United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R03-91/119
August 1991

EPA

Superfund Record of Decision:

USA Letterkenny Southeast Area, PA

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R03-91/119	2.	3. Recipient's Accession No.
4. Title and Subtitle ERFUND RECORD OF DECISION A Letterkenny Southeast Area, PA First Remedial Action			5. Report Date 08/02/91 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Orgainization Name and Address			10. Project/Task/Work Unit No. 11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/000 14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The USA Letterkenny Southeast Area site is on a 19,500-acre active U.S. Army facility in Chambersburg, Franklin County, Pennsylvania. Land use in the area is primarily agricultural with scattered residences and military facilities. Ground water flowing beneath the Southeast site discharges into two nearby streams. Drinking water in the 33 residences located within a 3-square-mile radius of the facility has been affected ground water contamination from the site. Since 1942, the U.S. Army has used the Southeast Area to overhaul, rebuild, and test wheeled and tracked vehicles; distribute Class III chemicals and petroleum; and store, maintain, demilitarize, modify, and demolish ammunition. These activities past industrial have involved the use and disposal of TCE, solvents, hydrocarbons, and metals. As a result of a Federal Interagency Agreement, EPA conducted several investigations which identified VOC-contamination of onsite soil in the K Area associated with the various burial trenches, pits, and landfills used for hazardous waste disposal. This Record of Decision (ROD) addresses contaminated soil in the Southeast Area, and is the first operable unit for that area. Future RODs will address other contaminant source areas

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - USA Letterkenny Southeast Area, PA
First Remedial Action
Contaminated Medium: soil
Key Contaminants: VOCs (TCE, xylenes)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

Availability Statement	19. Security Class (This Report)	21. No. of Pages
	None	48
	20. Security Class (This Page)	22. Price
	None	

(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

and ground water. The primary contaminants of concern affecting the soil are VOCs including TCE and xylenes.

The selected remedial action for this site includes excavating and treating onsite 8,000 cubic yards of VOC-contaminated soil using low temperature thermal treatment; controlling vaporized contaminants using a secondary high-temperature combustor, or collecting these vapors by adsorption onto activated carbon; backfilling the residual ash onsite; disposing of the residual carbon offsite; and conducting soil monitoring. The estimated present worth cost for this remedial action is $1,539,191. There are no O&M costs associated with this remedial action.

PERFORMANCE STANDARDS OR GOALS: Soil excavation levels will be set at 225 ug/kg for all contaminants to ensure that the levels of indicator chemicals in ground water will meet the State ground water requirements.

RECORD OF DECISION

ACCELERATED REMEDIAL ACTION
SOUTHEASTERN AREA
OPERABLE UNIT ONE: K AREA CONTAMINATED SOILS

LETTERKENNY ARMY DEPOT
CHAMBERSBURG, PENNSYLVANIA

June 27, 1991

TABLE OF CONTENTS

A. DECLARATION 1

B. DECISION SUMMARY. 3

1 SITE NAME, LOCATION, AND DESCRIPTION 3
1.1 SITE BACKGROUND. 3
1.2 SITE LOCATION. 3
1.3 SITE DESCRIPTION 6

2 SITE HISTORY AND ENFORCEMENT ACTIVITIES 11
2.1 SITE HISTORY 11
2.2 DESCRIPTION OF INVESTIGATIVE HISTORY 12
2.3 CERCLA ACTIVITIES. 18

3 HIGHLIGHTS OF COMMUNITY PARTICIPATION 18

4 SCOPE AND ROLE. 20

5 SUMMARY OF SITE CHARACTERISTICS 21
5.1 SITE CONTAMINATION AND AFFECTED MEDIA. 21
5.2 SOURCES OF CONTAMINATION 21
5.3 LOCATION OF CONTAMINATION. 21
5.4 POTENTIAL ROUTES OF MIGRATION. 22

6 SUMMARY OF SITE RISKS 22
6.1 EXPOSURE ASSESSMENT. 22
6.2 RISK CHARACTERIZATION. 23
6.3 RISK CONCLUSIONS 23

7 DESCRIPTION OF ALTERNATIVES 24
7.1 NO ACTION RESPONSE 25
7.2 CONTAINMENT RESPONSE 27
7.3 THERMAL TREATMENT RESPONSE 29
7.4 INNOVATIVE TECHNOLOGY RESPONSE 29

8 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES 30
8.1 EVALUATION CRITERIA. 30
8.2 ANALYSIS OF ALTERNATIVES 32

9 SELECTED REMEDY 34
9.1 RATIONALE FOR SELECTION OF PREFERRED ALTERNATIVE . . 34

10 STATUTORY FINDINGS. 37
10.1 PROTECTION OF HUMAN HEALTH AND ENVIRONMENT. 37
10.2 COMPLIANCE WITH ARARS 37
10.3 COST-EFFECTIVENESS. 39
10.4 UTILIZATION OF PERMANENT SOLUTIONS. 39

C. RESPONSIVENESS SUMMARY. 41

LIST OF TABLES

Table	Title	Page
2.1	LEAD CERCLA Reports for SE/PDO Areas	15
7.1	Summary of Remedial Alternatives	26
8.1	Summary of Detailed Analysis	35

LIST OF FIGURES

Figure	Title	Page
1.1	CERCLA Remedial Process for a Site	4
1.2	Location Map of LEAD and Vicinity	5
1.3	Generalized Geologic Map of LEAD	7
1.4	Predominant Faults Associated with SE Area	8
1.5	General Soils Map	10
2.1	Drainage Basin Map	13
2.2	Source Areas within K Area	14
2.3	Location of Soils to be Remediated	19
7.1	Cross-Section of Multimedia Cap	28
7.2	Process Schematic for LTT	31
9.1	Process Schematic for LTT	38

DECLARATION FOR THE RECORD OF DECISION
ACCELERATED REMEDIAL ACTION
SOUTHEASTERN AREA
OPERABLE UNIT ONE: K AREA CONTAMINATED SOILS
LETTERKENNY ARMY DEPOT

Site Name and Location

U.S. Department of Army
Southeastern Area (SE), Letterkenny Army Depot (LEAD)
Franklin County
Chambersburg, Pennsylvania

Statement of Basis and Purpose

This decision document presents the selected final remedial action for contaminated soils in the K Area, within the Southeastern Area at Letterkenny Army Depot, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the final remedy for this site. This decision is based on the administrative record.

The U.S. Environmental Protection Agency (EPA), Region III and the Pennsylvania Department of Environmental Resources (PADER) concur with the selected remedy. The information supporting this remedial action decision is contained in the administrative record for LEAD.

Assessment of the Site

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the final response action selected in this Record of Decision (ROD), may present an imminent and substantial threat to public health, welfare, or the environment.

Description of the Selected Remedy

This operable unit is the first operable unit of a possible three operable units for the Southeastern Area. The first operable unit at this site will provide source control for the contaminated soils in the K Area, thereby minimizing the contaminant migration from the soils into the groundwater at this site. The contaminated

soils are a principal threat in the K Area. Operable unit number two will address other contamination source areas and operable unit number three will address groundwater contamination and a final remedial response action will be selected for this media.

The remedial action described herein will not require long-term management due to the treatment of the contaminated soils in the K Area. The major components of the selected remedy include the following:

- excavation of 8000 cubic yards of contaminated soils in the K Area;
- thermal treatment of contaminated soils at a temperature not greater than 450 F;
- destruction of volatilized contaminants by a secondary high-temperature combustor or adsorption of volatilized contaminants onto activated carbon;
- analysis of representative samples of treated soils and comparison with treatment criteria;
- proper management of treated soils.

Declaration of Statutory Determinations

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, and it satisfies the statutory preference for remedies that employ treatment that reduce toxicity, mobility, or volume as their principal element.

Lewis D. Walker — 6/28/91

Lewis D. Walker
Deputy Assistant Secretary of the Army
for Environment, Safety, and Occupational
Health

Date

Edwin B. Erickson — 8/2/91

Edwin B. Erickson
Regional Administrator
U.S. Environmental Protection Agency, Region III

Date

1 SITE NAME, LOCATION, AND DESCRIPTION

1.1 SITE BACKGROUND

The U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) is currently performing Remedial Investigation/Feasibility Study (RI/FS) activities as required under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at U.S. Department of Army (Army), Letterkenny Army Depot (LEAD) in Chambersburg, Pennsylvania. Soil contamination for volatile organic compounds (VOCs) above the action levels designated by the Pennsylvania Department of Environmental Resources (PADER) and the U.S. Environmental Protection Agency (EPA) has been detected in the K Area which is within the Southeastern Area (SE) of the depot.

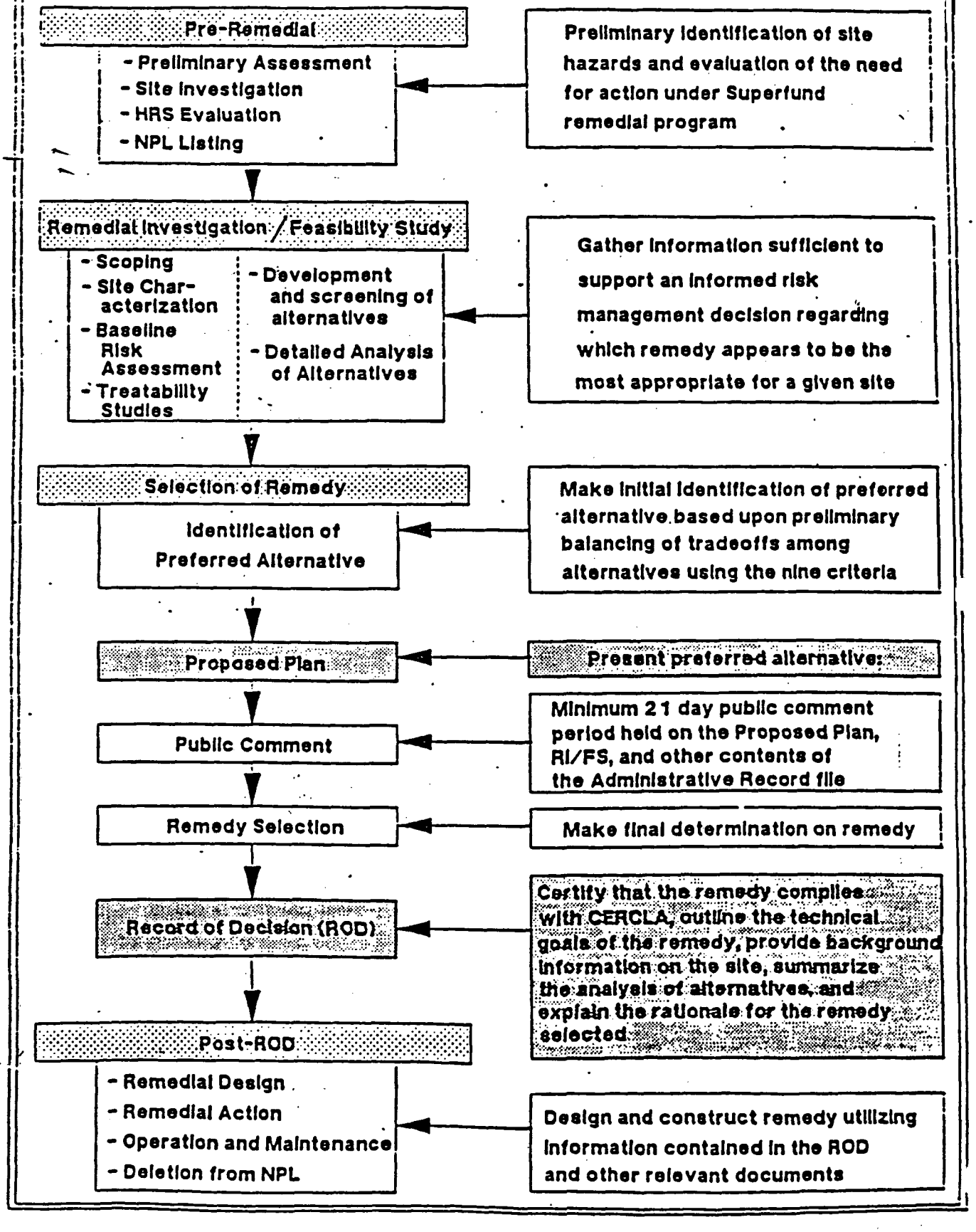
Previous investigations by USATHAMA, Battelle, Roy F. Weston, and Environmental Science & Engineering, Inc. (ESE) have defined three areas within the K Area where VOC contamination of the soil exists. These source areas are K-1, K-2, and K-3. Since contamination of area K-2 has been linked to the migration of contaminants from area K-1, K-2 will be considered a part of K-1. The Record of Decision (ROD) described in this document encompasses all three areas which hereafter will be referred to as the K Area.

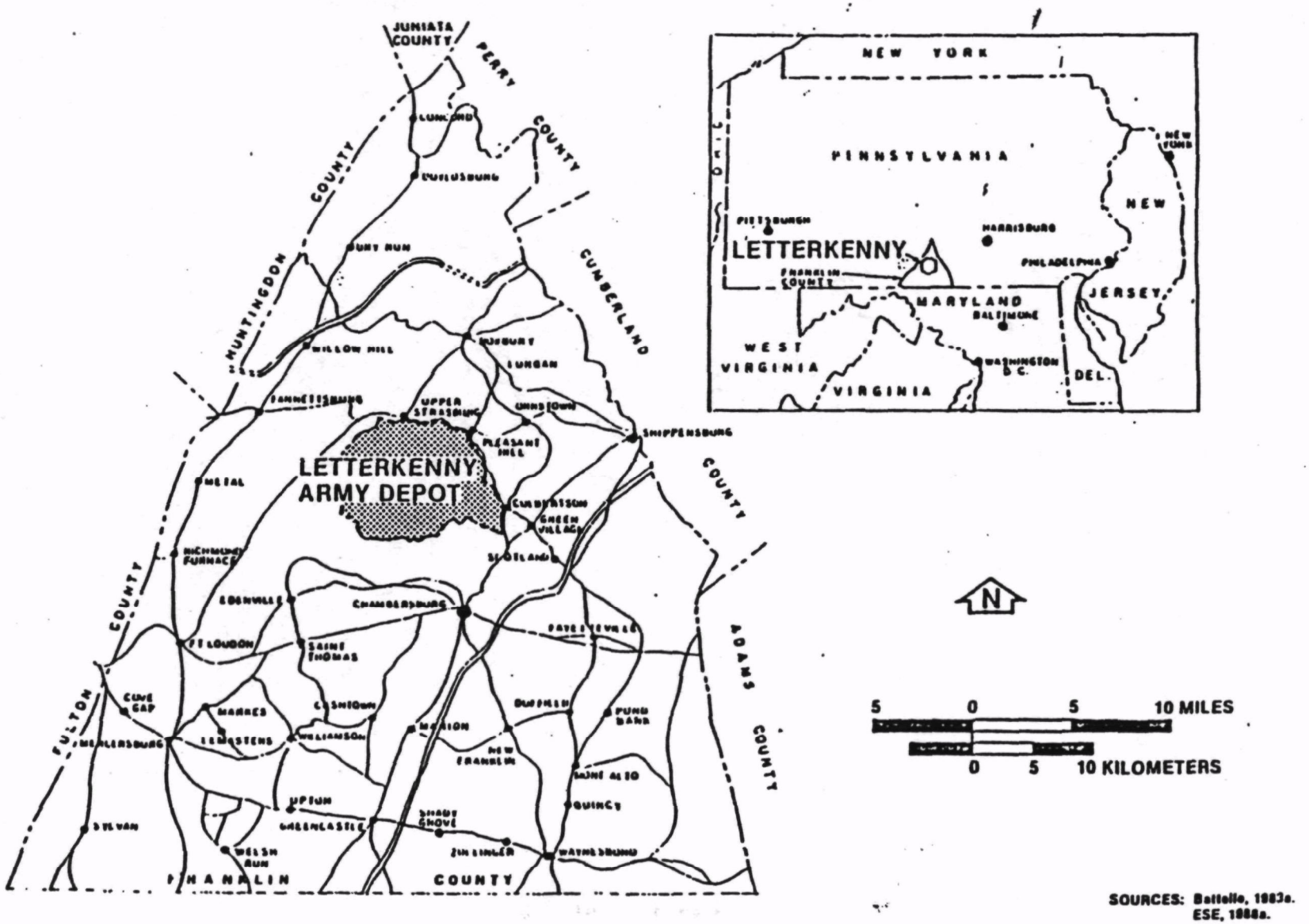
This document is the Army's ROD for the identification and implementation of a final soil remedial action in the K Area at LEAD. The purpose of this ROD is to: certify that a selected remedy complies with CERCLA, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and state law, outline technical goals of the selected remedy, provide background information for the contaminated site, summarize the analysis of the remedial action alternatives which were considered, and explain the rationale for the selected remedy. This ROD will document a final accelerated remedial action plan for operable unit one: K Area Contaminated Soils (OU1). The remaining final remedial actions and RODs currently planned for LEAD will be executed following the completion of the RI/FS. Figure 1.1 outlines the remedial process mandated by CERCLA for a site.

1.2 SITE LOCATION

LEAD, formerly known as Letterkenny Ordnance Depot, is located in south-central Pennsylvania in the central portion of Franklin County; in Letterkenny, Greene, and Hamilton Townships, about 5 miles north of the city of Chambersburg (Figure 1.2). The installation occupies 7,899 hectares (19,520 acres) situated in the western side of the Cumberland Valley, which is characterized by gently rolling terrain underlain by folded and faulted geologic formations. Approximately 5600 civilians and 140 military personnel

FIGURE 1-1
The Remedial Process





SOURCES: Battelle, 1983a.
ESE, 1988a.

Figure 1.2
LOCATION MAP OF LEAD AND VICINITY

REMEDIAL INVESTIGATION/ FEASIBILITY STUDY
Letterkenny Army Depot

U.S. Army
Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

are employed at LEAD, and more than 1862 buildings and structures are located on the installation with roughly 1096 miles of road.

The population for Franklin County is about 115,000. Chambersburg is the largest town and county seat, with 17,000 inhabitants. Thirty-three residences are located within a 3-square-mile (mi^2) area adjacent to the K Area with the SE Area at LEAD. Assuming each home contains 3.8 people, the population is approximately 126 people.

1.3 SITE DESCRIPTION

LEAD is located in the Great Valley section of the Valley and Ridge physiographic province. This area, known locally as the Cumberland Valley, extends northeast to southwest across the central part of Pennsylvania. Figure 1.3 is a generalized geologic map of the northern part of the Great Cumberland Valley, including LEAD.

1.3.1 GEOLOGICAL CHARACTERISTICS

The five formations that occur in the vicinity of LEAD are the shales of the Martinsburg Formation, the limestones of the Chambersburg Formation, the limestones of the St. Paul Group, the dolomites of the Pinesburg Station Formation, and the limestones and interbedded dolomites of the Rockdale Run Formation. The Chambersburg Formation, St. Paul Group, Rockdale Run Formation, and Pinesburg Station Formation occur in the SE Area with the St. Paul Group occurring in the K Area. These geologic formations are fractured and deformed to varying degrees from past geologic activity.

The Martinsburg Formation, predominately a black shale, and the Pinesburg Station Formation, predominately a dolomite, appear to be more resistant to erosion than the other rock units and tend to form hills. However, the Chambersburg Formation, St. Paul Group, and Rockdale Run Formation are limestones that form the valley floor of the SE Area at LEAD and have associated karst features (e.g. sinkholes and internal drainage). The limestones of the St. Paul Group are present within the K Area. The carbonate and shales in the SE Area are distorted by structural deformations that formed the Great Valley. The predominant faults associated with the SE Area of LEAD are the Pinola and Letterkenny Faults (see Figure 1.4).

1.3.2 GROUNDWATER CHARACTERISTICS

Groundwater flow in the Ordovician carbonates (Chambersburg Formation, St. Paul Group, Pinesburg Station Formation, and Rockdale Rum Formation) tends to parallel the strike of the bedding and joints, fractures, and major fault structures. In the Martinsburg Formation, extensive fracturing causes groundwater flow to resemble

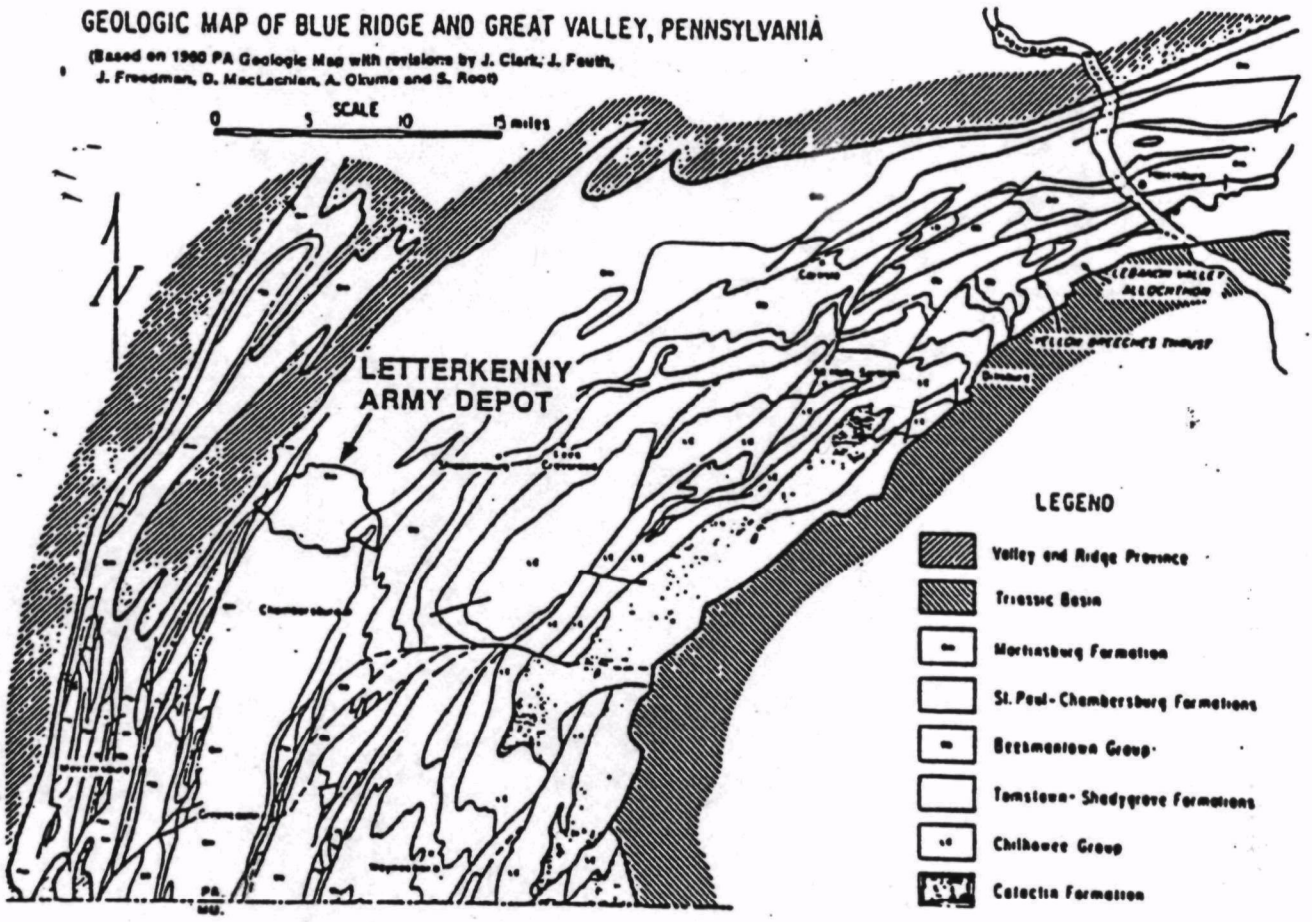


Figure 1.3
GEOLOGIC MAP OF LEAD AND SURROUNDING AREAS

SOURCE: Weston, 1984.

REMEDIAL INVESTIGATION/ FEASIBILITY STUDY
Letterkenny Army Depot

U.S. Army
Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

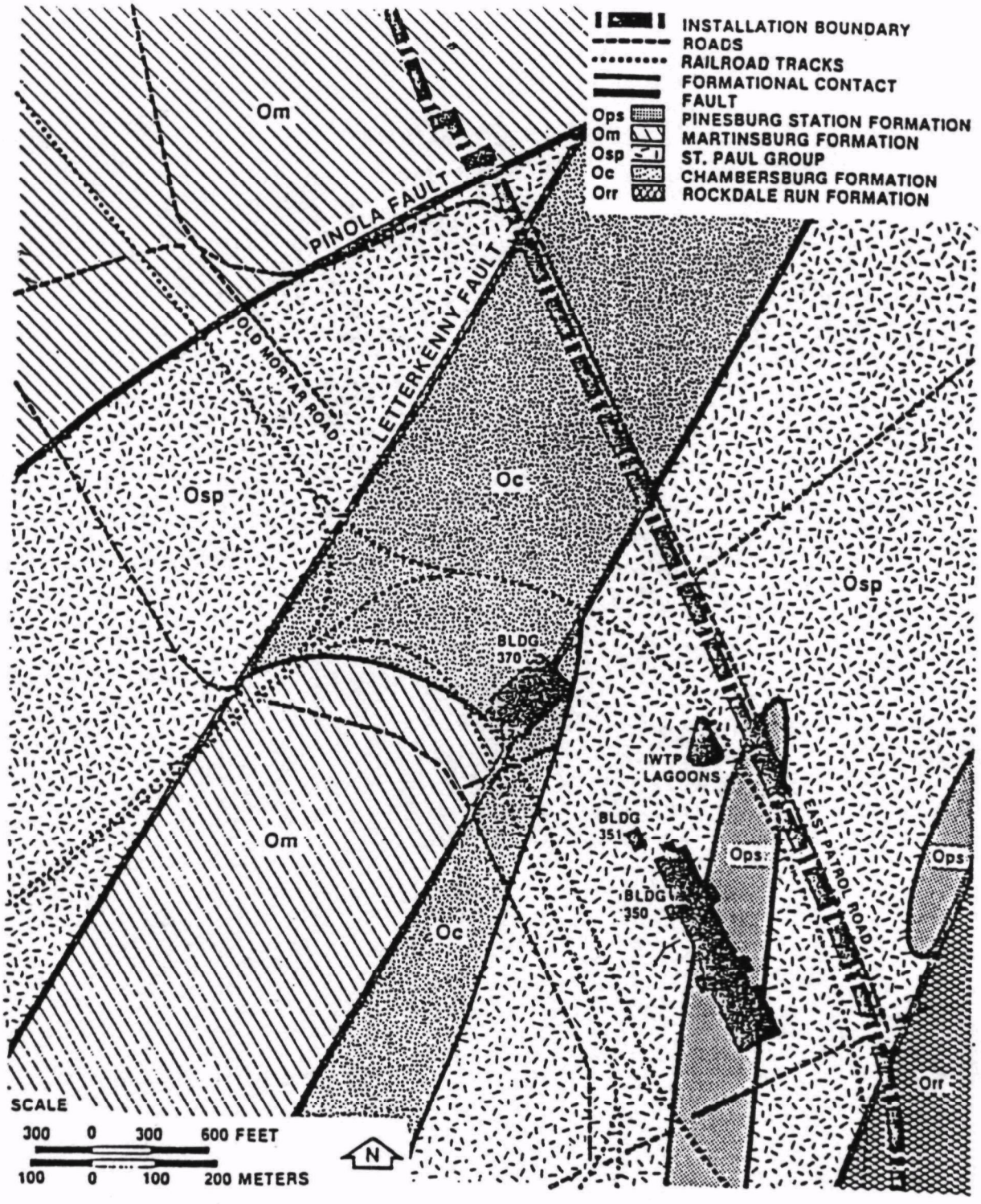


Figure 1.4
GEOLOGIC MAP SHOWING APPROXIMATE FORMATIONAL CONTACTS AND FAULTS IN THE SE AREA

SOURCES: Becher and Taylor, 1982.
EPA/EPIC, 1987, REVISED BY ESE, 1987.

REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
Letterkenny Army Depot

U.S. Army
Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

classical porous media flow patterns and is normal to the equipotential lines of the groundwater gradient.

The Martinsburg Formation is a thin-bedded, black, steeply inclined, fissile shale of late Ordovician age. It contains interbedded layers of sandstones, siltstones, and minor carbonates. Wells completed within the Martinsburg Formation yield from 50 to 150 gallons per minute (gpm).

The Middle Ordovician Chambersburg Formation is a dark gray, thick- to thin-bedded limestone that weathers into cobbles with moderate groundwater yields of approximately 11 to 35 gpm.

The Middle Ordovician St. Paul Group is a dark gray, thin-bedded limestone with some minor interbedding of dolomite. Due to the extensive faulting and shortening of the St. Paul Group in this area, it is difficult to distinguish the St. Paul Group aquifer from the Chambersburg Formation aquifer. Therefore, the St. Paul Group aquifer can be treated as part of the Chambersburg Formation aquifer in the K Area. Groundwater yields in this formation are approximately 15 gpm.

The Pinesburg Station Formation is a light gray dolomite of Middle Ordovician Age. The dolomites are structureless to locally planar, laminated, and contain small, white rosette chert nodules and sparse, dark chert masses. Water flow through the dolomites is restricted and acts as a barrier to groundwater flow. The contact between the Pinesburg Station and St. Paul Group carbonates is enlarged by solutioning and acts as a groundwater conduit along the barrier. The Pinesburg Station Formation is moderately productive, with maximum reported groundwater yields of 30 gpm.

The Rockdale Run Formation is an Ordovician Age limestone that outcrops frequently, forming gently rolling terrain, and is composed of limestones and a significant number of dolomite beds, both containing small, white chert nodules. This formation is a highly productive aquifer, with reported yields up to 410 gpm.

1.3.3 SOILS CHARACTERISTICS

The predominant soils at LEAD are developed through weathering of the Martinsburg shale and interbedded siltstones. The soils in the SE Area including the K Area at LEAD have been mapped as part of the Hagerstown-Duffield Association and Weikert-Berks-Bedington Association. These soils are described as silty clay loams and silty clays with shale and limestone fragments (see Figure 1.5).

1.3.4 SURFACE WATER CHARACTERISTICS

Two major stormwater drainage systems serve the SE Area at LEAD.

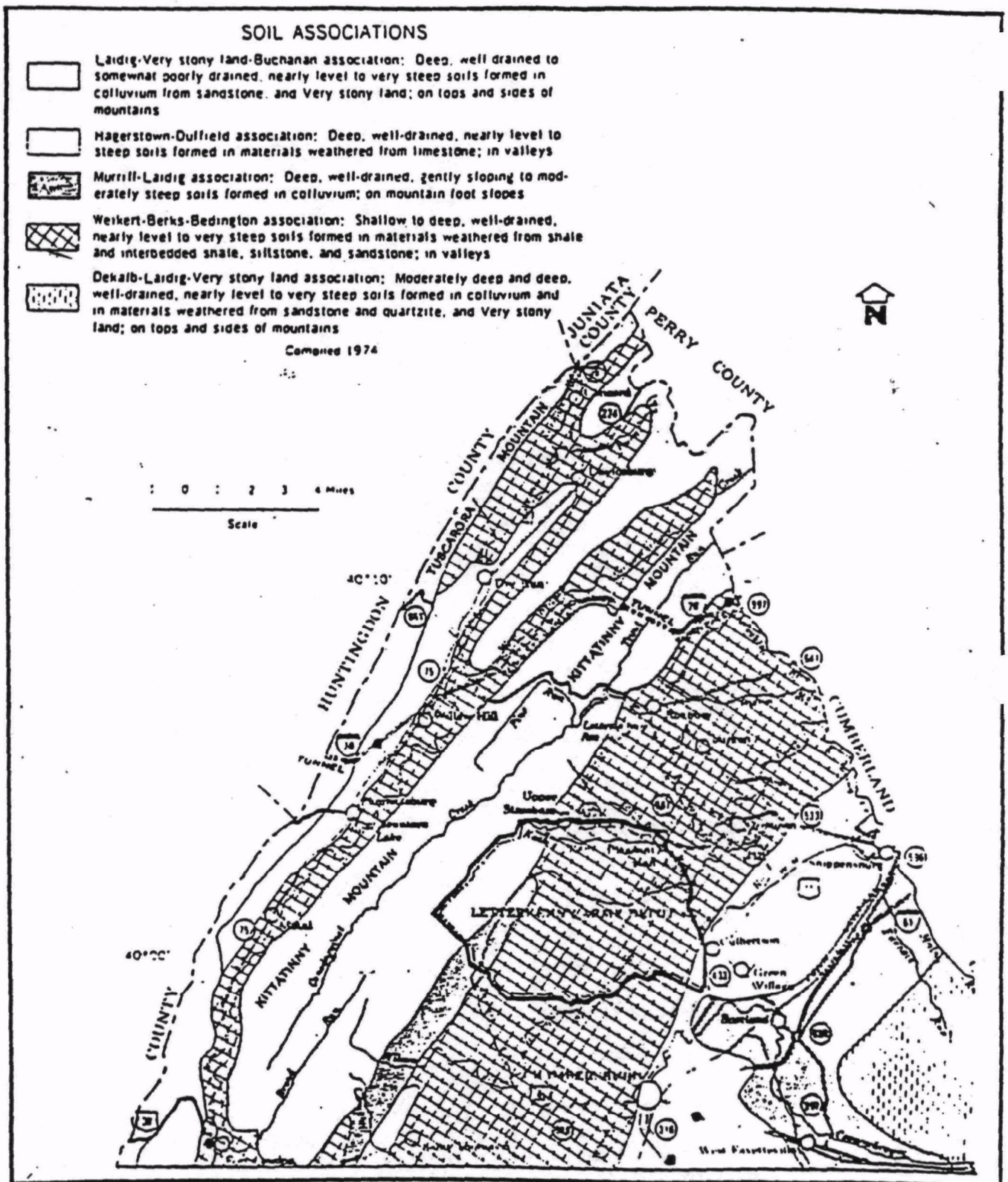


Figure 1.5
GENERAL SOILS MAP: FRANKLIN COUNTY, PENNSYLVANIA

SOURCE: Weston, 1984.

REMEDIAL INVESTIGATION/ FEASIBILITY STUDY
Letterkenny Army Depot

U.S. Army
Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

Drainage from south of Coffey Avenue exits through the storm drain outfall at the southeastern corner of the SE. It joins other surface runoff flowing southward 1.5 miles to Conococheague Creek, a tributary of the Potomac River. A portion of the runoff enters a small sinkhole located approximately 0.5 miles downstream of LEAD.

Runoff north of Coffey Avenue discharges into the industrial wastewater treatment plant (IWTP) outfall ditch and into Rowe Run. Rowe Run flows 3.5 miles to Muddy Run, which enters Conodoguinet Creek, a tributary of the Susquehanna River. Two springs, Rowe and Pinola, discharge into Rowe Run 1.25 and 3.1 miles, respectively, northeast of LEAD. It is believed that these springs are the major discharge points for groundwater flowing beneath the K Area within the SE Area.

1.3.5 LAND USES

No national or state forestland, or other public lands were identified as impacted by the contamination within the K Area at LEAD. The K Area is not located within a floodplain or wetlands. The principal land use adjacent to the K Area at LEAD is farming and raising of livestock (beef cattle and pigs). Principal crops are fruit trees (e.g. apples, pears, peaches), corn, and potatoes.

No threatened or endangered species have been identified within the K Area at LEAD. An environmental assessment for LEAD is being conducted and will result in endangerment and ecological assessments.

2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 SITE HISTORY

LEAD is owned and operated by the Army. Although established in 1942 with the mission of ammunition storage, the principal missions at LEAD currently include overhauling, rebuilding, and testing of wheeled and tracked vehicles; the issuance and shipment of Class III chemicals and petroleum; and the storage, maintenance, demilitarization, and modification of ammunition. Operations associated with current or prior missions have included cleaning and stripping, plating, lubrication, demolition, chemical and petroleum transfer and storage, and washout/deactivation of ammunition. Many of these activities, except those associated with ammunition, were conducted in the SE Area using significant quantities of trichloroethylene, other chlorinated hydrocarbons, hydrocarbons, and other solvents.

Past industrial activities and waste disposal practices of trichloroethylene, hydrocarbons, and other solvents have resulted in

VOC contamination of the soil and groundwater in parts of the SE Area. The primary contaminant sources in the K Area are the contaminated soils associated with the various burial trenches, pits, and landfills formerly used as hazardous waste disposal areas for the spent solvents such as trichloroethylene and 1,1,1-trichloroethane.

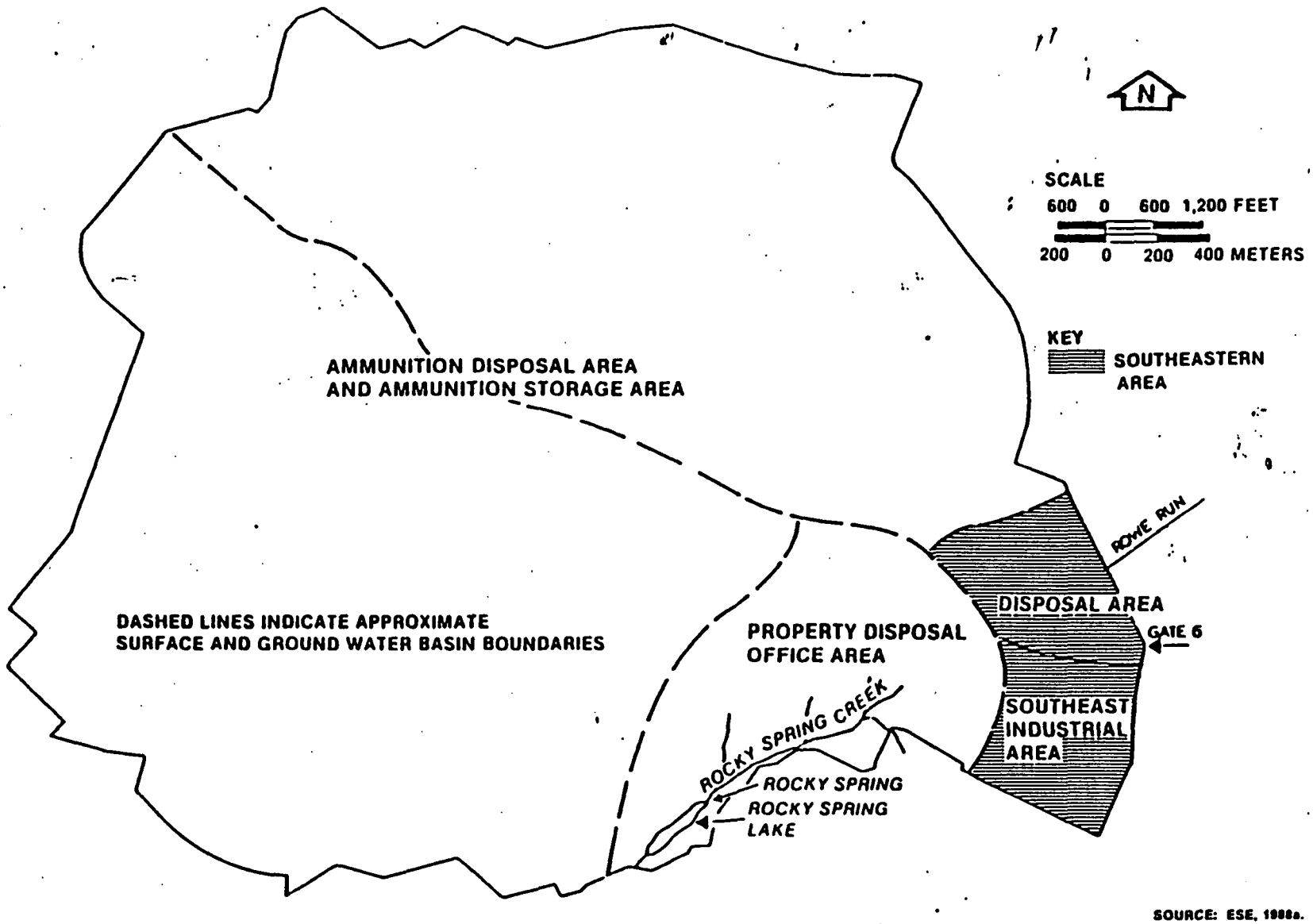
2.2 DESCRIPTION OF INVESTIGATIVE HISTORY

Two areas of LEAD were promulgated to the National Priorities List (NPL). The two NPL sites at LEAD are the Property Disposal Office Area (PDO) drainage system and the Southeastern Area (SE) drainage system. The PDO Area has a Hazardous Ranking System (HRS) score of 37.51, and the SE Area has a score of 34.21. The SE Area was listed on the NPL in July 1987, and the PDO Area was listed in March 1989. These two sites are shown in Figure 2.1. The dashed lines that separate the areas indicate approximate surface water and groundwater basins. The K Area is located within the SE drainage system. Figure 2.2 delineates the source areas of soil contamination in the K Area; K-1, K-2, and K-3, which this ROD will discuss.

A Preliminary Assessment of the depot was conducted by USATHAMA in 1980. A Remedial Investigation/Feasibility Study (RI/FS) was initiated by USATHAMA for both NPL Areas in 1984. The nature and extent of the contaminant sources in the SE Area has been investigated in these previous reports. See Table 2.1 for a compilation of all environmental contamination reports for LEAD which are contained in the administrative record. Groundwater contamination in the K Area within the SE Area has been confirmed for four source areas; areas A, B, K-1, and K-2, with three of these areas; areas A, B, and K-1 identified as migration sources contributing to the groundwater contamination in the area (Weston, 1984). Soil gas sampling performed within the SE Area during the 1989 EPRDA Soil Gas Investigation identified four areas of high concentrations of VOC's; areas C, K-1, K-2, and K-3 (Weston, 1989a).

Offpost groundwater contamination has occurred in private wells adjacent to the SE Area at LEAD. Recent efforts with a dye tracer study have helped to more clearly identify contaminant pathways between some sources within the SE Area and certain offpost, private wells.

Pursuant to CERCLA Section 120, an Interagency Agreement (IAG) was signed in February 1989 between EPA, PADER, and the Army to ensure cooperation and understanding between all three parties and to facilitate a sound and aggressive environmental cleanup program at LEAD for the two NPL areas. The accelerated remedial action for the K Areas which is the subject of this ROD is required by the IAG. The regulators have reviewed all prior reports listed in Table 2.1



SOURCE: ESE, 1988a.

Figure 2.1 SURFACE WATER AND GROUNDWATER BASINS AND STUDY AREA AT LEAD	REMEDIAL INVESTIGATION/ FEASIBILITY STUDY Letterkenny Army Depot	U.S. Army Toxic and Hazardous Materials Agency Aberdeen Proving Ground, Maryland

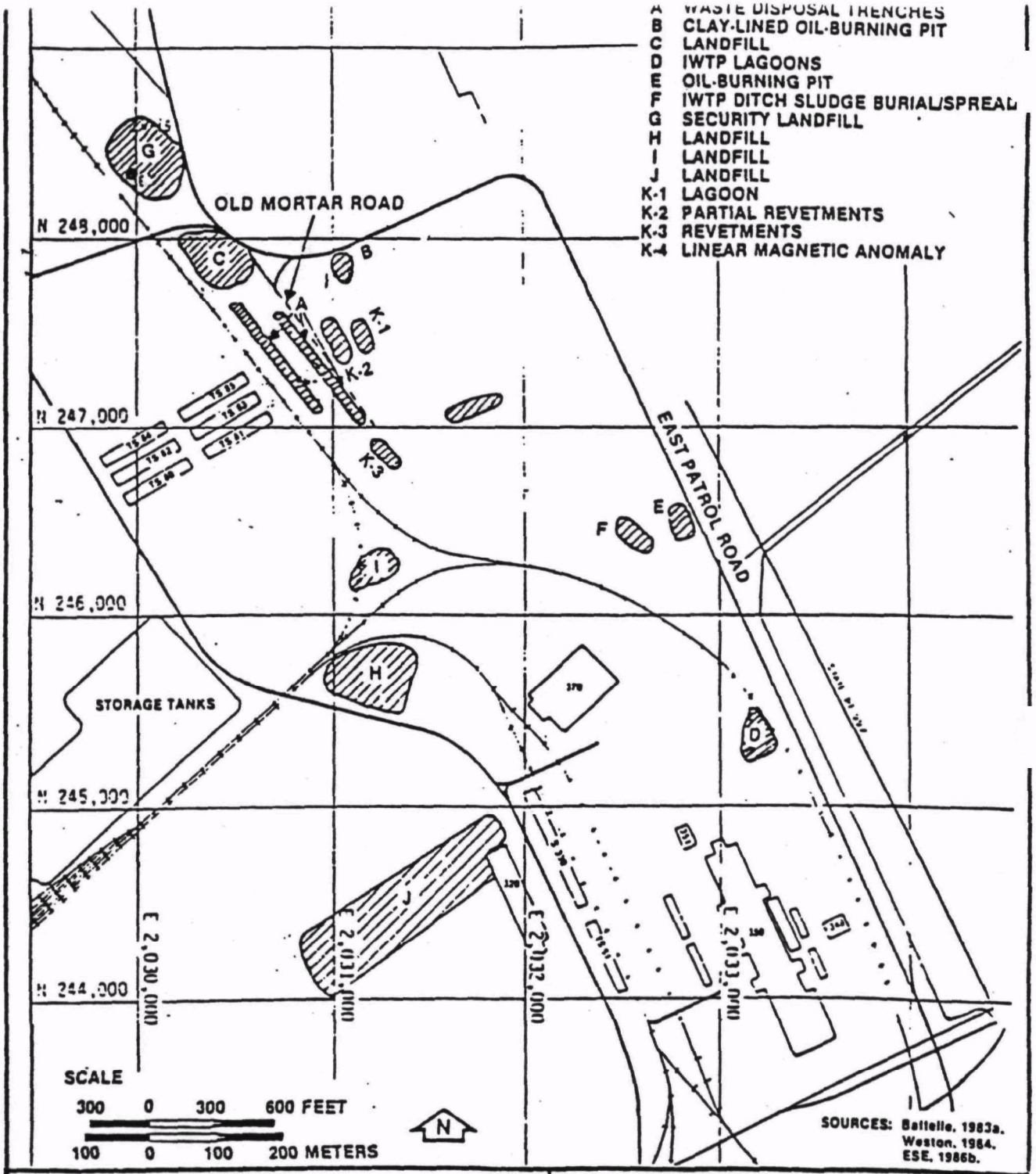


Figure 2.2
POTENTIAL CONTAMINANT SOURCE AREAS IN THE SE AREA

REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
Letterkenny Army Depot

U.S. Army
Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

Table 2.1

LEAD CERCLA Reports for the PDO/SE Areas

1. Installation Assessment USATHAMA Jan. 1980 (USATHAMA, 1980)

2. Army Pollution Abatement Studies (PDO) Berger Associates Feb. 1981 (Berger, 1981)

3. Geophysical Survey of the Southeastern Area (SE) Battelle June 1983 (Battelle, 1983a)

4. Environmental Contamination Survey (SIA) Battelle Sept. 1983 (Battelle, 1983b)

5. Environmental Contamination Survey (PDO) Battelle Oct. 1983 (Battelle, 1983c)

6. Environmental Contamination Survey: Exploratory and Confirmatory (PDO & SIA) Battelle Dec. 1983 (Battelle, 1983d)

7. Remedial Investigation/Feasibility Study of LEAD (SIA - Disposal Area) ESE Feb. 1984 (Weston, 1984)

8. Environmental Contamination Survey: Multiphase (PDO) & SIA) Battelle May 1984 (ESE, 1984)

9. Environmental Contamination Monitoring (PDO & SIA) ESE Jan. 1986 (ESE, 1986a)

10. Pilot Investigation of LTT of VOCs from Soil (Disposal Area-SIA) Weston June 1986 (Weston, 1986)

11. Remedial Investigation of the Disposal Area (SIA) ESE Aug. 1986 (ESE, 1986b)

12. Records Search of the Southeast Industrial Area (SIA) ESE Oct. 1986 (ESE, 1986c)

13. Fracture Trace Analysis (PDO & SIA) EPA-EPIC 1987 (EPA, 1987)

14. Geophysical Investigation of Eastern Boundary, Vol. I (SIA) Technos/ESE May 1987 (Technos, 1987a)

15. Geophysical Investigation of the IWTP Area, Vol. II (SIA) Technos, ESE May 1987 (Technos, 1987b)

16. Remedial Investigation of the PDO Area (PDO) ESE Sept. 1987 (ESE, 1987a)

17. Remedial Investigation of the SE Area (SE) ESE Dec. 1987 (ESE, 1987b)

18. Downhole Geophysical Logging of the SE Boundary (SE) Technos/ESE Dec. 1987 (Technos, 1987c)

19. Endangerment Assessment of the PDO Area (PDO) ESE Feb. 1988 (ESE, 1988a)

20. Feasibility Study of the PDO Area (PDO) ESE Aug. 1988 (ESE, 1988b)

21. Feasibility Study of the SE Area, First operable Unit (SE) ESE Sept. 1988 (ESE, 1988c)

22. Endangerment Assessment of the SE Area (SE) ESE Sept. 1988 (ESE, 1988d)

23. Feasibility Study of the SE Area, Second Operable Unit (SE) ESE May 1989 (ESE, 1989)

24. EPRDA Soil Gas Survey (SE - Disposal Area) Weston Oct. 1989 (Weston 1989a)

25. In-Situ Volatilization Study (SE & PDO) Weston Oct. 1989 (Weston, 1989b)

26. Emissions Treatment Technology Evaluations for the ISV Systems (PDO & SE) Weston Oct. 1989 (Weston, 1989c)

27. Focused Feasibility Study (PDO & SE) USATHAMA Aug. 1990 (USATHAMA, 1990)

28. Public Involvement and Response Plan (PDO & SE) ESE Feb. 1990 (ESE, 1990a)

29. Site Investigation Technical Plan EA Engineering Apr. 1990 (EA, 1990a)

30. Remedial Investigation/Feasibility Study Work Plan ESE June 1990 (ESE, 1990b)

31. Proposed Plan for the SE Area (FFS) LEAD Sep. 1990 (LEAD, 1990a)

32. Proposed Plan for the PDO Area (FFS) LEAD Sep. 1990 (LEAD, 1990b)

and have identified problems and data gaps under the RI/FS program. LEAD is currently conducting field work to ensure that the final RI/FS documents are complete and adequate. In addition, the Industrial Waste Treatment Plant lagoons are being closed in accordance with the Resource Conservation and Recovery Act.

2.3 CERCLA ACTIVITIES

A Focused Feasibility Study (FFS) was prepared for LEAD to develop and evaluate alternate remedial responses to uncontrolled releases of hazardous substances from specified areas within the depot's two NPL sites, the SE Area and the PDO Area. The FFS is an accelerated Feasibility Study which focuses specifically on contaminated soils in the K Area and PDO Area. The purpose of the FFS is to begin remediation on a known source area while the remaining final remediation plans are being prepared as further described in the IAG Section IX.D. The FFS is a required document under the IAG. Within the SE Area, the FFS has focused on the contaminant sources in the K Area and has evaluated potential final remedial measures for the soils in the K Area. This study, in conjunction with past reports, has indicated that soil remediation is feasible (Weston, 1984).

The FFS provides the information necessary for identification of final remedial alternatives at LEAD, in accordance with CERCLA and the NCP. This cost-effective remedial alternative will effectively mitigate and minimize threats to and provide adequate protection of public health and welfare and the environment. Except as provided in 40 CFR 300.68(i)(5), the selected remedy must attain or exceed applicable or relevant and appropriate Federal and State public health and environmental requirements that have been identified for the specific site. This ROD will focus on the contaminated soils in the K Area. Figure 2.3 shows the areas which this document will discuss.

As outlined in the IAG, the Army is the lead agency and EPA and PADER are the support agencies. As the lead agency, the Army is required to identify the "preferred alternative" and prepare the ROD for an NPL site. The Army is issuing this ROD as required by Sections 120(e)(2) and 117 of CERCLA. This document summarizes information which can be found in greater detail in the Remedial Investigation/Feasibility Study (RI/FS) for the SE Area of December 1987 (ESE, 1987b), the FFS of August 1990 (USATHAMA, 1990), the Proposed Plan for the SE Area of May 1991 (LEAD, 1991) as well as other documents contained in the administrative record file for this site.

3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The FFS and the Proposed Plans for the SE Area and the PDO Area

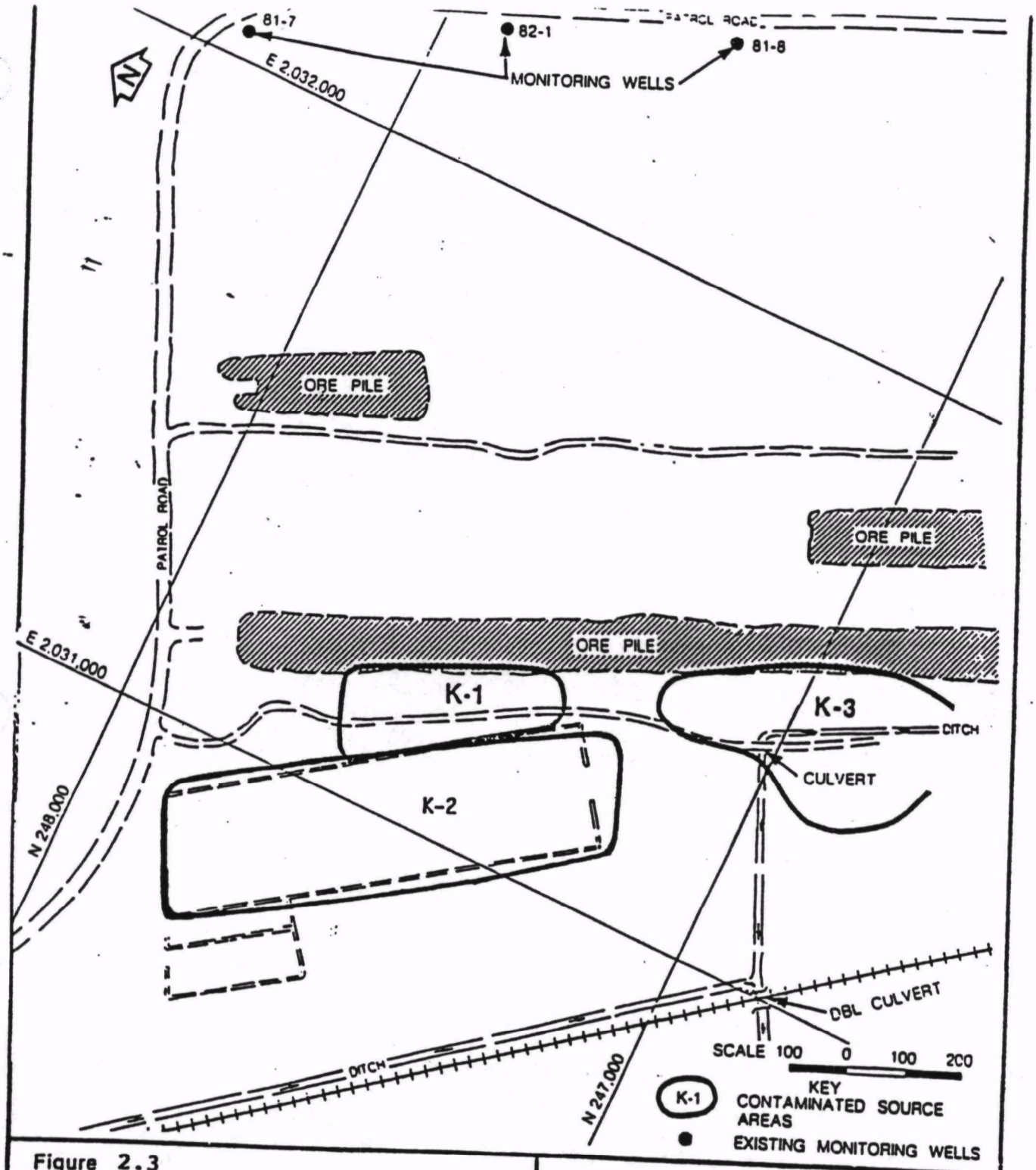


Figure 2.3
LOCATION OF SOILS TO BE REMEDIATED AT LEAD DA

SOURCES: Weston, 1984; ESE, 1988b.

REMEDIAL INVESTIGATION
FEASIBLITY STUDY
Letterkenny Army Depot

U.S. Army
Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

at LEAD were released to the public on April 6, 1991. These two documents were made available to the public in both the administrative record and an information repository maintained at the EPA Docket Room in Region III, Philadelphia, Pennsylvania, at Building 663 at LEAD, and at the Coyle Free Library in Chambersburg, Pennsylvania. The notice of availability for these two documents was published in a local Chambersburg newspaper, The Public Opinion, on April 6, 13, 20 and 27, 1991. A public comment period was held from April 6, 1991 to May 20, 1991. In addition, a public meeting was held on May 14, 1991. At this meeting, the Army presented an overview of the proposed plan and the preferred alternative being proposed as required under CERCLA. Community attendance at the public meeting was very low. The Responsiveness Summary of this ROD provides a discussion of public comments received during the public comment period. This decision document presents the selected final remedial action for the K Area at LEAD, chosen in accordance with CERCLA, and the NCP. The decision for this site is based on the administrative record.

4 SCOPE AND ROLE

Due to the complexity of the contamination problems at LEAD, the Army has divided the cleanup work in the PDO and SE Areas into manageable components called "operable units" (OUs). OUs are separate response measures which are components of the overall cleanup at a NPL site. There are five operable units currently planned for the depot. The OUs at the two NPL sites have been numbered separately. These OUs are;

SOUTHEASTERN AREA

* Operable Unit 1 - K Area Contaminated Soils
* Operable Unit 2 - SE Area Source Identification
* Operable Unit 3 - SE Area Contaminated Groundwater

PROPERTY DISPOSAL OFFICE AREA

* Operable Unit 1 - Revetments, Oil Burn Pit Contaminated Soils
* Operable Unit 2 - PDO Area Contaminated Groundwater

The remedial objective for LEAD is to reduce contamination to levels that eliminate unacceptable risk to human health and the environment. The overall strategy for LEAD is to address the contaminated soils OUs first and the contaminated groundwater OUs in the future. The contaminated soils OUs are being considered first because contaminated soils are usually less difficult to clean up than contaminated groundwater, and the contaminated soils are often more localized and accessible. Therefore, LEAD is taking immediate actions on the contaminated soils in the PDO and SE Area as required

to reduce the direct risk to human health and the environment relatively quickly. These actions will also help avert the contaminated soils from acting as a continuing source of groundwater contamination in these areas.

This OU, the first one for the SE Area, addresses the contaminated soils in the K Area. These soils are one of the principal threats posed by the site. The K source areas include K-1, a former lagoon area, and K-3, a revetment used in the past for drum storage. The area K-2 is contaminated as a result of migration from contaminants from K-1. Therefore, K-2 will be considered as part of K-1 and will be included in this final remedial action. The selected remedy satisfies the preference for using treatment as a principal element of the remediation. This remedy will be consistent with any future remediation at the site.

5 SUMMARY OF SITE CHARACTERISTICS

5.1 SITE CONTAMINATION AND AFFECTED MEDIA

The contaminated medium in the K Area is the soils. Contaminants in the soils in this area were previously documented and include a variety of organic compounds at concentrations up to 7,000,000 micrograms per kilogram (ug/kg). The commonly occurring organic compounds are xylene, trans-1,2-dichloroethylene, ethylbenzene, and trichloroethylene. The groundwater in the SE Area is contaminated with the same organic compounds as the soils from the K Area, with concentrations in the groundwater occurring at up to 20,000 micrograms per liter (ug/L). The soils in the K Area are also contaminated with various heavy metals, however, groundwater contamination with metals is minimal in the SE Area, probably due to the retentive properties of the clayey soils with respect to metals (ESE, 1986a, 1986b). The limestone geology in the K Area soils appears to be naturally stabilizing the metals in this area. Analysis and disposal of treated soils will be performed in accordance with Pennsylvania proposed Residual Waste Regulations.

5.2 SOURCES OF CONTAMINATION

The primary contaminant sources in the K Area are the contaminated soils associated with the various burial trenches, pits, and landfills formerly used as hazardous waste disposal areas for the spent solvents such as trichloroethylene and 1,1,1-trichloroethane.

5.3 LOCATION OF CONTAMINATION

There are no structures such as buildings or roadways which could impede the remedial action of the soils in the K Area. The impacted area is easily accessible and is located away from the main

industrial buildings on depot.

5.4 POTENTIAL ROUTES OF MIGRATION

Migration of the organic contaminants from the SE Area into and through the groundwater is still occurring due to the continued presence of the various source soils in the K Area. A slight trend toward decreasing contaminant levels in the groundwater with time may be due to the dilution of existing sources by groundwater throughflow. Interpretations from the dye tracer study being conducted in the SE Area indicate flow rates in different parts of the actively functioning aquifer are highly variable, from 4 to 300 feet per hour. As described earlier, groundwater will be addressed as operable unit three and is the subject of an ongoing RI/FS.

Offpost, the contaminant transport mechanisms appear to be related to the fractured karst bedrock environment associated with Rowe and Pinola Springs to the northeast, both of which discharge groundwater to the surface water of Rowe Run. The direction and rate of contaminant migration in the groundwater has not been quantitatively determined in the SE Area due to the complex nature of the limestone aquifer, but the general flow direction offpost appears to be to the northeast, toward Rowe Spring, based on contaminant distributions in offpost private wells.

Thirty-three residences are located within a 3-square-mile (mi2) area adjacent to the K Area with the SE Area at LEAD. Assuming each home contains 3.8 people, the population impacted by the contamination at the K Area is approximately 126 people. A waterline has been installed to 41 residences located adjacent to the SE Area. These residences have been affected by the contaminated groundwater which is migrating off depot from the SE Area. The installation of the waterline has eliminated the drinking water threat to these 41 residences.

6 SUMMARY OF SITE RISKS

6.1 EXPOSURE ASSESSMENT

The SE Area Endangerment Assessment (EA) (ESE, 1988d) identified two compounds, 1,1-dichloroethylene and trichloroethylene, as critical contaminants in the groundwater offpost of the K Area. Therefore, the FFS concentrated on these contaminants for determining the site risks for the contaminated soils in the K Area.

The SE Area EA (ESE, 1988d) evaluated potential health risks for workers and offpost residents by activities that would bring them into contact with contaminated soils in the source areas. Skin absorption, incidental ingestion of soils, and inhalation of vapors from contaminated soils were considered to be possible concurrent

exposures. However, ingestion of contaminated soils and direct skin contact with such soils were not considered for the K Area because the contaminants are located in soils well below the ground surface which limits their exposure through direct contact with the soil. Access onto the installation is restricted by fences which limits the potential for exposure for non-LEAD personnel. Inhalation vapors for offpost receptors and all routes for onpost workers in the K Area were considered.

6.2 RISK CHARACTERIZATION

The cancer risk for all routes for workers in the K Area was calculated to be 6.10 x 10-8 which is below EPA's acceptable range for risk levels. EPA acceptable range for risk levels is 1 x 10-4 to 1 x 10-6, with the target risk level designated as 1 x 10-6. A cancer risk of 1 x 10-6 means that one additional person out of a million is at risk of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime if the site is not cleaned up. This risk analysis for the area indicates that air concentrations, as a result of volatilization from the soil, do not present a health hazard to workers. Health risks to residents located downwind of the K Area were evaluated at less than 1 x 10-7 (2.13 x 10-8) because of the low levels of volatile organics detected in the soils in this area.

A hazard index (HI) represents the sum of the ratios of calculated exposure levels to acceptable exposure concentrations for all chemicals under consideration. The HI provides a reference point. When the HI exceeds unity, there may be a concern for a potential health risk. A hazard index of 2.47 x 10-1 for the noncarcinogenic compounds in the K Area indicates that a significant health hazard to workers does not exist. Noncarcinogenic compounds were also determined to pose a low health risk to offpost receptors potentially exposed to the inhalation pathway.

6.3 RISK CONCLUSIONS

Federal Applicable or Relevant and Appropriate Requirements (ARARs) are not available for the SE Area indicator contaminants in the soil; however, the State ARAR for the indicator contaminants in soils is that the soils must be cleaned up to the extent necessary to meet the background groundwater cleanup requirements. The State ARAR for groundwater is background. A soil cleanup criteria was developed based on the soil-to-groundwater ratios observed in the SE Area.

The ratios of soil-to-groundwater concentrations were found to be 1 for 1,1-dichloroethylene and 45 for trichloroethylene in the SE Area EA (ESE, 1988a). The federal Maximum Contaminant Level (MCL) for both organics was considered. The MCL is the maximum

permissible level of a contaminant in water which is delivered to the free flowing outlet of the ultimate user of a public water system. The MCL for trichloroethylene, 5 micrograms per liter (ug/L), is more stringent than the MCL for 1,1-dichloroethylene, 7 ug/L. Therefore, by using the MCL for trichloroethylene, the acceptable soil concentration developed for the K Area in the FFS is determined to be 225 ug/kg for this compound (45 x 5 micrograms per liter). The average concentration of trichloroethylene in the K Area soils is 4,900 ug/kg (ESE, RI, 1987), which exceeds 225 ug/kg, the calculated soil criteria. Excavation and cleanup of the soils in the K Area with concentrations above 225 ug/kg is expected to result in reduction of contaminant transfer from soil to groundwater to levels which, in conjunction with other final remedial actions in the Southeastern Area, will eventually reduce groundwater concentrations.

Actual or threatened releases of hazardous substances from this site, if not addressed by the response action selected in this ROD, may present an imminent and substantial endangerment to the public health, welfare, or the environment.

7 DESCRIPTION OF ALTERNATIVES

The FFS for operable unit one screened a number of alternatives that could potentially achieve the remedial objective of reducing contamination to levels that eliminate unacceptable risk to human health and the environment. The final remedial action alternatives initially considered for the K Area encompassed the following basic actions:

- No Action
- Containment and a cap
- Thermal treatment
- Innovative technologies

All alternatives were evaluated using the following criteria derived from CERCLA Section 121:

- Protection of human health and the environment
- Compliance with all Applicable or Relevant and Appropriate Requirements(ARARs)
- Long-term effectiveness and permanence
- Reduction of waste toxicity, mobility, and volume

- Short-term effectiveness
- Implementability
- Community Acceptance
- State Acceptance
- Cost

As a result of initial screening conducted during the Focused Feasibility Study, the number of alternatives considered for the contaminated soils in the K Area were reduced from eleven to five. The eliminated alternatives and the primary reasons for their elimination may be found in the FFS. Five alternatives were selected for further detailed analysis (Table 7.1). The No Action alternative was retained as a baseline for the final evaluations. One alternative represents the no-action response, one alternative is limited action, one alternative is for containment response action, one alternative is a treatment technique, and one alternative incorporates an innovative technology. These alternatives are briefly described in the following sections.

7.1 NO ACTION RESPONSE

Alternative 1A:

No Action - Long-Term Monitoring

Capital Cost: $ 0

Annual Operation and Maintenance (O&M) Costs: $ 9355

Present Worth: $ 143,434

Time to Implement: 0 days

Alternative 1A is a no action alternative utilizing long-term groundwater monitoring. The "No Action" alternative is required to be evaluated at every site to establish a baseline for comparison with other alternatives being considered. This alternative involves taking no action to remediate contaminated media at operable unit one. Monitoring wells in the K Area would be sampled and the contaminant concentrations monitored over time for comparison with the health-based criteria developed in the SE Endangerment Assessment. Long-term groundwater monitoring would be conducted in compliance with EPA 40 CFR Chapter 264, Standards for the Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Subpart F, Part 264.100.

Table 7.1 Summary of Remedial Action Alternatives for DA Soils in the SE Area at LEAD for Detailed Analysis

Alternative	Technologies Used
1A. No Action	o Long-term groundwater monitoring only
1B. Limited Action	o Long-term groundwater monitoring o Institutional and land use controls
2C. Containment	o Multimedia cap
3D. Treatment - Thermal	o Excavate and treat onsite using high-temperature incineration
4A. Innovative Technologies	o Excavate and treat onsite using low-temperature thermal stripping

Note: DA = Disposal Area
LEAD = Letterkenny Army Depot
SE = Southeastern

Source: ESE, 1986b

Alternative 1B:

Limited Action - Long-Term Monitoring

Institutional and Land Use Controls

Capital Cost: $ 0

Annual Operation and Maintenance (O&M) Costs: $ 9355

Present Worth: $ 143,434

Time to Implement: 0 days

Alternative 1B is a limited action alternative using the long-term groundwater monitoring described in Alternative 1A coupled with institutional and land use controls. These controls would provide a measure of protection for human health and the environment by restricting the use of the groundwater and the surface water affected by the contamination resulting from the groundwater movement through the contaminated soils. Long-term groundwater monitoring would be conducted in compliance with EPA 40 CFR Chapter 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Subpart F, Part 264.100.

7.2 CONTAINMENT RESPONSE

Alternative 2C:

Containment - Multimedia Cap

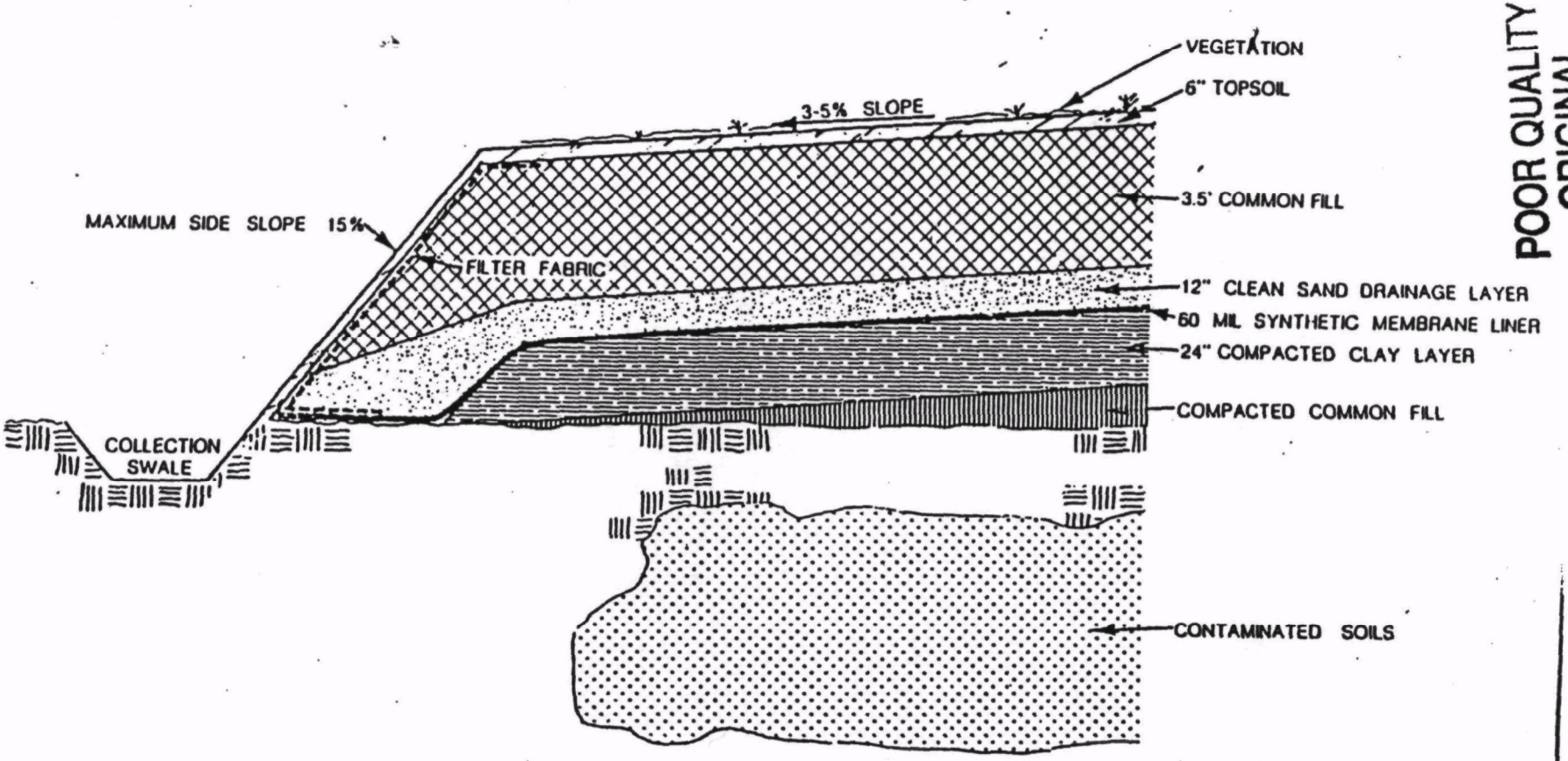
Capital Cost: $ 104,960

Annual Operation and Maintenance (O&M) Costs: $ 9705

Present Worth: $ 254,150

Time to Implement: 6 months

Alternative 2C is a multimedia cap designed to prevent the infiltration of rainfall and storm water into the contaminated zones. The contaminated soil would be left in place and a cap would be installed over the entire areas; area K-1 is 10,000 ft2 and are K-3 is 4000 ft2. A multimedia cap would consist of a 2foot clay liner overlain by a synthetic liner, a 1-foot sand layer for drainage, and 5 feet of soil cover (Figure 7.1). A separate cap would be designed for each of the areas, K-1 and K3. The caps would be designed to meet ARARs under the RCRA Landfill Closure



POOR QUALITY ORIGINAL

Figure 7.1
TYPICAL CROSS SECTION OF MULTIMEDIA CAP FOR THE DA AT LEAD

SOURCE: ESE, 1988b.

REMEDIAL INVESTIGATION FEASIBLITY STUDY
Letterkenny Army Depot

U.S. Army
Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

regulations in EPA 40 CFR Chapter 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Part 264.310 as well as the Pennsylvania groundwater and closure regulations outlined in Chapter 75.264.

7.3 THERMAL TREATMENT RESPONSE

Alternative 3D:

Thermal Treatment - High-Temperature Incineration

Capital Cost: $ 4,235,191

Annual Operation and Maintenance (O&M) Costs: $0

Present Worth: $ 4,235,191

Time to Implement: 90 days

The objective of this alternative is to excavate soils with concentrations above 225 ug/kg and provide thermal treatment of the contaminated soils to the lowest levels possible so that the ash can be used as clean backfill if there are no detectable levels of contamination remaining. The unit would consist of a rotary kiln with a secondary combustion chamber, packed tower, and jet scrubber. Approximately 8000 yd3 of contaminated soils would be excavated and incinerated onsite with this mobile unit (Area K-1: 10,000 ft2 x 18 ft deep; Area K-3: 4000 ft2 x 8 ft deep). Incineration rates would be maintained to ensure destruction efficiencies greater than 99.99 percent and to comply with particulate standards and VOC emissions guidelines. The ash resulting from the incineration would be used as backfill in the K-1 and K-3 areas. Due to the anticipated volume reduction of the soil from the incineration process, additional soils would be needed to complete the backfilling of the excavated areas. ARARs for this alternative include: Pennsylvania Title 25; Chapters 75 (Solid Waste Management Facilities Applying for a Permit and Incinerators), 271 (Municipal Waste Management), 273 (Municipal Waste Landfills), 123 (EPA PM-10 Standards), 127 (Construction, Modification, Reactivation, and Operation of Sources), 131 (Ambient Air Quality Standards), the PADER Air Toxic Guidelines, EPA 40 CFR Chapters 264 and 261, and technical guidelines for incinerators.

7.4 INNOVATIVE TECHNOLOGY RESPONSE

Alternative 4A:

Innovative Technologies - Low-Temperature Thermal Treatment

Capital Cost: $ 1,539,191

Annual Operation and Maintenance (O&M) Costs: $0

Present Worth: $ 1,539,191

Time to Implement: 70 days

The objective of this alternative is to reduce soil contaminant concentrations below the cleanup criteria of 225 ug/kg without posing additional risks as a result of air emissions. This alternative will excavate soils with concentrations above 225 ug/kg and provide thermal treatment of the contaminated soils to the lowest levels possible so that the ash can be used as clean backfill if there are no detectable levels of contamination remaining. A low-temperature thermal unit evaporates VOCs through the application of the contaminated soils to an indirect heat exchanger. This unit operates at temperatures up to 450oF to dry and heat the soils. Anticipated efficiency of this treatment technique is greater than 99.95 percent. The vaporized contaminants can either be destroyed through a secondary high-temperature combustor or collected through condensate or adsorption onto activated carbon (Figure 7.2). If activated carbon is utilized for emissions treatment, this carbon would be disposed of in accordance with RCRA regulations. Approximately 8000 yd^3 of soil would be excavated and treated onsite with this mobile unit. Once treated, the soils could be returned to the original excavation. ARARs for this alternative include: Pennsylvania Title 25; Chapters 75 (Solid Waste Management Facilities Applying for a Permit and Incinerators), 271 (Municipal Waste Management), 273 (Municipal Waste Landfills), 123 (EPA PM-10 Standards), 127 (Construction, Modification, Reactivation, and Operation of Sources), 131 (Ambient Air Quality Standards), the PADER Air Toxic Guidelines, EPA 40 CFR Chapters 264 and 261, and technical guidelines for incinerators. The Pennsylvania proposed Residual Waste Regulations, PA Bulletin Volume 20, Number 8, February 24, 1990, will govern handling and final disposition of the treated waste. In addition, the site will be capped in accordance with the PA Residual Waste Regulations.

8 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

CERCLA and the NCP dictate the use of the set of nine criteria to evaluate remedial action alternatives for a NPL site (Table 8.1). In this section, the evaluation criteria are briefly described and all five alternatives are compared to these criteria.

8.1 EVALUATION CRITERIA

These nine evaluation criteria are:

Threshold Criteria:

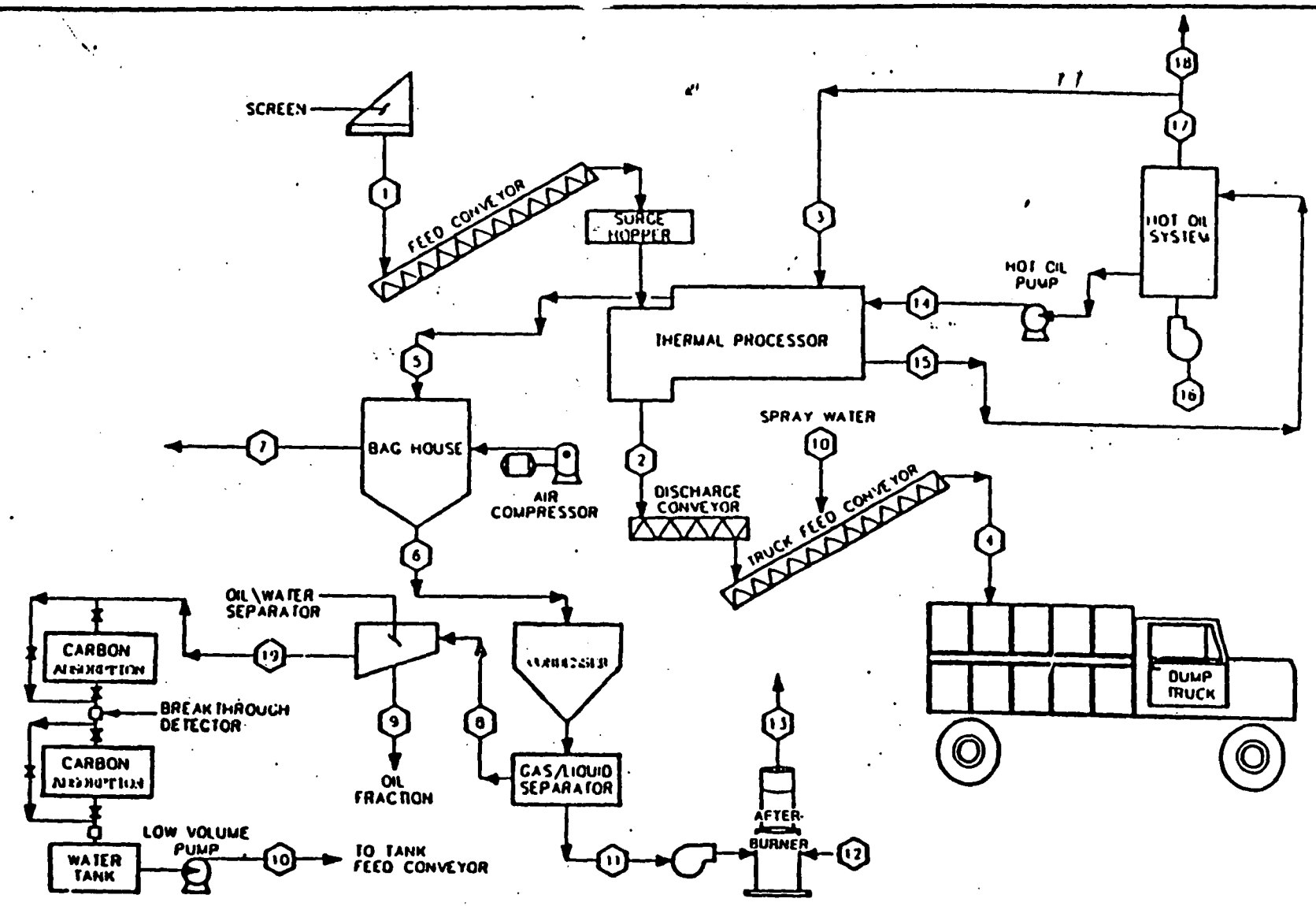


Figure 7.2
PROCESS SCHEMATIC FOR THE MOBILE LOW TEMPERATURE THERMAL TREATMENT SYSTEM

SOURCE: Weston, 1987.

REMEDIAL INVESTIGATION/ FEASIBILITY STUDY
Letterkenny Army Depot

U.S. Army
Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

Overall Protection of Human Health and the Environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

Compliance with ARARs addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of Federal and State environmental statutes and/or provide grounds for invoking a waiver.

Balancing Criteria:

Long-Term Effectiveness and Permanence refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

Reduction of Toxicity, Mobility, or Volume (TMV) Through Treatment is the anticipated performance of a treatment technology that may be employed in a remedy.

Short-Term Effectiveness refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.

Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

Cost includes capital, operation and maintenance costs, and present worth. An operating period of 30 years was selected to allow for comparison of alternatives.

Modifying Criteria:

State Acceptance indicates whether, based on its review of the FFS and the Proposed Plan for this operable unit, the State concurs with, opposes, or has no comment on the preferred alternative.

Community Acceptance is assessed in the Record of Decision for this operable unit following a review of the public comments received on the FFS and the Proposed Plan.

8.2 ANALYSIS OF ALTERNATIVES

Overall Protection of Human Health and the Environment. Alternatives 1A and 1B do not reduce contaminant concentrations in the groundwater, although 1B would provide information on migration

of contaminants and the potential threat to receptors. Alternative 2C would reduce the amount of infiltration into the contaminated soils which would potentially reduce the concentration and migration of contaminants. However, the level to which this alternative would reduce the groundwater concentrations is unknown. Alternatives 3D and 4A would both result in a reduction of VOC concentrations in the soils, with a resulting reduction in the groundwater concentrations.

Compliance with ARARs. Alternatives 1A and 1B would not achieve the ARARs for the contaminated soils based on the groundwater concentrations in the areas and the level of cleanup required for soil cleanup. Alternative 2C would not achieve soil cleanup ARARs for the source areas and this alternative would require additional testing to determine if it would reduce contaminant concentrations in the groundwater to acceptable chemical-specific ARARs. Alternatives 3D and 4A would be expected to result in achievement of soil ARARs for the source areas and therefore reduce the groundwater concentrations below the chemical-specific ARARs. Alternatives 3D and 4A would also comply with the necessary action-specific ARARs.

Long-Term Effectiveness and Permanence. With Alternative 2C, the long-term effectiveness of the cap to control the source is undetermined and the effect on the groundwater is also undetermined. By removing the contaminants from the soils, Alternatives 3D and 4A are highly effective in the long-term. These alternatives would necessitate excavation of the soils before the treatment could begin so that the performance of the treatment could be more easily monitored.

Reduction of Toxicity, Mobility, or Volume (TMV) Through Treatment. Alternative 2C would theoretically reduce the mobility of the contaminant by reducing the infiltration however, the level of mobility reduction is unknown. This alternative would not reduce the toxicity or the volume of the source. Alternatives 3D and 4A would both provide for substantial reduction in TMV of the contaminant in the soil using high-temperature incineration (3D) or low-temperature thermal treatment (4A) to achieve actual destruction of the contaminants.

Short-Term Effectiveness. In Alternative 2C, the installation of a cap would have an undetermined effect on the migration of contaminants, therefore the short-term effectiveness of this alternative is unknown. Alternatives 3D and 4A are both fairly effective in the short term. However, 4A would take the least time to implement which would result in greater short-term effectiveness.

Implementability. All alternatives utilize known technologies for which the necessary equipment and expertise is readily available. Therefore, no implementation problems are anticipated for any of the alternatives.

Cost. Alternative 2C has low capital, operation and maintenance (O&M) costs, and present worth costs. However, this alternative does not satisfy the other eight criteria. Alternatives 3D and 4A both fulfill the other criteria with 4A having lower capital and present worth costs ($1,539,191) than 3D ($4,235,191). Both 3D and 4A have no O&M costs associated with their implementation.

State Acceptance. State and federal acceptance of the preferred alternative was evaluated after PADER and EPA had reviewed and approved the Proposed Plan for the SE Area.

Community Acceptance. Community acceptance of the preferred alternative was evaluated after the public comment period on the Proposed Plan for the SE Area. The community acceptance is described in the Responsiveness Summary of this ROD.

Table 8.1 is a summary of the detailed analysis for the five alternatives which were considered for the contaminated soils in the K Area.

9 SELECTED REMEDY

The preferred alternative for OU1 is Alternative 4A, Innovative Technology. This alternative includes excavation and low-temperature thermal treatment of the contaminated soils. Based on current information, this remedial approach would appear to provide the best balance in meeting the nine evaluation criteria.

9.1 RATIONALE FOR SELECTION OF PREFERRED ALTERNATIVE

The final remedial action recommended for the contaminated soils in the K Area at LEAD is Alternative 4A, excavation and low-temperature thermal treatment of these soils. The selected remedy is comprised of:

a. Excavation of 8000 yd3 of contaminated soils according to the procedures outlined previously,

b. Thermal treatment of the contaminated soils at a temperature not to exceed 450°F,

c. Destruction of the volatilized contaminants by a secondary high-temperature combustor,

d. Chemical analysis of representative samples of the treated soils to ensure cleanup criteria are met,

e. Proper management of treated soils.

TABLE 8.1 Summary of Detailed Analysis of Remaining Alternatives for DA Soils

Alternative	Effectiveness Factors						Implementability Factors			Cost ($)		
	Protectiveness	ARARs	Reduction of TMV	Short-Term Effectiveness	Long-Term Effectiveness	Reliability	Technical Feasibility	Administrative Feasibility	Availability	Capital	OGM	Pre Wo
1A--No Action Long-term monitoring	Does not protect human health	Does not comply	No reduction in soils or groundwater	Will not achieve remedial action objectives	Risk associated with exposure to groundwater will not be reduced	Not reliable	No technical limitations; easy to implement and maintain	Approval for implementation may easily be obtained; however, community and agency support may be difficult to obtain since it does not protect human health	Technology, equipment, operators, and spare parts are readily available	0	9,355	145,43
1B--No Action Long-term monitoring, institutional/ land use controls	Does not protect human health	Does not comply	No reduction in soils or groundwater	Will not achieve remedial action objectives	Risk associated with exposure to groundwater will not be reduced	Not reliable	No technical limitations; easy to implement and maintain	Approval for implementation may easily be obtained; however, community and agency support may be difficult to obtain since it does not protect human health	Technology, equipment, operators, and spare parts are readily available	0	9,355	143,43

TABLE 8.1 Summary of Detailed Analysis of Remaining Alternatives for IA Soils (Continued, Page 2 of 2)

Alternative	Effectiveness Factors: Protectiveness	ARARs	Reduction of TMV	Short-Term Effectiveness	Long-Term Effectiveness	Reliability	Implementability Factors: Technical Feasibility	Administrative Feasibility	Availability	Cost ($): Capital	O&M	Present Worth
2C--Containment Multimedia cap	Level of protection is undetermined; pilot-or bench-scale test required to determine level of protection	Unknown if it will meet ARAR	Will reduce mobility; will not reduce toxicity or volume	Leach tests required to determine level of performance	Leach test and monitoring required to determine if risk is reduced	Reliable	Greater degree of difficulty due to construction; however, it is a well-demonstrated and widely used technology	Approval for implementation may easily be obtained; however, additional work may be required to demonstrate level of protection to obtain community and agency support	Technology, equipment, operators, and spare parts are readily available	104,960	9,705	254,50
3D--Treatment Onsite high-temperature incineration	Provides protection through removal of source and destruction of contaminants	Complies	Will reduce TMV	Achieves all remedial response objectives	Risk associated with groundwater exposure will be eliminated	Reliable	No technical limitations; however, personal protective gear may be required during excavation and operation	Coordination with state agency for air emissions required	Technology, equipment, operators, and spare parts are readily available	4,235,191	0	4,235,19
4A--Innovative low-temperature thermal stripping	Provides protection through removal of source and destruction of contaminants	Complies	Will reduce TMV	Achieves all remedial response objectives	Risk associated with groundwater exposure will be eliminated	Reliable	No technical limitations; however, personal protective gear may be required during excavation and operation	Coordination with state agency for air emissions required	Technology, equipment, operators, and spare parts are readily available	1,539,191	0	1,539,19

POOR QUALITY ORIGINAL

Figure 9.1 presents a diagram of the treatment system. The soils would be staged in an area adjacent to the treatment unit and would require approximately 2 acres.

Low-temperature thermal treatment of the contaminated soils would result in the achievement of the ARARs for the soils and ultimately for the groundwater in the K Area. The technology has been tested in the field and has proven successful in lowering contaminant concentrations in soils below ARAR levels. Also, the utilization of this alternative would meet the ARARs which were discussed during the description of the alternative. However, coordination with PADER would be necessary for the air emissions. This alternative is cost effective in that it is expected to meet the ARAR and response objectives for a comparable or lower present worth cost than most of the other treatment alternatives, and this alternative satisfies all other evaluation criteria. There are no O&M costs associated with this alternative and the present worth of this treatment ($1,539,191) is lower than alternative 3D, high temperature incineration, which is the only other acceptable alternative.

10 STATUTORY FINDINGS

Because this action is a final remedial action, it is necessary to achieve all requirements that would apply to a final action under CERCLA. The Army plans to remediate the contaminated soils in the K Area to cleanup levels that would eliminate the need for any further action with regards to the soils in this area. This action provides for the reduction and minimization of contaminant migration by treating the soils and thereby controlling the sources in the K Area.

10.1 PROTECTION OF HUMAN HEALTH AND ENVIRONMENT

As required by Section 121 of CERCLA, alternative 4A provides for the protection of human health and the environment by lowering the contaminant concentration in the soils and ultimately in the groundwater. The TMV of the contaminants in the soils and groundwater would be permanently and significantly reduced as a result of the implementation of this technology. This alternative would also be effective in the short-term as this method of treatment takes the least amount of time to implement. Although the exposure levels for this site are already within the EPA accepted range of 1×10^{-4} to 1×10^{-6} for risk, this treatment would reduce the exposure levels even further.

10.2 Compliance with ARARs

ARARs are provided to the Army by PADER and EPA Region III for

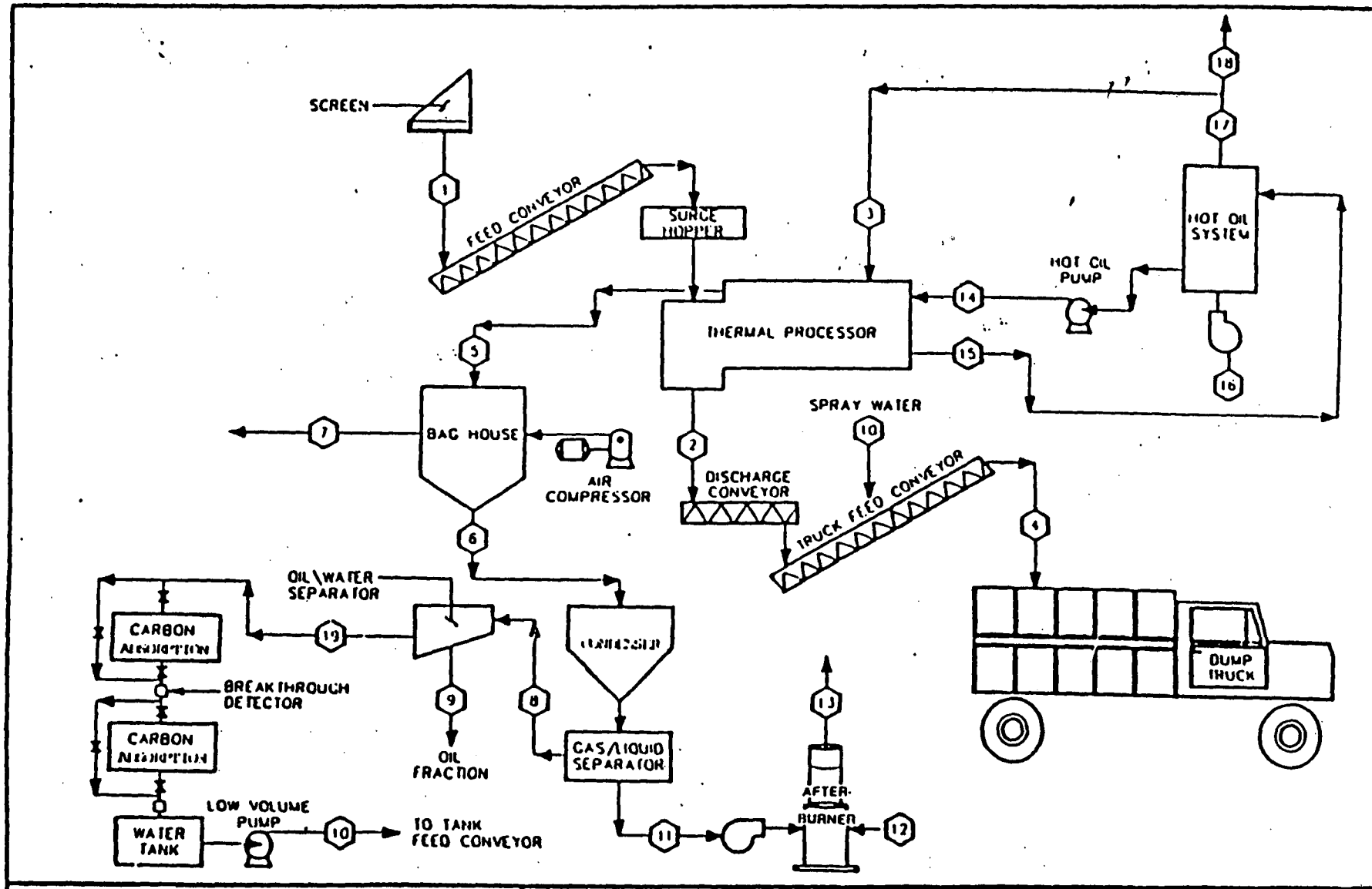


Figure 9.1
PROCESS SCHEMATIC FOR THE MOBILE LOW TEMPERATURE THERMAL TREATMENT SYSTEM

SOURCE: Weston, 1987.

REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
Letterkenny Army Depot

U.S. Army
Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland

POOR QUALITY ORIGINAL

the soil and air emissions from the low-temperature thermal treatment unit. The air emissions from this treatment will be controlled by either a secondary high-temperature combustor or activated carbon so that attainment with applicable Federal and state air regulations will be achieved. The generation of any wastes from the implementation of this alternative will also be managed according to applicable Federal and state regulations. Federal ARARs are not available for the indicator contaminants in the soil; however, the State ARAR for the indicator contaminants in soils is that the soils must be cleaned up to the extent necessary to meet the groundwater cleanup. The State ARAR for groundwater is background. Therefore, the source soils in the K Area must be remediated to levels which will provide that the Pennsylvania groundwater ARARs are met. Selection of this action does not expressly or otherwise waive the Pennsylvania ARAR for groundwater which requires that groundwater be remediated to background levels. Evaluation of the risks to and posed by the groundwater is ongoing and will be addressed in Operable Unit 3.

Because this action is being performed under CERCLA, formal permits for discharges to air and operation of a waste treatment facility are not required. However, PADER and EPA technical requirements for these permits will be established and met during the performance of this final remedial action.

10.3 COST-EFFECTIVENESS

This action has been determined to be cost-effective in that it achieves the remedial action objectives and meets the best balance of the evaluation criteria at the least cost.

10.4 UTILIZATION OF PERMANENT SOLUTIONS

This alternative achieves a long-term permanent solution and utilizes an innpvative treatment technology to the maximum extent possible. In addition, the planned final remedial action satifies the statutory preference for employing treatment which will significantly reduce the mobility, toxicity, and volume of contaminated soil. Approximately, 8,000 yd3 will be excavated, treated, and returned to the site. Removal efficiencies of approximately 97.00 percent to 99.95 percent are expected for this planned final remedial action. This treatment method uses a known technology for which the equipment and expertise is readily available, and this technology is cost-effective.

The removal of the contaminants will be realized with this planned final remedial action. This alternative will reduce the risks associated with the groundwater exposure since this method will destroy nearly all of the VOC contaminants in the soil. Therefore, the short-term and longterm effectiveness of the

treatment is realized.

The short-term effectiveness and the reduction of the TMV were regarded as the most decisive factors in the selection process.

This action is a final ROD action for the contaminated soils in the K Area as it is a permanent solution. Implementation of this alternative will contribute to the overall final remedial action in the SE Area which will be concerned with the contaminated groundwater in this area. Low-temperature thermal treatment meets the statutory requirement to utilize permanent solutions and treatment technologies to the maximum extent practicable.

3. RESPONSIVENESS SUMMARY

This Responsiveness Summary documents concerns and comments regarding proposed remedial actions for K-Area Operable Unit One as expressed to the United States Department of Army by members of the community surrounding the site. The remarks were presented during the public comment period, and they addressed the Army's FFS and Proposed Plan to remediate contaminated soils at the K-Area of the Letterkenny Army Depot.

a. Summary Community Involvement

Community relations activities at LEAD to date have included review and coordination meetings with federal and state regulatory agency personnel; site visits and/or meetings with elected federal, state and local officials; news releases to the local media; and direct contact with nearby property owners through the offsite well sampling program and subsequent bottled-water provisions and connection to the Guilford Water Authority (GWA).

Meetings with regulatory agency personnel have been conducted regularly and are held with representatives from LEAD, USATHAMA, the Pennsylvania Department of Environmental Resources (PADER), EPA Region III, Department of the Army, U.S. Army Materiel Command (AMC), and Depot Systems Command (DESCOM). Topics of discussion at these meetings generally included review of project status, review of new technical information, resolution of problem areas, and direction and schedule for further studies. In addition to the formal meetings, LEAD, USATHAMA, PADER, and EPA personnel maintain frequent telephone contact on an as-needed basis.

Site visits to LEAD have been made by representatives of USATHAMA, PADER, EPA Region III, and USATHAMA contractors. Numerous site visits by PADER representatives have allowed consistent communications and cooperation between LEAD and PADER. Formal and informal project briefings and/or site visits have also been held with local and township officials and state representatives and senators.

At various times since June 1982, formal news releases have been issued by LEAD concerning the groundwater contamination problem. The timing of these releases has generally coincided with the availability of significant results from the onpost and offpost contamination surveys and with the occurrence of status review meetings between LEAD, USATHAMA, EPA and PADER. The news releases have provided the local media and general public with information on the status and results of the contamination surveys, ongoing actions to protect public health, and plans and schedules for additional activities.

Numerous articles have been published in local and regional newspapers concerning the contamination problem at LEAD since the problem was first identified in mid-1982. Topics covered in the articles has ranged from informational reports on the results of the technical environmental surveys to interviews with affected residents and their concerns on the problem.

Public involvement activities regarding the LEAD contamination problem also have involved direct contact and communication with local property owners, businesses, churches and residents. LEAD held four local news conferences in 1982 to directly brief local citizens, media and officials regarding the contamination problem. A news conference was also held at LEAD in August 1985 in conjunction with the pilot thermal stripping project. The technology presented during that news conference is the forerunner to the technology being proposed for remediation of the K Area soils. Contact with the local citizens also has been made in conjunction with the offsite well sampling program, which was initiated in certain adjacent areas in mid-1982. Local residents who have been affected by contamination of their potable wells have had contact and communication with LEAD through the Army's program to provide bottled water and, ultimately, connection to GWA. These contacts have included letters to and meetings with residents with affected potable wells.

Since the groundwater contamination problem at LEAD was identified in mid-1982, overall public interest and concern with the problem has been relatively high. Identified community interest and concern with the problem has involved primarily citizens residing in the potentially affected areas adjacent to LEAD and the local Chambersburg area. Interest in the contamination problem at LEAD outside the local area primarily involves EPA Region III and PADER as part of their regulatory programs, and state and federal elected officials representing the local citizens.

Currently, the primary community concerns identified at LEAD pertain to the contamination of groundwater and the safety of drinking water. Local concerns with the contamination problem have been significant since contamination levels in some offpost drinking water wells were found at higher levels than the recommended human health criteria. The local residents affected by the groundwater contamination are satisfied since they are now connected to GWA. However, many residents interviewed indicated displeasure with the length of time it took the Army to provide them with clean water.

More than 9 years have passed since the problem was initially identified, and, as may be expected, a number of community concerns have been expressed in association with the groundwater contamination problem. These concerns include the following:

- Desire to know if well water will be safe to use again in the future;
- Potential long-term health effects that may have occurred prior to knowing about the problem;
- Concern about fairness in water bill settlements;
- Concern regarding amount of money spent on research and studies instead of corrective actions;
- Concern that contamination will continue to spread;
- Schedule or expediency of efforts to remedy problem;
- Effectiveness of remedial actions; and
- Devaluation of property.

The Army, through public meeting, news conferences and news releases, has provided the local community with all available information to address the concerns raised over the contamination problem. The Technical Review Committee (TRC) established in conjunction with the LEAD installation restoration program includes representatives of the city of Chambersburg, Greene Township, Franklin County, and Southampton County. The TRC was established to provide a forum to address public concerns and questions and to keep the public informed of installation restoration activities at LEAD.

c. Summary of Public Comments and Responses

No written comments were received during the public comment period for the Proposed Plan. The comment period was held from April 6, 1991 through May 20, 1991. Also, there was only limited participation at the public meeting held on May 14, 1991 to discuss the Proposed Plan. No specific comments or concerns were raised at the public meeting dealing specifically with the Proposed Plan for the PDO Area Source Areas. Two main comments raised during the meeting are summarized below along with discussion that followed:

1. One citizen was concerned about the overall higher rate of cancer for residents within the area surrounding Chambersburg and inquired if the contamination problems at LEAD could be the cause.

Response: While this was outside the scope of the Proposed Plan in question, the Army provided a brief explanation of the risk factors associated with the contamination at the K Areas and the PDO Area source areas and available pathways from the site to offpost residents. The low contamination levels, coupled with the limited pathways to the offpost residents makes it unlikely that any such increase in cancer could be linked to the environmental problems at LEAD.

2. Another citizen raised a concern over the metals

contamination in the soils and the absence of a plan for treatment of the metals in the Proposed Plan.

Reponse: Army representatives explained that the metals contamination in the soils have been stabilized by the clayey soils. Metals have not been detected in the groundwater at the site and are, therefore, not considered a threat to the environment. It was further explained that the treated soils will be analyzed to determine if thermal treatment effects the ability of the clayey soils to stabilize the metals, thereby creating a potential leaching problem, prior to placement of the soils into the excavations.

d. Remaining Concerns

All concerns raised during the public meeting were addressed to the satisfaction of all in attendance.