pile Site Operable Unit (OU 2A) Technical Memorandum Report (ABB-ES, April 1995). The results of this comparison are summarized in Table 1 (attached).

Only two chemicals of concern, silver and Aroclor-1260, exceeded the PRGs in the confirmation samples. Although the PRGs of 2 for these compounds were slightly exceeded, the following points should be considered:

Silver

- Silver exceeded the PRG of 2 mg/kg in 13 samples, but the highest detection was only 5 mg/kg. the hazard quotient for silver at the maximum concentration detected is 2.5, indicating adverse affects are unlikely.
- The PRG for silver is based on a plant receptor. According to the Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Terrestrial Plants (Will and Suter, September 1994), there is a low confidence in the benchmark for silver. This results in an overly conservative estimate of risk. A portion of this document is attached for your reference.
- Ecological exposures, which are assumed to occur within the top 2 ft below ground surface, are further mitigated by the addition of up to 1 ft of clean fill to the excavation site.
- A human health PRG for silver of 1327.27 mg/kg was calculated for comparison purposes (Attachment 2). This number is significantly higher than the concentrations of silver detected in the confirmatory sampling.
- Silver was not detected in the groundwater, surface water, or sediment samples during the OU 2A Remedial Investigation (RI). Therefore, it does not appear to be migrating.
- The uniform distribution of silver in the confirmation samples and the absence of silver in the subsurface soil samples from the CADA (the two detections in the RI sampling were from the Drum Disposal Area and the Paint Can Disposal Area) indicate naturally high background rather than contamination.

Aroclor-1260

- Aroclor-1260 exceeded the PRG of 0.12 mg/kg in two samples by a small margin. The PRG for Aroclor-1260 is based on an older child trespasser scenario. The risk from Aroclor-1260 at the maximum concentration detected is 2.73 x 10-6, which is below the Maine Department of Environmental Protection target risk range of 1 x 10-5 and within the U.S. Environmental Protection Agency target risk range of 1 x 10-4 to 1 x 10-6.
- The concentrations of Aroclor-1260 detected in the confirmation samples were both below the ecological PRG of 1.8 mg/kg.
- Risk would be further mitigated by the addition of clean fill to the excavation site.

The analysis indicates that the presence of silver and Aroclor-1260 does not present a risk to human health or the environment at the CADA. Therefore, it is not necessary to perform an estimate of residual risk at this site.

TABLE 1

Screening of Proposed PRG's with Analytical Results for the Coal Ash Pile Removal Action

OU-2A: Coal Ash Pile

Loring Air Force Base

Chemical of Concern (mg/kg)	Proposed PRG (mg/kg)	Environmental Sample	Analytical Results
Silver	2	CAP01CFD-41000652-WC-2006	4
	2	CAP01CSA-41000651-WC-2005	4
	2	CAP03CSA-41000635-WC-2012	5
	2	CAP04CSA-41000636-WC-2013	5
	2	CAP05CSA-41000637-WC-2014	4
	2	CAP06CSA-41000638-WC-2015	5
Silver	2	CAP07CSA-41000640-WC2017	4
	2	CAP08CSA-41000641-WC-2018	4
	2	CAP09CSA-41000643-WC-2020	4
	2	CAP10CSA-41000642-WC-2019	4
	2	CAP11CSA-41000644-WC-2021	4
	2	CAP12CSA-41000646-WC-2023	5
	2	CAP13CSA-41000657-WC-2024	4
Aroclor-1260	0.12	CAP06CSA-41000638-WC-2015	.230P
Aroclor-1260	0.12	CAP07CSA-41000640-WC-2017	.300P

notes

J = Concentrations estimated; reported below the sample quantitation limit

P = Pesticides/PCBs only: Quantitation is estimated since percent difference between the primary quantitation column and secondary confirmation column is greater than 25%

<IMG SRC 01961200>

M. E. Will
G. W. Suter II

Date Issued-September 1994

Prepared by
Environmental Sciences Division
Oak Ridge National Laboratory
under direction from the
Environmental Restoration Risk Assessment Council

Prepared for
U.S. Department of Energy
Office of Environmental Restoration and Waste Management
under budget and reporting code EW 20

OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831-6285
managed by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

Attachment 2

Calculation of a Human Health Preliminary Remediation Goal for Silver
for the Coal Ash Pile, Operable Unit 2A, Loring Air Force Base

Silver was selected as an ecological contaminant of concern (COC) in the Operable Unit (OU) 2A Remedial Investigation (RI) Report. Silver was not selected as a COC for the human health risk assessment, because it was screened out during the concentration/toxicity screening procedure used in the selection of COCs.

For comparison purposes, a human health Preliminary Remediation Goal (PRG) was calculated based on the ingestion of silver and noncarcinogenic effects. Toxicity values are not available for carcinogenic effects or for noncarcinogenic effects due to inhalation. The dermal pathway is essentially insignificant.

The parameters used in the equation were taken from the OU 2A RI Report recreational child receptor scenario.

Oral RfD (RfD) = 5.0e-03
Ingestion Rate of Soil (IR) = 200 mg/day
Conversion Factor (CF) = 10-6 kg/mg
Exposure Frequency (EF) = 110 days/yrs
Exposure Duration (ED) = 6 years
Body Weight (BW) = 16 kg
Averaging Time (AT) = 6 years
Concentration in Soil (CS) = PRG

Equation: $$CS = \frac{BW \times AT \times 365\ days/yr \times RfD}{IR \times CF \times EF \times ED}$$

The resultant PRG is 1327.27 mg/kg for silver in soils. The concentration of silver in soil detected in the confirmatory sampling at the Coal Ash Pile is significantly lower than this value. This value is based on site specific exposures and should not be applied to other sites at Loring Air Force Base.

CORRESPONDENCE, JANUARY 4, 1996

<IMG SRC 0196120P>

Dear Mr. St. Peter:

Drum Disposal Area Residual Risk Assessment

Per your request, the Hazardous Waste Remedial Actions Program has calculated residual risk based on the results of confirmation sampling at the Drum Disposal Area (DDA) in Operable Unit 2A. Because of further removals at sampling location DD008, sampling results from this location were excluded from residual risk calculations. Sampling location DD102 was also not included in the residual risk calculations because the sample was taken in an area where pieces of asphalt pavement are located, and the sample is not indicative of the level of contamination at the site.

Only benzo(a)pyrene and zinc were detected above their respective Preliminary Remediation Goals (PRGs). The maximum detected concentration was used in the residual risk calculations. Table 1 shows the calculations risk levels associated with these compounds through the ingestion and dermal contact exposure routes for the most conservation receptor, the child trespasser. Neither inhalation toxicity values nor dermal absorption efficiencies are available for benzo(a)pyrene or zinc.

Benzo(a)pyrene contributes a carcinogenic risk of 1.7 x 10-6. This risk level is within the U.S. Environmental Protection Agency (EPA) target risk range and below the Maine Department of Environmental Protection (MEDEP) target risk level. Zinc contributes a noncarcinogenic HQ of 0.0046, which is below the EPA and MEDEP target Hazard Index of 1.

In considering ecological receptors, the maximum concentration of benzo(a)pyrene detected of 0.73 mg/kg is well below the PRG 0f 34. Zinc was detected at a maximum concentration of 366 mg/kg. This value exceeds the PRG of 93.9 based on background, resulting in a hazard quotient (HQ) of 18.3. The toxicity benchmark for plant exposure is 20 mg/kg, indicating that the literature toxicity value for zinc is overly conservative because plants are not likely to be adversely affected below the background level. The detection would also exceed a PRG based on invertebrate exposure to zinc (130 mg/kg,) resulting in a HQ of 2.8.

In summary, neither benzo(a)pyrene nor zinc contributed to a human health residual risk above regulatory guidelines. Only zinc contributed to a HQ above 1 for ecological receptors. Location DD004 is the only location where zinc exceeds the background concentration by more than a factor of 2. It is possible that this location could present a localized risk of adverse effects to plants. However, all other detections of zinc are less than two times the background concentration and are unlikely to cause adverse effects. Risk at the DDA is further mitigated by the placement of at least 1 ft of clean fill across the site. Therefore, further soil removal or sampling is not warranted at the DDA.

Please call me at 423-435-3291 if you have any questions or if you require additional information.

Sincerely,

<IMG SRC 0196120Q>

BTS:

Attachment

c/attn.: S. H. Stines
File-RC-0770

translocated to all parts of the plant, including the seed, in low molecular weight compounds (Broyer et al., 19972). Toxicity symptoms include chlorosis, stunting, and yellowing of the leaves. The mechanism of toxicity is thought to be indiscriminate replacement of S by Se in proteins and nucleic acids with disruptions in metabolism (Trelease et al. 1960)

3.1.23 Sliver

Experiments Conducted in Soil

There were no primary reference data showing toxicity of Ag to plants grown in soil. We have low confidence in the benchmark because it is based on a report of unspecified toxic effects on plants grown in a surface soil with the addition of 2 ppm Ag (Kabata-Pendias and Pendias, 1984).

Experiments Conducted in Solution

Wallace (1979) examined the effect of Ag from AgNO, on shoot weight of bush bean seedlings grown in nutrient solution (pH 5) for 13 days. Silver at 0.16 ppm reduced shoot weight 58% while 0.016 ppm had no effort.

Confidence in the 0.1 ppm benchmark for toxicity to plants growing in solution is low due to lack of data.

Mechanism of Phytotoxicity

Silver taken up by plants remains in the root system precipitated with phosphate or chloride (Ward et al., 1979). The toxicity of Ag is related to the binding potential Ag ions to enzymes and other active molecules at cell surfaces (Cooper and Jolly. 1970).

3.1.24 Technetium

Experiments Conducted in Soil

Wildung et al. (1977) investigated the affect of Tc on wheat and soybean grown in a silt loam soil (pH 6.8, % organic matter 1.4) from seed for 30 days. Addition of 1 ppm Te as TcOA reduced shoot weight of wheat 100% and soybeans 99%, while 0.1 ppm had no effect.

Confidence in the benchmark of 0.2 ppm Te is low because it is based on this study alone. The authors' chose to divide the LOEC by 5 because although it was not expressed as such in the study, the severity of the effects seemed to border on mortality of the plants.

Experiments Conducted in Solution

Berlyn et al. (1980) conducted several experiments to examine the effect of Te on fresh weight of soybean seedlings. When seedlings were germinated and allowed to grow for 20 days in nutrient solution containing 0.2 ppm Te(TcO) plant weight was reduced 31% Technetium at

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Koeppe, D.E. 1981. "Lead: Understanding the minimal toxicity of lead in plants." In: N.W. Metal Pollution on Plants. Vol 1. Effects of Trace metals on Plant

TABLE 1. REASONABLE MAXIMUM RISK CALCULATIONS FOR INGESTION AND DERMAL ABSORPTION OF SOIL BY A TRESPASSING/EXPLORING CHILD AT OU-2A - drum disposal area.

EXPOSURE PARAMETERS — EQUATIONS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
Concentration in soil	CS	Max.	mg/kg	CANCER RISK = INTAKE (mg/kg-day)x CSF (mg/kg-day)-1
Ingestion Rate	IR	200	mg/day	EPA, 1991b HAZARD QUOTIENT = INTAKE (mg/kg-day) / RID (mg/kg day)
Fraction Ingestion	FI	100%		Assumption
Soil Adherence Factor	SAF	1.00	mg/cm3	EPA, 1989a
Surface Area Exposed	SA	2,295	cm3/day	EPA, 1992
Dermal Absorption Ellicie	AE	0.06	unitless	EPA, 1992
Conversion Factor	CF	0.000001	kg/mg	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
Body Weight	BW	16.00	kg	EPA, 1991b
Exposure Frequency	EF	110.000000	days/year	Assumption INTAKE- INGESTION = CS x IR x FI x CF X FF X ED
Exposure Duration	ED	6	years	Assumption BW x ATx365 days/yr
Averaging Time				
Cancer	AT	70	years	EPA, 1989a INTAKE-DERMAL = CS x SA x SAF x CF x FFx ED
Non cancer	AT	6	years	Assumption BW x AT x 365 days/yr
Permeability Constant	PC			
Ingestion	Comp. Specific			EPA, 1989b
Dermal	Comp. Specific			EPA, 1989b

References:

EPA, 1989a. Risk Assessment Guidance for Superfund
EPA, 1989b. Supplemental Risk Assessment Guidance
EPA, 1991. Standard Default Exposure Factors
EPA, 1992. Dermal Exposure Assessment: Principles and Applications

Note:

CSF - Cancer Slope Factor
RID - Reference Dose
HO - Hazard Quotient
COC - Constituent of Concern

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CARCNOGENIC EFFECTS

COC	0$ (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL AE	INTAKE DERMAL (mg/kg-day)	INGESTION C$$ (mg/kg-day) 1	DERMAL C$$ (mg/kg-day) 1	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)pyrene	0.7300	2.4E-07	NA	-	7.3000	NA	1.7E-06	-	1.7E-06
zinc	366.0000	1.2E-04	NA	-	NA	NA	-	-	-
				SUMMARY CANCER RISK			1.7E06	0 0E + 00	1.7E.06

NONCARINOGENIC EFFECTS

COC	0$ (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL AE	INTAKE DERMAL (mg/kg-day)	INGESTION RID (mg/kg-day) 1	DERMAL RID (mg/kgday) 1	liQ INGESTION	liQ DERMAL	TOTAL HQ
Benzo(a)pyrene	0.7300	2.8E-08	NA	-	NA	NA			
zinc	366.0000	1.4E.03	NA	-	3.00E-01	NA	4.6E-03	-	4.6E-03
				SUMMARY HAZARD INDEX			4.6E-03	-	4.6E.03

NA = No value available

- No calculation because invalid exposure pathway or no toxicity value available

APPENDIX C
LETTERS OF CONCURRENCE

<IMG SRC 0196120R>

February 5. 1996

Mr. Peter Forbes
Air Force Base Conversion Agency

Operation Location "M"
RR #1, Box 1719
Limestone, Maine 04750

Re: Loring Air Force Base Superfund Site, Maine

Dear Mr. Forbes:

The Maine Department of Environmental Protection (MEDEP) has reviewed the January, 1996 Draft Final Record of Decision (ROD) regarding Operable Unit 2A (OU 2A) for the Loring Air Force Base Superfund Site located in Limestone, Maine

Based on the Draft Final ROD, the MEDEP concurs with the Air Force's determination that no action under CERCLA is necessary to address the contamination at OU2A. The MEDEP also concurs with the following recommendations:

1. The Air Force and USEPA have determined that no further CERCLA action is required at OU2A. Remaining closure activities for Landfill 1 will be completed in accordance with Maine Solid Waste Management Regulations.

2. The time critical removal action performed at the Coal Ash Pile (CAP), as described in the "Time Critical Removal Action Memorandum, Operable Unit 2A, coal Ash Pile Site". (AFCEE, 1994) provides closure at the CAP.

3. USEPA in consultation with the state has the authority to revisit the No-Action under CERCLA decision even if Loring is removed from the NPL. This could occur if future conditions indicate that an unacceptable risk to human health or the environment would result from exposure to contaminants at Landfill 1 or from the CAP.

Clean Up Levels:

The remedial alternative selected for the site must achieve goals for reducing contamination at OU2A. Clean-up goals for OU2A have been set for contaminated soil and sediment, based either on background concentrations, analytical detection limits, or on risk calculations.

Tables 1 through 8 list the compounds and elements for which a remedial goals have been set, as well as the summary of risk associated with the sites included in this OU.

Description of No Action Alternative

The following describes the no action remedial alternative developed for Operable Unit 2A at Loring:

Based on the result of the remedial investigation (RI) and Baseline Risk Assessment, no further remedial action under CERCLA is considered necessary for OU 2A at LAFB.

The DEP accepts the Air Force's recommendation that Landfill 1 be classified as a construction debris landfill with no CERCLA requirement for action. As such, the remaining closure activities should be completed in accordance with the Maine Solid Waste Regulations, and no five year site reviews will be conduct.

To close the landfill in accordance with the State of Maine Solid Waste Regulations, Chapter 401.6 and 404.5 (effective date may 25, 1989,) a soil landfill cover system has been designed. Permits will not be required for cover construction. The proposed cover for Landfill 1 will consist of the following:

A. 18 inches of well-graded soil with at least 35 percent fines;

B. A final cover of 6 inches of soil suitable to support vegetative cover.

The primary objective of a construction debris landfill cover is to mitigate surface physical hazards and reduce the impact on groundwater from infiltration through the landfill. Additionally, the soil landfill cover system will mitigate any potential risk to ecological receptors associated with surface soils at the site.

Post closure activities would be performed at Landfill 1 for a minimum of ten years. O & M requirements are minimal. Periodic site inspections and maintenance of the cover (e.g. mowing) are the primary components of O & M for Landfill 1.

Contaminants identified to present or have the potential to present risk to human health and the environment have been removed from the CAP under a time critical removal action. The rationale for this removal action was described in the "Time Critical Removal Action Memorandum, Operable Unit 2A, Coal Ash Pile Site", (AFCEE, 1994). Closure was documented in the "Remedial Action Report, Project Closeout Report, OU 2, OU 2A, OU 6, OU 7, and Other Sites", (AFCEE, 1995) and in the "Removal Action, Report, Project Close-out
Report for the PCDA and DDA", (AFCEE, 1996) satisfying the requirement under Section 19.1 of the FFA.

The State's concurrence in the selected remedy, as described above, should not be construed as the State's concurrence with any conclusion of law or finding of fact which may be set forth in the Record of Decision (for OU 2A). 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 USEPDA to resolve the environmental problems posed by this site. If you need additional information, do not hesitate to contact myself or Mark Hyland.

Sincerely,

<IMG SRC 0196120S>

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