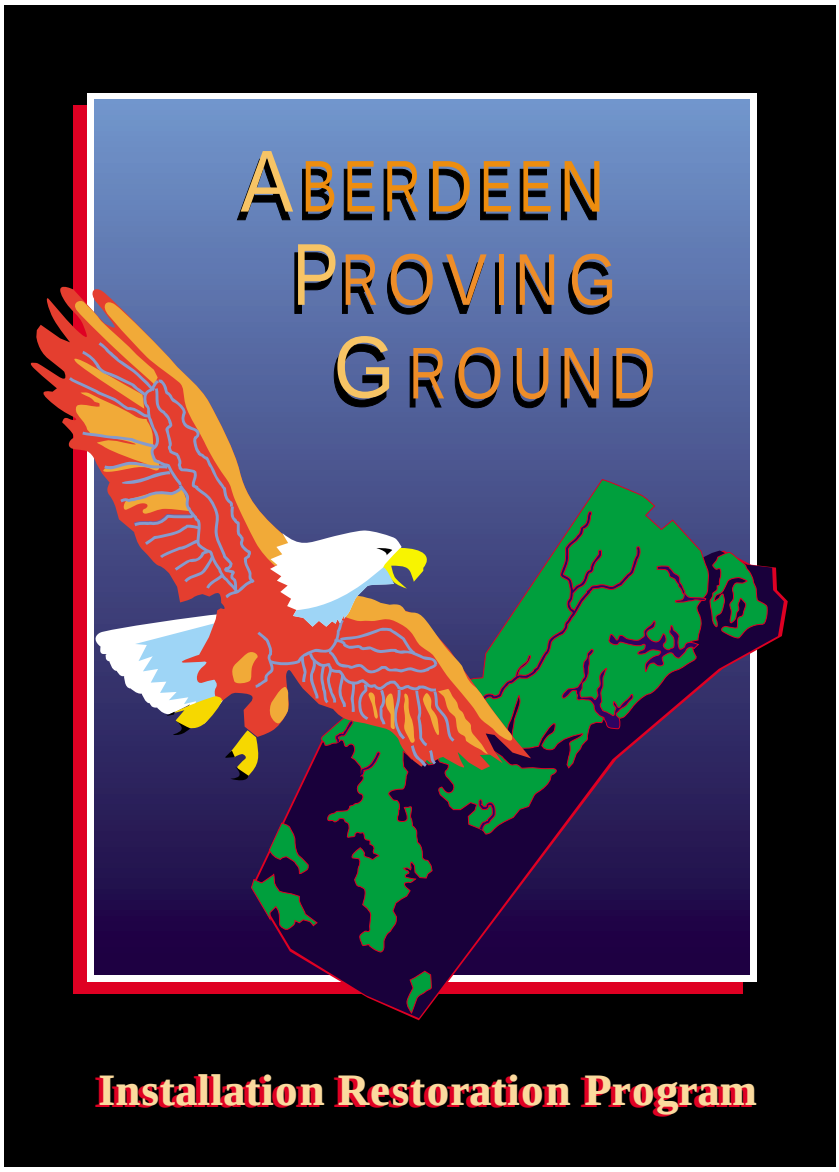

EXPLANATION OF SIGNIFICANT DIFFERENCES
J-FIELD SOIL OPERABLE UNIT REMEDIAL ACTION
DRAFT-FINAL

AUGUST 2000
EDGEWOOD AREA
ABERDEEN PROVING GROUND, MD

00P-1027-6b

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EXPLANATION OF SIGNIFICANT DIFFERENCES
J-FIELD SOIL OPERABLE UNIT REMEDIAL ACTION
DRAFT-FINAL

Edgewood Area
Aberdeen Proving Ground, MD

Prepared for

Directorate Of Safety, Health And Environment
Environmental Conservation and Restoration Division
Installation Restoration Program
U.S. Army Garrison Aberdeen Proving Ground, Maryland

August 2000

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LIST OF FIGURES

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LIST OF ACRONYMS

AOCs	Areas of Concern
APG-EA	Aberdeen Proving Ground - Edgewood Area
APGSCC	Aberdeen Proving Ground Superfund Citizens' Coalition
ARARs	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CWM	chemical warfare material
DSHE	Directorate of Safety, Health, and Environment
EPA	U.S. Environmental Protection Agency
ERA	Ecological Risk Assessment
ERDEC	Edgewood Research, Development, and Engineering Center
ESD	Explanation of Significant Differences
HE	high explosive
HHRA	Human Health Risk Assessment
J-Field SOU	J-Field Soil Operable Unit
MDE	Maryland Department of the Environment
ND	not detected
O&M	operation and maintenance
PAOCs	Potential Areas of Concern
PCBs	polychlorinated biphenyls
PSB	Protective Soil Blanket
RAB	Restoration Advisory Board
RAOs	Remedial Action Objectives
RBCs	risk-based concentrations
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
SVOCs	semivolatile organic compounds
TEU	Technical Escort Unit
UXO	unexploded ordnance
VX	O-ethyl-S-(2-isopropylaminoethyl) methyl phosphonothiolate
XRF	X-ray fluorescence

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Commanding General
U.S. Army Aberdeen Proving Ground

Date

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Regional Administrator
U.S. Environmental Protection Agency,
Region III

Date

ABERDEEN PROVING GROUND

DRAFT-FINAL
EXPLANATION OF SIGNIFICANT DIFFERENCES
J-FIELD SOIL OPERABLE UNIT REMEDIAL ACTION

August 2000 Aberdeen Proving Ground, Maryland

1. INTRODUCTION AND PURPOSE

This Explanation of Significant Differences (ESD) summarizes the proposed modifications to the remedial action for the J-Field Soil Operable Unit (J-Field SOU). The remedial objective for the J-Field SOU is to reduce exposure of human and environmental receptors to surface soil contamination in the three source areas: Northern Main Burning Pit, Southern Main Burning Pit, and Pushout Area.

J-Field is located in the southern peninsula of the Aberdeen Proving Ground - Edgewood Area (APG-EA), Maryland (the "site"). The DSERTS number for the J-Field SOU is EAJF05-A (Toxic Burning Pits - Southern Main Pits Overall).

This ESD summarizes the SOU current conditions, the basis for modifying the remedial action, and summarizes the proposed changes to the remedial action to address soil contamination at the J-Field SOU Edgewood Area, APG Maryland. This OU consists of two main burning pits (the Northern Main Burning Pit and Southern Main Burning Pit) and the Pushout Area (consisting of the VX Burning Pit, the Mustard Burning Pit, and the Liquid Smoke Disposal Pit). These areas are shown in Figure 1.

This ESD presents information that can be found in greater detail in the J-Field SOU Record of Decision (ROD) and in the reports, *J-Field Soil Operable Unit Final Report of Activities Edgewood Area, Aberdeen Proving Ground, MD* (WESTON, April 2000)*; Final J-Field Shoreline Stabilization Project Final Technical Report (As-Built)* (WESTON, September 1999)*;* and *Geochemical Evaluation of Arsenic and Lead Mobility, Toxic Burning Pit Area, J-Field, Aberdeen Proving Ground, MD* (Accuscience Environmental, January 2000). Other relevant documents include the references for these reports and other documents contained in the Administrative Record for this site.

A ROD was signed for the J-Field SOU on 27 September 1996. The September 1996 ROD specified limited removal of contaminated soils from the Toxic Burning Pits (TBPs), followed by construction of a Protective Soil Blanket (PSB) to prevent ecological exposure. Additional remedial components included shoreline erosion controls along the southern shore of the Gunpowder Neck peninsula to prevent future erosion of contaminated materials into the bay.

The September 1996 ROD implementation was conducted from March 1998 through May 1999. During excavation, unexploded ordnance (UXO) and chemical warfare material (CWM) were encountered before excavation to specified cleanup criteria was completed in some areas. Hand excavation was subsequently required for worker safety. However, sufficient material has been removed to permit construction of the PSB as originally described in the September 1996 ROD.. The Army has evaluated the potential for migration of remaining contaminants to ecological receptors. Based upon the results of this evaluation and the issues associated with excavation of the remaining materials, the Army is proposing to modify the remedial action at the TBP from that described in the September 1996 ROD to include work completed to date, followed by construction of the PSB as originally planned. Shoreline erosion control measures have been implemented as specified in the September 1996 ROD.

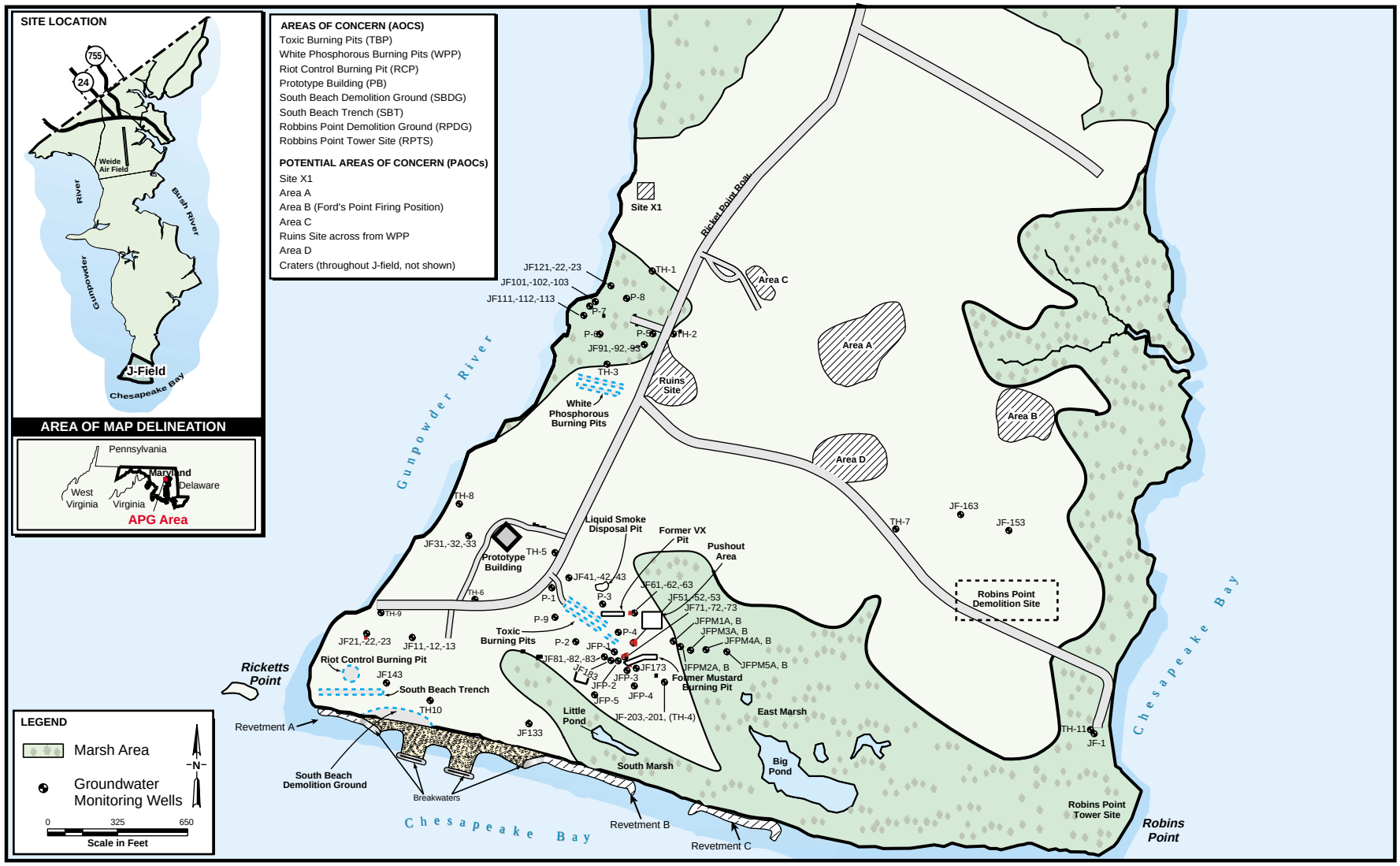

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FIGURE 1 LOCATIONS OF AREAS OF CONCERN (AOCs) AND POTENTIAL AREAS OF CONCERN (PAOCs) AT J-FIELD

OPPORTUNITIES FOR COMMUNITY INVOLVEMENT

Community Meeting—Community members are encouraged to attend a community meeting at the Edgewood Senior Center, 1000 Gateway Dr., Edgewood, MD, on 19 September 2000 at 7:15 p.m. A poster session will begin at 6:30 p.m. The purpose of the meeting is to discuss the revision to the J-Field SOU remedial action and to receive oral and written public comments.

Public Review and Comment Period—A 30-day public review and comment period on this ESD will be from 30 August to 29 September 2000. All interested members of the public are encouraged to review and comment on the ESD. The Administrative Record, which contains all the documents that will be used in selecting a remedy, is available for public inspection at the following locations:

Harford County Public Library -
Aberdeen Branch
21 Franklin Street
Aberdeen, MD 21001
(410) 273-5608

Hours:
Mon, Tue, and Thurs: 10 a.m. - 8 p.m.
Wed: 1 p.m. - 8 p.m.
Fri: 1 p.m. - 5 p.m.
Sat: 10 a.m. - 5 p.m.

Harford County Public Library -
Edgewood Branch
2205 Hanson Road
Edgewood, MD 21040
(410) 612-1600

Hours:
Mon, Tue, and Thurs: 10 a.m. - 8 p.m.
Wed: 1 p.m. - 8 p.m.
Fri: 1 p.m. - 5 p.m.
Sat: 10 a.m. - 2 p.m.

Kent County -
Washington College
Miller Library
Chestertown, MD 21620
(410) 778-2800

Hours:
Monday – Friday: 8:30 a.m. - 10:00 p.m.
Sat: 10 a.m. –10 p.m.
Sun: 10 a.m. –10 p.m.
Summer: 8:30 a.m. –4:30 p.m.

Comments can be submitted either orally (at the community meeting) or in writing throughout the public comment period.

This document is issued by the U.S. Army, the owner of the site and the U.S. Environmental Protection Agency (EPA), Region III, the lead regulatory agency for APG-EA remedial activities.

2. SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

Beginning around World War II, the J-Field Toxic Burning Pit area was used for the disposal (by burning) of toxic chemical materials, CWM, drummed chemical wastes, and materials contaminated with CWM (such as nerve agents, mustard, VX, and other types of chemical agents). The pits were used extensively from the late 1940s to the 1960s, and to a lesser extent in the 1970s. The pits have rarely been used since 1980. In addition to disposal operations by burning, high explosive (HE) munitions were disposed by detonation along the southeastern edge of the Toxic Burning Pit area. The soil in and around the Toxic Burning Pits was contaminated with heavy metals, chlorinated solvents, phthalates, semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and pesticides. The Risk Assessment identified the primary Contaminants of Concern in each of the three areas as follows: lead and arsenic in the Northern Main Burning Pit, PCBs in the Southern Main Burning Pit, and lead in the Pushout Area.

When the burning operations were completed, residue from the Toxic Burning Pits was pushed eastward to the Pushout Area which has filled in 30 to 50 ft of freshwater marsh east of the pits. The primary contaminants in the Pushout Area are lead and zinc. Chlorinated solvents are also present in this area in the soil and groundwater.

The remedial action specified in the September 1996 ROD for the J-Field SOU was an interim action as a component of the comprehensive cleanup activities being conducted at APG. This will be the final action for the J-Field SOU. The RI/FS for the site concluded that the area poses a potential risk to human health and the environment resulting from elevated levels of metals and PCBs in soils. The Liquid Smoke Disposal Pit, Southwestern Suspect Burning Area, Storage Area, and High Explosive Demolition Ground do not pose a risk to human health and the environment and no further action was required in the September 1996 ROD for these areas. Areas which did not require further action under the September 1996 ROD will not be addressed in this ESD.

The main objective of the Interim Remedial Action at the Toxic Burning Pits and the Pushout Area was to remove soil containing concentrations of lead, arsenic, and PCBs above site Action Levels, which are protective of worker exposure, prior to the final remedial action of a PSB installation as established in the September 1996 ROD. The three areas of concern are the Northern Main Burning Pit (lead and arsenic), the Southern Main Burning Pit (PCBs), and the Pushout Area (lead). Only soils above the established Action Levels were to be removed and transferred to an off-site disposal/treatment facility. The Action Levels are as follows:

Area	Action Level
Lead (Northern Main Burning Pit and Pushout Area)	1,000 mg/kg
Arsenic (Northern Main Burning Pit)	328 mg/kg
PCBs (Southern Main Burning Pit)	25 mg/kg

Table 1 in the September 1996 ROD shows concentrations of COPCs in the Northern and Southern Main Burning Pits and Pushout Area prior to removal, compared to human health risk-based concentrations (RBCs) and regional background levels. Ecological COPCs are also shown.

2.1 Summary of Site Risks

A Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA) were completed as part of the remedial investigation/feasibility study (RI/FS) process for the J-Field SOU. Pertinent conclusions from the HHRA included:

- **Current Land Use Scenario:** Risks from ingestion and dermal exposure fall within acceptable range as defined by EPA.

- **Future Land Use Scenario:** Risks for an industrial worker due to incidental ingestion and dermal exposure exceeded EPA's target carcinogenic risk ranges and the total Hazard Index was slightly greater than one. Risks were driven primarily by dermal exposure to arsenic in the Northern Main Burning Pit soil. The total excess lifetime carcinogenic risk for a trespasser due to incidental ingestion and dermal

adsorption of chemicals in surface soils was at the upper end of EPA's target carcinogenic risk range, while the total Hazard Index was less than one, indicating that adverse noncarcinogenic effects were not likely to occur. Risk was driven primarily by arsenic in Northern Main Burning Pit surface soil.

- **Exposure to Lead:** Maximum lead concentrations exceeded the industrial screening criterion of 1,000 mg/kg in the Northern Main Burning Pit, the Mustard Pit, and the Pushout Area.

The risks associated with these exposures were considered to be conservative given current land use, the low likelihood that the site would be removed from Army control in the future, and the existing restrictions on site access under Army ownership.

Pertinent conclusions from the ERA included:

- Several ecological COPCs pose potentially high to extreme risks to wildlife. Risks are associated primarily with soil levels of aluminum, antimony, arsenic, cadmium, chromium, cyanide, lead, mercury, selenium, and zinc.

- Extensive adverse ecological effects are evident at the J-Field SOU but are limited to soil biota and vegetation and some aquatic components. The ERA concluded that the J-Field SOU poses high risk to ecological receptors.

- Effects assessments showed adverse ecological effects to ecological receptors at the J-Field SOU. Moderate to extreme risks from soil contamination were determined for terrestrial vegetation and terrestrial receptors mainly from exposure to inorganics. Areas of greatest concern included the Pushout Area and the Main Burning Pits. The Pushout Area may also be the source of contamination and risk associated with surface water and sediment along the marsh/Pushout Area boundary.

- Ecologically significant adverse effects on a local scale could occur due to the then-current levels of contamination at the J-Field SOU. In addition, those levels of contamination could pose adverse effects to wide ranging biota that are not restricted to J-Field SOU, including migratory waterfowl and top-level avian predators.

It should also be noted that the risks presented in the HHRA and ERA as summarized above represent risks from exposure to the site as they existed at the time of the RI and before any remedial activities had been implemented. The excavation and removal which has taken place to date under the September 1996 ROD has reduced these risks.

2.2 Selected Remedial Alternative for the J-Field Soil Operable Unit (September 1996 ROD)

2.2.1 Selection of Remedial Alternative

The Remedial Action Objectives (RAOs) for the J-Field SOU were to reduce human and environmental exposure to surface soil contamination in the three source areas: Northern Main Burning Pit, Southern Main Burning Pit, and Pushout Area. The following remedial alternatives were considered for the J-Field SOU and were presented in the September 1996 ROD:

- **Alternative 1: No Action.**

- **Alternative 2: In Situ Containment and Limited Disposal.**

- **Alternative 3: Removal and Short-Term Storage.**

- **Alternative 4: Removal, On-site Treatment, and Limited Disposal.**

- **Alternative 5: Removal, Off-site Treatment, and Disposal.**

These remedial alternatives were evaluated in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) criteria. The selected remedial alternative as presented in the September 1996 ROD was **Alternative 2: In Situ Containment and Limited Disposal.** Alternative 2 provided the best balance of features among the remedial alternatives, which were protective of human health and the environment. This alternative would include excavation of soils above Action Levels, followed by construction of a Protective Soil Blanket. Once the PSB is constructed, no adverse effects are expected to develop in humans, animals, or vegetation as a result of the J-Field SOU. It will comply with all chemical-, location-, and action-specific Applicable or Relevant and Appropriate Requirements (ARARs) and is cost effective because it provides overall protectiveness consistent with its cost. It uses permanent solutions to reduce the toxicity, mobility, and volume of contaminants and satisfies the statutory preference for treatment as a principal element of the remedy.

2.2.2 Changes in the September 1996 ROD from the Original Proposed Plan

The J-Field SOU September 1996 ROD incorporated the following changes from the Proposed Plan, based upon the public participation process:

- The arsenic cleanup level (328 mg/kg) required in the ROD resulted in a cancer risk level much lower than the upper bound acceptable level of 10^{-4} (an increased cancer risk of one in ten thousand), which was considered acceptable in the Proposed Plan and resulted in a Hazard Index for noncancer adverse effects.
- The PCB cleanup level was adjusted to the current level of 25 mg/kg.
- The name of the Area was changed from the Former Toxic Burning Pits to the J-Field Soil Operable Unit for clarification.
- The additional excavation of lead to levels below 1,000 mg/kg in the Pushout Area was added.

2.2.3 Summary of Performance Standards in September 1996 ROD

The following Performance Standards were presented in the September 1996 ROD:

- Excavation in the Northern Main Burning Pit and Pushout Areas to remove lead to levels below the industrial screening level of 1,000 mg/kg.
- Excavation in the Northern Main Burning Pit to remove arsenic above concentrations of 328 mg/kg.
- Depth of excavation in the Northern and Southern Main Burning Pits to be not less than 2 feet in any area.
- Excavation of PCBs in the Southern Main Burning Pit to below concentrations of 25 mg/kg.
- Construction of the PSB covering the Northern and Southern Main Burning Pits and the Pushout Area with a minimum thickness of 2 feet in all places.
- PSB to be underlain by a geotextile membrane to separate unexcavated soil from clean backfill.
- PSB to include the geotextile barrier to prevent encroachment of burrowing animals.
- Shoreline protection to be constructed along the unexcavated J-Field/Chesapeake Bay boundary.
- PSB to include an earthen berm to reduce surface runoff from J-Field SOU toward the marsh.
- Backfill of the excavated area with clean soil from an off-site source. Off-site disposal or recycling of excavated materials.
- Monitoring of the PSB in accordance with an approved operations and maintenance (O&M) plan.

3. BASIS FOR THIS DOCUMENT

3.1 Implementation of the September 1996 ROD

The Army implemented the J-Field SOU September 1996 ROD from March 1998 to May 1999. The remedy complied with ARARs identified in the September 1996 ROD. A detailed description of activities conducted is provided in the reports, *J-Field Soil Operable Unit Final Report of Activities Edgewood Area, Aberdeen Proving Ground, MD* (WESTON, April 2000); and *Final J-Field Shoreline Stabilization Project Final Technical Report (As-Built)* (WESTON, September 1999).

Approximately 266 cubic yards of soil was removed during the remedial action at the J-Field SOU. The breakdown of soil removal is as follows:

- 93 cubic yards of soil contaminated with lead and arsenic from the Northern Main Burning Pit.
- 74 cubic yards of soil contaminated with PCBs from the Southern Main Burning Pit.
- 99 cubic yards of soil contaminated with lead from the Pushout Area.

The following subsections discuss the remediation completed at the Toxic Burning Pit area.

3.1.1 Methodology

The proposed method for excavation in the Northern and Southern Main Burning Pits and the Pushout Area was to remove soil in 2-ft lifts using a tracked excavator until detected concentrations of contaminants of concern were below the Action Levels. However, as excavation proceeded, UXO and CWM in glass containers were encountered, and excavation proceeded manually (i.e., hand excavation in Level B personal protective equipment) to protect worker safety. The required change in excavation method would result in increasing the remediation cost (to the Action Levels specified in the September 1996 ROD) by a factor of approximately six to ten.

Thereafter, soil was excavated from the Northern and Southern Main Burning Pits and the Pushout Area manually and with the use of a tracked excavator. Excavation was accomplished in 6-inch intervals so that the soil could be visually inspected for UXO material before it was removed from the trench and again when the soil was placed into the dump truck for transportation. The soil was taken to the soil processing area and screened (1/2-inch screen size) to remove all metal objects. All recovered UXO were reported to the Technical Escort Unit (TEU) for removal by TEU personnel. Metal objects that were recovered and were not UXO were stored and secured in wooden scrap boxes and screened for CWM material by trained Edgewood Research, Development, and Engineering Center (ERDEC) personnel. When ERDEC cleared the metal objects for CWM, Directorate of Safety, Health, and Environment (DSHE) contractors removed the soil and boxes of metal from the site; eventually, the manual excavation was halted. Although some contamination above Action Levels remained, the additional removal would not enhance the protectiveness of the remedy. Details for each of the individual areas are described in the following subsections.

3.1.2 Northern and Southern Main Burning Pit Area Excavation

Prior to excavation, the Main Burning Pits were divided into 20-ft by 20-ft grids and surveyed for UXO using both active and passive surveys. The September 1996 ROD specified a minimum total excavation depth of 2 feet in both Main Burning Pits. Therefore, the initial approach was to excavate 2 feet of soil from each Main Burning Pit prior to sampling for contaminants of concern. However, due to the amount of metal in the soil around the Main Burning Pits, sampling was initiated at the surface and soil was removed in 6-inch increments.

In situ surface testing was completed in the Northern Main Burning Pit using a Niton field-portable X-ray fluorescence (XRF) unit to establish the extent of contamination. Those grids where concentrations of lead and/or arsenic exceeded the Action Levels were sampled at depth. In the Southern Main Burning Pit, the results of PCB enzyme immunoassay testing of the surficial samples dictated which grids required additional sampling.

At all sampling locations in each grid, samples were collected from the surface and from depths of 1, 2, and 3 feet. Because of the high concentration of UXO, it was not possible to collect samples at depth at all locations. Samples were then collected at the maximum possible depth. Continued concentrations of lead and/or arsenic in the Northern Main Burning Pit dictated the need for sample collection from depths of 5 and 8 ft below ground surface (bgs), where possible.

Soil and metal objects were excavated and mechanically screened to remove debris prior to off-site disposal, as required. However, as excavation proceeded, UXO and CWM were encountered. Of particular concern was CWM in glass containers. Due the potential for accidental detonation or CWM release, excavation proceeded manually. After hand excavation was stopped, verification sampling was conducted. Laboratory results from the verification sampling indicated levels of contaminants in exceedance of excavation criteria present in some locations. However, due to UXO/CWM concerns, a determination was made to cease further excavation since the remaining remedial objectives could still be met by construction of the PSB as originally specified.

When contaminant concentrations below the Action Levels were achieved, or excavation could not proceed due to presence of UXO or CWM, or when groundwater was encountered, verification samples were collected for analysis in an off-site laboratory.

3.1.2.1 Northern Main Burning Pit

Following removal of the first 2 feet of soil in grids 1, 2, and 3 in the Northern Main Burning Pit, a footprint of contamination to a depth of 2 ft bgs on the floor and sidewalls was outlined in each area using the field-portable XRF to determine lead and arsenic contamination. Soil was then removed from the contaminated grids to a depth of 2 feet, and was field-tested to a depth of 8 feet, where possible. Upon initiation of excavation in the Northern Main Burning Pit, it was determined that significant quantities of UXO, as well as small quantities of CWM, were present in the pit. Appropriate safety procedures were implemented and excavation activities continued until the quantity of UXO and CWM increased requiring cessation of the excavation. A total of 93 cubic yards of soil contaminated with lead and arsenic was removed from the Northern Main Burning Pit.

3.1.2.2 Southern Main Burning Pit

Following the surface UXO clearance, 2 feet of soil from the surface of the Southern Main Burning Pit was excavated using a tracked excavator. Soil excavation was accomplished in 6-inch lifts only, and was surveyed for UXO after each 6-inch lift. No CWM or glass containers and minimal UXO were recovered from the Southern Main Burning Pit. A total of 74 cubic yards of soil contaminated with PCBs was removed from the Southern Main Burning Pit.

3.1.3 Pushout Area

Prior to excavation, the Pushout Area was divided into 20-ft by 20-ft grids and surveyed for UXO using both active and passive surveys. The intent for this part of the J-Field project was to excavate soil in the Pushout Area until lead concentrations were determined to be below the Action Level. Discovery of UXO and CWM in glass vials, however, resulted in site closure after excavation of the upper 2 feet of soil in grids within the footprint of contamination. No additional excavation was completed in the Pushout Area. A PSB will be included for this area.

3.2 Field Analytical Results

3.2.1 Northern Main Burning Pit

Ten sampling grids were established in the Northern Main Burning Pit and sampling locations were selected in each grid. During March and April 1998, in situ surface readings were taken using the XRF. One composite sample consisting of three separate locations was collected from the floor and each of the sidewalls within each grid, except grids 1, 2, and 3, which had been excavated to a depth of 2 ft. A total of 24 samples were analyzed. Lead concentrations, where detected, ranged from a minimum of 104 mg/kg on the sidewall of grid 6 at 1-ft depth to a maximum of 24,700 mg/kg on the floor of grid 6 at 1-ft depth. Lead was detected above Action Levels in grids 1, 2, 4, 5, 6, 7, and 8. Based on

these results, 2 feet of soil was removed from grids 4 through 9. From 30 July through 5 August 1998, a second round of samples was collected from the Northern Main Burning Pit and was analyzed for lead and arsenic. Results of these analyses indicated lead concentrations above the Action Level in grids 1, 2, 3, 4, 5, 6, 7, 8, and 9. Lead concentrations ranged from not detected (ND) in the sidewalls of grids 5, 6, and 7 to 5,190 mg/kg on the floor of grid 6. Arsenic concentrations ranged from ND in most locations to 1,000 mg/kg on the floor of grid 4.

3.2.2 Southern Main Burning Pit

Nine sampling grids were established in the Southern Main Burning Pit and sampling locations were selected in each grid. On 1 April 1998, one composite sample consisting of three separate locations was collected from the floor and each of the sidewalls within each grid for a total of 27 samples. These samples were analyzed for PCBs using an enzyme immunoassay field test kit. Results of analysis indicated the presence of PCBs above the Action Level in samples collected at a depth of 1 foot on the floor of grids 6 and 9 and at a depth of 2 feet in grid 7. Based on these results, 2 feet of soil was manually excavated from grids 3, 6, 7, and 9 in the Southern Main Burning Pit and these grids were resampled on 20 May 1998. Results of analysis indicated that no PCBs were present in concentrations greater than 25 mg/kg.

3.2.3 Pushout Area

Lead concentrations in soil in the Pushout Area, as determined by in situ testing using the field portable XRF, are presented in Figures 2 through 4. No additional sampling was conducted in the Pushout Area. The high concentration of UXO caused difficulty in finding sampling locations that could be extended to depths below 2 feet. In several grids, the 2-ft depth could not be attained. Work subsequently was moved to the Northern and Southern Main Burning Pits. As indicated previously, decisions based on findings in the Northern Main Burning Pit subsequently resulted in ceasing excavation activities at the J Field SOU, and work in the Pushout Area was not resumed.

3.3 Laboratory Analytical Results

3.3.1 Northern Main Burning Pit

In February 1999, 203 samples were collected from grids 1, 2, 3, 4, 5, 6, 7, and 8 for analysis of lead and arsenic at an off-site laboratory. The results are summarized in Figures 5 and 6. Lead concentrations exceeded the Action Level of 1,000 mg/kg on the pit floor in several sample grids, to a maximum depth of 5 ft. All lead samples exceeding the Action Level were located on the north side of the pit floor. These results were corroborated by results of analyses on samples collected from the sidewalls of the Northern Main Burning Pit. Only one sample from the south wall, located at a depth of 8 ft in one grid, contained concentrations of lead above 1,000 mg/kg (17,000 mg/kg). Concentrations of lead in samples collected from the north sidewall showed consistent exceedances of the lead Action Level to a depth of 2 ft; the deepest exceedance was 5 ft.

3.3.2 Southern Main Burning Pit

Two feet of soil was excavated from grids 6, 7, and 9. On 22 July 1998, samples were collected for field analysis from these three grids. Results of immunoassay analysis indicated that only two samples, collected from the south wall of grid 6 and the floor of grid 7, had concentrations of PCBs exceeding the Action Level of 25 mg/kg. Nine verification samples were collected for laboratory analysis on 5 August 1998. Results of analyses indicated that the south wall of grid 6 (230 mg/kg) and the floor on the south side of grid 7 (26 to 82 mg/kg) still contained concentrations of PCBs above the Action Level. The final samples were collected from depths of 0, 1, 3, 5, and 8 feet in the Southern Main Burning Pit on 17 and 18 February 1999. These samples were cleared for CWM and were transported to the laboratory in March 1999. Results of analysis indicated that only one sample (south wall of grid 6 at 1-ft depth) contained concentrations of PCBs above 25 mg/kg.

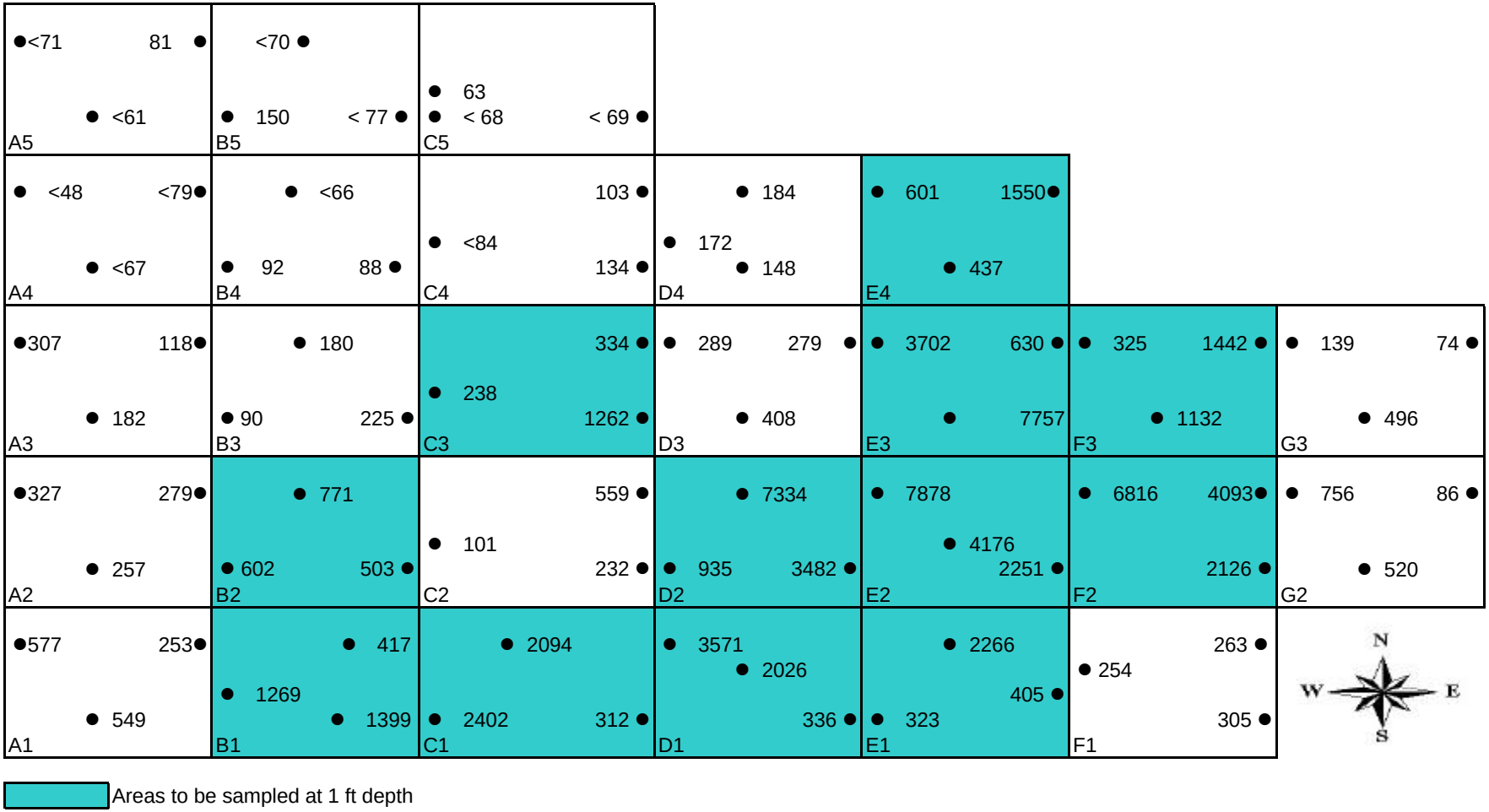


Figure 2 XRF In Situ Lead Results for Surface Samples
Pushout Area
March/April 1998

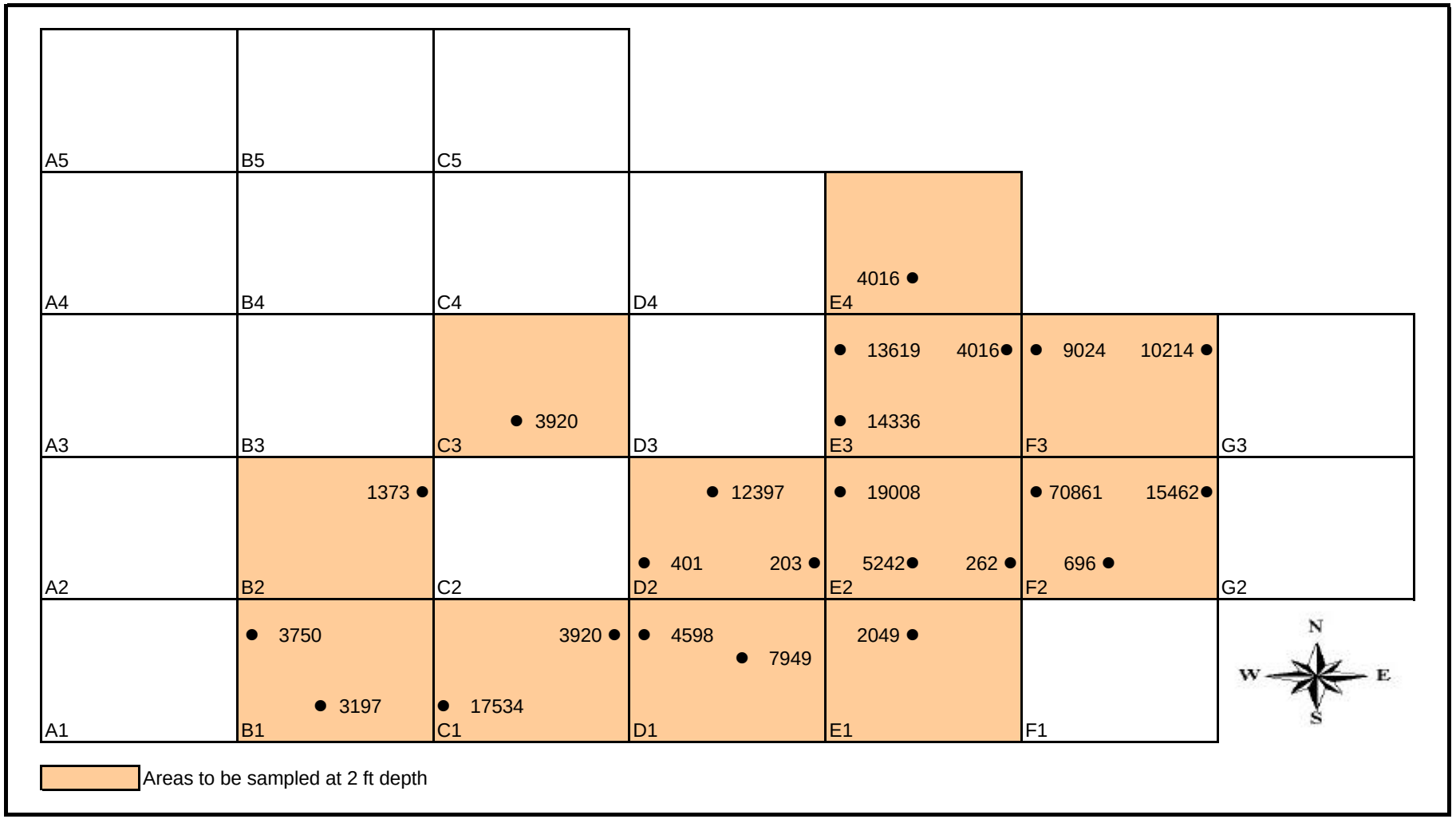


Figure 3 XRF In Situ Lead Results for Soil at 1-ft Depth
Pushout Area
March/April 1998

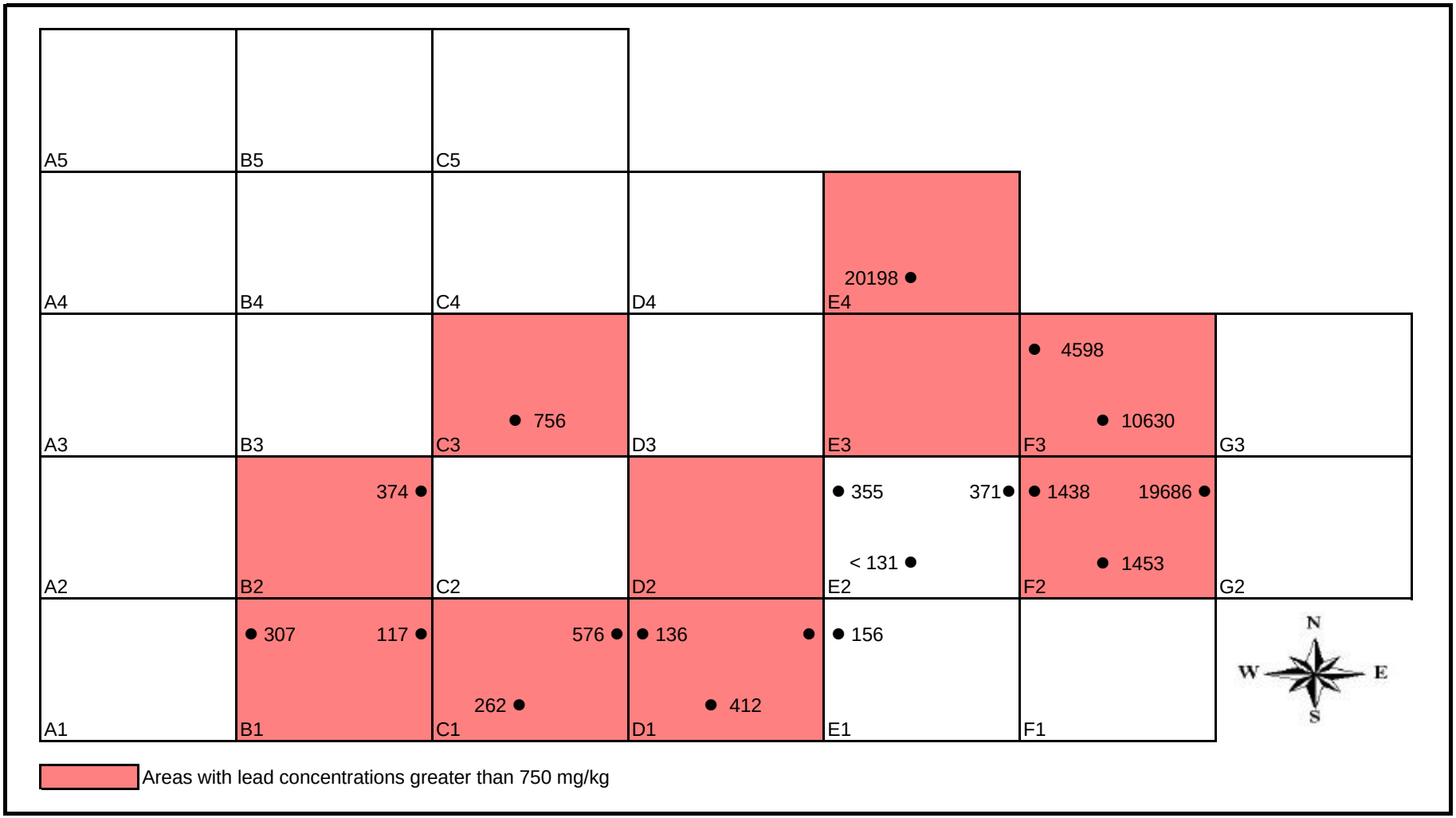


Figure 4 XRF In Situ Lead Results for Soil at 2-ft Depth
Pushout Area
March/April 1998

		North Wall Grid Numbers →	1			2			3			4			5			6			7			8		9
	Sample Locations		31	32	33	31	32	33	31	32	33	31	32	33	31	32	33	31	32	33	31	32	33	31	32	33	
Depth penetrating into sidewall (ft)	8 ft		NS	NS	NS	Not Sampled			Not Sampled			*Pb 560* As 88	NS	NS	NS	NS	NS	Pb 870 **As 390**	NS	Pb 63 As 42	NS	NS	NS	Pb 8.1 As 2.4	Pb 110 As 4.1	Not Sampled
	5 ft		NS	NS	NS							Pb 700 **As 1500**	**Pb 6800 As 530**	NS	NS	**Pb 4600** As 110	Pb 850 **As 2000**	NS	Pb 550 **As 1300**	NS	*Pb 620 As 210*	NS	NS	NS	Pb 4.1 As 1.6	Pb 170 As 6.9	
	3 ft		NS	NS	NS							Pb 770 **As 890**	**Pb 2900 As 1300**	NS	**Pb 3000** As 9.5	**Pb 1600** As 29	Pb 950 **As 790**	NS	*Pb 960 As 190*	NS	**Pb 1100** As 19	NS	Pb 410 **As 650**	NS	Pb 11 As 9.6	Pb 16 As 5.1	
	2 ft		NS	**Pb 1700** As 100	NS							**Pb 4800** As 66	**Pb 3100** As 17	NS	**Pb 1200** As 22	**Pb 1800** As 17	**Pb 2000 As 1400**	**Pb 1200** As 14	**Pb 1400** As 22	**Pb 1600** As 16	Pb 670 **As 340**	**NS**	**Pb 2000 As 430**	**Pb 5300** As 33	Pb 110 As 4.8	Pb 6.9 As 9.6	
	1 ft		**Pb 2300** As 48	**Pb 1700** As 25	**Pb 13,000** As 25							**Pb 3800** As 11	**Pb 2200** As 41	**Pb 9800** As 14	Pb 170 As 13	*Pb 930* As 9.1	**Pb 1600** As 210	**Pb 1900** As 12	**Pb 1500** As 23	**Pb 1600** As 11	**Pb 4800** As 12	Pb 290 As 27	Pb 83 As 37	**Pb 1700** As 27	Pb 6.8 As 4.5	Pb 12 As 5.8	

North Pit Floor

Depth penetrating into sidewall (ft)	1 ft	Pb 4.2 As 5.1	Pb 11 As 4.9	Pb 3.8 As 2.3	Pb 2.3 As 2.2	Pb 3.7 As 3.5	Pb 4.2 As 3.9	Pb 4.2 As 2.3	Pb 4 As 3.4	Pb 6.2 As 7.5	Pb 19 As 7.1	Pb 7 As 7.5	Pb 23 As 7.5	Not Sampled	Not Sampled		Not Sampled		Not Sampled
	2 ft	Pb 4.3 As 4.9	Pb 11 As 4.2	Pb 4.7 As 3.5	Pb 3.7 As 2.8	Pb 3.5 As 3	Pb 4.9 As 3.9	Pb 4.9 As 3.2	Pb 2.2 As 1.9	Pb 5.5 As 5.1	Pb 9 As 3.5	Pb 6.9 As 5.5	Pb 6.8 As 6.4						
	3 ft	Pb 5.8 As 4.3	Pb 7 As 3.5	Pb 8.4 As 4.8	Pb 5.1 As 2.9	Pb 3.8 As 2.6	Pb 4.8 As 3.1	Pb 18 As 2.9	Pb 6.4 As 5.1	Pb 5.2 As 5.1	Pb 7.7 As 13	Pb 6.3 As 3.5	Pb 5.2 As 5.8						
	5 ft	Pb 7.7 As 6.5	Pb 6 As 4.3	Pb 4.6 As 4.5	Pb 7.5 As 4.0	Pb 5.4 As 3.5	Pb 5.5 As 3.5	Pb 5.1 As 3.8	Pb 6 As 3.7	Pb 6.3 As 5.6	Pb 6.3 As 4.2	Pb 4.5 As 2.1	Pb 6.6 As 3.3						
	8 ft	Pb 11 As 4	Pb 6.8 As 3.7	Pb 6.4 As 4.6	Pb 4.9 As 2.2	Pb 6.3 As 2.2	**Pb 17,000** As 4.2	Pb 3 As 1.5	Pb 3 As 1.1	Pb 2.5 As 1.1	NS	NS	NS						
	Sample Locations	28	29	30	28	29	30	28	29	30	28	29	30						

South Wall

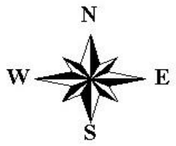
All units in mg/kg.

As - Arsenic
Pb - Lead

Sample Locations:
28 - Lower western portion of south wall
29 - Middle eastern portion of south wall
30 - Upper western portion of south wall
31 - Upper western portion of north wall
32 - Middle eastern portion of north wall
33 - Lower western portion of north wall

Not Sampled - Concentrations of Pb and/or As below Action Levels in previous sampling.
NS - Unable to penetrate to sample depth.

Action Levels:
Pb 1,000 mg/kg
As 328 mg/kg



Concentrations of Pb and As less than Action Levels.
Concentrations of either Pb or As greater than Action Levels.
Concentrations between 400 and 1,000 mg/kg for Pb and 100 and 328 for As.
Sample collected between two flagged sampling locations because proposed sampling locations were impenetrable.

Bold indicates concentrations exceed Action Level.
Italic indicates Pb concentration between 400 and 1,000 mg/kg and/or As concentration between 100 and 328 mg/kg.

Figure 5
Northern Main Burning Pit
Aerial View of Pb and As Concentrations on Sidewalls, February 1999

		West																						East					
		North Pit Floor Grid Numbers →			1			2			3			4			5			6			7			8			9		
	Sample Locations	25	26	27	25	26	27	25	26	27	25	26	27	25	26	27	25	26	27	25	26	27	25	26	27	25	26	27	25	26	27
Sample Depth (ft)	1 ft	**Pb 1700** As 64	**Pb 1400 As 1700**	Pb 27 As 5.2	Pb 840 **As 520**	**Pb 1900 As 950**	Pb 6.8 As 2.7	**Pb 2400 As 4800**	Pb 290 **As 680**	Pb 4.5 As 1.8	**Pb 1100** As 140	**Pb 2800 As 1300**	Pb 3.8 As 2.4	Pb 850 **As 780**	Pb 250 As 11	Pb 9.7 As 3.8	**Pb 1800** As 270	Pb 210 *As 280*	NS	*Pb 710 As 200*	NS	Pb 46 As 24	Not Sampled			Not Sampled				
	2 ft	NS	Pb 360 **As 620**	Pb 7 As 1.9	*Pb 680 As 210*	Pb 860 **As 760**	NS	NS	Pb 260 *As 240*	Pb 5.9 As 6.2	Pb 210 *As 170*	**Pb 1500 As 650**	Pb 120 As 16	**Pb 1300 As 1000**	*Pb 550* As 37	Pb 9.7 As 3.1	Pb 150 *As 200*	NS	Pb 23 As 4.9	**Pb 10,000** As 130	NS	Pb 4.6 As 2.5							
	3 ft	NS	Pb 3500 As 610	Pb 5.4 As 2.3	Pb 720 **As 330**	NS	Pb 6 As 2.3	NS	Pb 300 *As 320*	Pb 6.7 As 5.9	Pb 480 **As 620**	*Pb 570 As 300*	Pb 13 As 2.7	**Pb 1200 As 1100**	Pb 200 As 18	Pb 6.6 As 1.5	Pb 700 **As 460**	NS	Pb 12 As 2.5	*Pb 460* As 62	NS	Pb 3.3 As 2.4							
	5 ft	NS	Pb 28 As 95	Pb 3.8 As 2.1	Pb 31 As 11	NS	Pb 4.7 As 3.1	NS	Pb 100 As 47	Pb 9.3 As 18	Pb 23 As 17	**Pb 2200** As 310	Pb 18 As 13	NS	NS	Pb 3.4 As 4.4	Pb 310 *As 100*	NS	Pb 41 As 5	NS	NS	Pb 2.8 As 1							
	8 ft	NS	Pb 38 As 33	Pb 5.8 As 6.1	Pb 6.8 As 10	NS	Pb 4.5 As 2.5	NS	Pb 35 As 45	Pb 2.2 As 1.4	Pb 6.6 As 5.6	Pb 220 *As 120*	Pb 11 As 8.7	Pb 37 As 46	Pb 3.4 As 6.4	Pb 5.9 As 2.6	Pb 19 As 23	NS	Pb 13 As 2.8	NS	NS	Pb 2.5 As 2.1							

All units in mg/kg.

As - Arsenic
Pb - Lead

Not Sampled - Concentrations of Pb and/or As below Action Levels in previous sampling.
NS - Unable to penetrate to sample depth.

Action Levels:

Pb	1,000 mg/kg
As	328 mg/kg

Concentrations of Pb and As less than Action Levels.
Concentrations of either Pb or As greater than Action Levels.
Concentrations between 400 and 1,000 mg/kg for Pb and 100 and 328 for As.
Sample collected between two flagged sampling locations because proposed sampling locations were impenetrable.

Bold indicates concentrations exceed Action Level.
Italic indicates Pb concentration between 400 and 1,000 mg/kg and/or As concentration between 100 and 328 mg/kg.

Sample Locations
25 and 26 - Near the north wall of the pit
27 - Near the south wall

Cross-sectional view looking northward

Figure 6
Northern Main Burning Pit
Cross-Sectional View of
Pb and As Concentrations on
Pit Floor, February 1999

3.3.3 Pushout Area

No samples were collected from the Pushout Area for laboratory analysis.

3.4 UXO Results

Many types of UXO and related items were found during excavation activities at the Northern Main Burning Pit, the Southern Main Burning Pit, and the Pushout Area, and during inspection of screened material at the soil processing area. Lists of UXO encountered at each area are tabulated in the *J-Field Soil Operable Unit Final Report of Activities* (WESTON, April 2000).

3.5 Excavation Summary

Approximately 266 cubic yards of soil were removed during the remedial action at the J-Field SOU. The breakdown of soil removal by area is as follows:

- 93 cubic yards of soil contaminated with lead and arsenic from the Northern Main Burning Pit.
- 74 cubic yards of soil contaminated with PCBs from the Southern Main Burning Pit.
- 99 cubic yards of soil contaminated with lead from the Pushout Area.

The contaminated soil was removed from the site and disposed of by DSHE contractors.

3.6 Shoreline Stabilization Project

Shoreline Erosion Controls (SECs) were installed between September 1998 and April 1999 as specified in the J-Field SOU September 1996 ROD. The J-Field Shoreline stabilization system was intended to mitigate shoreline erosion of approximately 3,000 feet of the J-Field shoreline along the Chesapeake Bay from Ricketts Point to the eastern edge of Big Pond, and thereby to protect freshwater marsh habitats and Big Pond, and prevent migration of hazardous materials. The completed systems are illustrated in Figure 7. The system consists of on-shore revetments and off-shore breakwaters. Construction details are provided in the *Final Technical Report (As–Built)*. The configuration of these systems was based upon the result of a wave climate analysis to evaluate erosion potential and the type of configurations which could be used to minimize damage. Following construction of the revetments and breakwaters, the area was vegetated with 32,000 wetland plants (*Spartina patens* and *Scirpus americanus*) to provide support to the beach nourishment system. To maintain some intertidal exchange along the shoreline as requested by the U.S. Fish and Wildlife Service, a portion of the shoreline remains unprotected. Erosion in this area will be monitored as presented in *Post Construction Survey Monitoring Program for J-Field Shoreline Protection Project* (WESTON, September 2000).

Work was completed in April 1999. Inspection of the area in the summer of 1999 showed that establishment of the vegetative layer is proceeding. After extensive agency review, the shoreline protection system was deemed appropriate by DSHE and compliant with September 1996 ROD requirements to protect the eroding shoreline from further damage, while protecting valuable habitat.

3.7 Geochemical Evaluation of Arsenic and Lead Mobility

While the Remedial Action Objective for the J-FIELD SOU was to reduce human and environmental exposure to surface soil contamination in the three source areas, the Army recognizes that contaminants will remain in soils beneath the PSB at the completion of the remediation. To address questions regarding the potential for migration of remaining constituents to the marsh, the Army conducted an evaluation of the mobility of lead and arsenic under site-specific conditions. The results of this evaluation are provided in detail in the report, *Geochemical Evaluation of Arsenic and Lead Mobility, Toxic Burning Pit Area, J-Field, Aberdeen Proving Ground, MD* (Accuscience Environmental, August 2000).

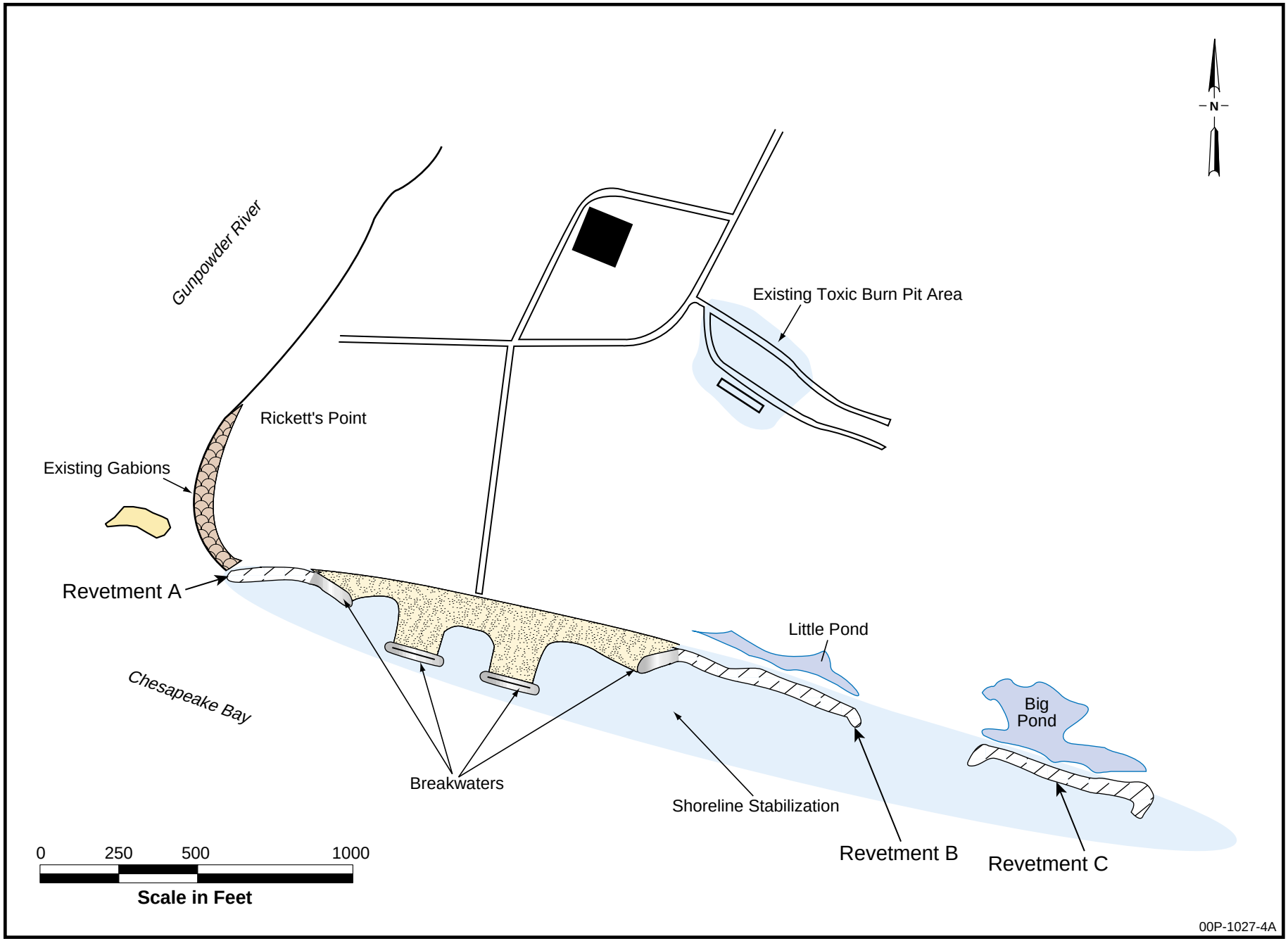


FIGURE 7 J-FIELD SHORELINE PROTECTION

Available site data and documents were reviewed to consider existing conditions at the site. Literature was researched to identify physical and chemical mechanisms which may be involved in attenuating arsenic and lead mobility. Assumptions were made in areas where site-specific information was not available. Based upon this background information, the mobility of arsenic and lead was modeled using the USGS PHREEQC computer program. The results of these modeling simulations indicate that predicted arsenic and lead concentrations are within approximately an order of magnitude of historically measured concentrations in wells downgradient from the Main Burning Pits:

- Maximum arsenic loading to the marshes was estimated typically to be 100 µg/kg or less, with a maximum predicted concentration in one model simulation of 360 µg/kg.

- Maximum lead loading to the marshes was calculated in most simulations to be on the order of 5 µg/kg or less, with a maximum predicted concentration of 850 µg/kg in one model simulation.

Overall, simulation results indicate that mobile and solid phase arsenic and lead concentrations will either stabilize or increase very slowly over a period of years in areas downgradient of the Main Burning Pits source. Sensitivity analyses suggest that seasonal variances in subsurface conditions may periodically affect mobile arsenic and lead concentrations with changes in concentration on the order of a factor of 10.

In summary, this evaluation indicated that loadings of mobile phase arsenic and lead to the marshes adjoining the Main Burning Pits source should not differ substantially from historically measured groundwater concentrations downgradient of the pits. Long-term groundwater monitoring conducted in the J-Field area will provide additional data.

3.8 Removal of J-Field Soil/Debris Piles

Several soil/debris piles remain at J-Field from past activities. The piles of soil/debris are located just south of the J-Field SOU Toxic Burning Pit area, and were identified after a controlled burn at the south end of J-Field on 5 April 2000. These soil piles will be removed and disposed.

All metallic debris items will be removed from the dirt piles and will be placed in 4 ft by 4 ft wooden boxes. Soil excavated from the piles to locate metallic targets will be left in place. After all debris is removed, the piles will be leveled to ground surface using a small excavator. Following inspection of the wooden boxes by ERDEC, the boxed debris will be disposed of by DSHE. This action began in April 2000 and is expected to be completed in summer 2000.

Based on comments and recommendations received from EPA and the Aberdeen Proving Ground Superfund Citizens' Coalition (APGSCC), additional sampling will be conducted in an area east of the Toxic Burning Pits for potential products of combustion. Sampling is expected to occur in late summer 2000. The areas to be sampled are shown in Figure 8. Results of this sampling effort will be addressed in a separate ROD, as appropriate.

00P-1707

FIGURE 8 AREAS TO BE SAMPLED FOR POTENTIAL PRODUCTS OF COMBUSTION

4. DESCRIPTION OF SIGNIFICANT DIFFERENCES FROM SEPTEMBER 1996 J-FIELD SOIL OPERABLE UNIT (SOU) ROD

The Army is modifying the J-Field SOU September 1996 ROD in the Toxic Burning Pit area and the Pushout Area. The changes are described below.

Excavation of the Northern and Southern Main Burning Pits and the Pushout Area will not proceed beyond the materials already excavated. At this point, limited areas of arsenic and lead contamination remain above the intended cleanup performance standards. However, the overall depth of the excavation meets the 2-ft minimum depth specified in the September 1996 ROD, and the PSB will be constructed in full accordance with the September 1996 ROD, consisting of a minimum of 2 feet of clean backfill underlain by geotextile as a barrier to burrowing animals. Therefore, the completed system will function as intended and the intent of the original design will be fulfilled. Additional excavation would not enhance the protectiveness of the remedy. Additionally, the J-Field Study Area is located in the Edgewood restricted area of APG. Access to the restricted area is strictly controlled and a wide variety of physical security measures are in place to prevent unauthorized personnel from entering the area.

The PSB will be constructed in accordance with the September 1996 ROD. Clean concrete excavated from other site actions at J-Field will be used as part of the structural backfill material underlying the PSB. Additional clean soil will be placed to act as fill material between the concrete and the PSB to maintain the PSB integrity. Final design of the PSB is proceeding.

The intent of the remedial actions at the J-Field SOU was to address direct human and ecological exposures to surface soils. This concern will be addressed by the excavation completed to date under the September 1996 ROD and the construction of the PSB. However, metals contamination remaining in the backfilled excavation may pose some migration potential to groundwater/surface water. To further evaluate the proposed change, the Army has conducted a supplemental evaluation of the potential mobility of the remaining metals contamination. The results of this evaluation indicate that loadings of mobile phase arsenic and lead to the marshes adjoining the Main Burning Pit source should not differ substantially from historically measured groundwater concentrations downgradient of the pits. Continued groundwater monitoring, which will be conducted in support of the J-Field groundwater activities, will provide additional data for metals in groundwater. This information will be evaluated in the CERCLA 5-year review for the site.

Based upon the extent of remediation conducted to date and the results of the geochemical modeling, the completed J-Field SOU remedial action, as modified, will be protective of surface water in addition to meeting the remedial action objective to reduce human and environmental exposure to surface soil contamination in the three source areas (Northern Main Burning Pit, Southern Main Burning Pit, and Pushout Area).

5. SUPPORT AGENCY COMMENTS

The Maryland Department of the Environment (MDE) has reviewed, and concurs with, this ESD.

6. STATUTORY DETERMINATIONS

The Army and the EPA have determined that the completed J-Field SOU remedial action, as modified, will be protective of surface water in addition to meeting the Remedial Action Objective to reduce human and environmental exposure to surface soil contamination in the three source areas (Northern Main Burning Pit, Southern Main Burning Pit, and Pushout Area). The modified remedy satisfies CERCLA requirements.

7. PUBLIC PARTICIPATION COMPLIANCE

A public meeting was held on 12 August 1996 to present the original Proposed Plan, to answer community questions, and to receive comments. The transcript for this meeting is part of the administrative record for this site. All comments and concerns were considered by the Army and EPA in selecting the final clean-up methods for the site. Additionally, community opinion has already been incorporated into this ESD through discussions with the Restoration Advisory Board (RAB).

A community meeting for the ESD will be held on 19 September 2000 at the Edgewood Senior Center, 1000 Gateway Drive, Edgewood, MD. The poster session will begin at 6:30 p.m. followed by the public meeting at 7:15 p.m. A 30-day public review and comment period will be held from 30 August to 29 September 2000.

Comments will be summarized and responses provided on the Final ESD. To send written comments or obtain further information, contact the following representatives:

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(410) 436-3320

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Waste Management Division
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Baltimore, MD 21224
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8. REFERENCES

Accuscience Environmental. August 2000. *Geochemical Evaluation of Arsenic and Lead Mobility, Toxic Burning Pit Area, J-Field, Aberdeen Proving Ground, MD*.

ICF Kaiser Engineers. September 1996. *J-Field Soil Operable Unit Final Record of Decision Edgewood Area, Aberdeen Proving Ground, MD.*

WESTON (Roy F. Weston, Inc.). September 2000. *Post Construction Survey Monitoring Program for J-Field Shoreline Protection Project.*

WESTON (Roy F. Weston, Inc.). April 2000. *J-Field Soil Operable Unit Final Report of Activities Edgewood Area, Aberdeen Proving Ground, MD.*

WESTON (Roy F. Weston, Inc.). September 1999. *Final J-Field Shoreline Stabilization Project Final Technical Report (As-Built).*