

USATHAMA

U.S. Army Toxic and Hazardous Materials Agency

VOLUME I

JEFFERSON PROVING GROUND
SOUTH OF THE FIRING LINE

FINAL TECHNICAL PLAN

Prepared For:

U.S. ARMY TOXIC AND
HAZARDOUS MATERIALS AGENCY (USATHAMA)
ABERDEEN PROVING GROUND, MARYLAND

CONTRACT NO. DAAA-90-Q-0265

Prepared By:

SEC DONOHUE, INC.
GRAND JUNCTION, COLORADO

SEPTEMBER 1992

DTIC QUALITY INSPECTED 1



Jefferson Proving Ground
South of the Firing Line
RI/FS Technical Plan
Volume I

September 1992

SEC Donohue, Inc.
Grand Junction, Colorado 81506

Distribution unlimited approved for public release.

Prepared for
U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland 21010-5401
Under Contract No. DAAA15-90-D-0007

19980807 129

Contents

	<u>Page</u>
1.0 INTRODUCTION	1
1.1 Plan Organization	2
1.2 Scope of Work	2
2.0 SITE BACKGROUND AND ENVIRONMENTAL SETTING	6
2.1 Location	6
2.2 Site History	6
2.3 Previous Investigations	9
2.4 Environmental Setting	10
2.4.1 Physiography	10
2.4.2 Climate	10
2.4.3 Geology	11
2.4.4 Hydrology	11
2.5 Land Use/Demography	15
3.0 REGULATORY SETTING	17
4.0 CONCEPTUAL SITE MODELS	24
4.1 Building 185 Incinerator	24
4.1.1 Potential Contaminant Sources	24
4.1.2 Evaluation of Contaminant Pathways	26
4.1.3 Evaluation of Existing Data	26
4.2 Water Quality Laboratory	27
4.2.1 Potential Contaminant Sources	27
4.2.2 Evaluation of Contaminant Pathways	27
4.2.3 Evaluation of Existing Data	27
4.3 Building 177 Sewage Treatment Plant	27
4.3.1 Potential Contaminant Sources	27
4.3.2 Evaluation of Contaminant Pathways	28
4.3.3 Evaluation of Existing Data	28
4.4 Explosive Burning Area	29
4.4.1 Potential Contaminant Sources	29
4.4.2 Evaluation of Contaminant Pathways	29
4.4.3 Evaluation of Existing Data	29
4.5 Abandoned Landfill	29
4.5.1 Potential Contaminant Sources	29
4.5.2 Evaluation of Contaminant Pathways	31
4.5.3 Evaluation of Existing Data	31
4.6 Wood-Storage Pile and Wood-Burning Area	31
4.6.1 Potential Contaminant Sources	31
4.6.2 Evaluation of Contaminant Pathways	33

Contents (continued)

	<u>Page</u>
4.6.3 Evaluation of Existing Data	33
4.7 Red Lead Disposal Area	33
4.7.1 Potential Contaminant Sources	33
4.7.2 Evaluation of Contaminant Pathways	33
4.7.3 Evaluation of Existing Data	33
4.8 Photographic Laboratory	33
4.8.1 Potential Contaminant Sources	33
4.8.2 Evaluation of Contaminant Pathways	36
4.8.3 Evaluation of Existing Data	36
4.9 Building 333 Incinerator (New)	36
4.9.1 Potential Contaminant Sources	36
4.9.2 Evaluation of Contaminant Pathways	38
4.9.3 Evaluation of Existing Data	38
4.10 Small Arms Firing Range	38
4.10.1 Potential Contaminant Sources	38
4.10.2 Evaluation of Contaminant Pathways	38
4.10.3 Evaluation of Existing Data	40
4.11 Burning Ground (South of Gate 19 Landfill)	40
4.11.1 Potential Contaminant Sources	40
4.11.2 Evaluation of Contaminant Pathways	40
4.11.3 Evaluation of Existing Data	40
4.12 Gate 19 Landfill	42
4.12.1 Potential Contaminant Sources	42
4.12.2 Evaluation of Contaminant Pathways	42
4.12.3 Evaluation of Existing Data	42
4.13 Burning Area for Explosive Residue	43
4.13.1 Potential Contaminant Sources	43
4.13.2 Evaluation of Contaminant Pathways	45
4.13.3 Evaluation of Existing Data	45
4.14 Building 602, 617, and 279 Solvent Pits	45
4.14.1 Potential Contaminant Sources	45
4.14.2 Evaluation of Contaminant Pathways	49
4.14.3 Evaluation of Existing Data	49
4.15 Old Fire Training Pit	50
4.15.1 Potential Contaminant Sources	50
4.15.2 Evaluation of Contaminant Pathways	50
4.15.3 Evaluation of Existing Data	50
4.16 Temporary Storage Areas (Buildings 105, 186, 204, 211, and 227)	52
4.16.1 Potential Contaminant Sources	52
4.16.2 Evaluation of Contaminant Pathways	53

Contents (continued)

	<u>Page</u>
4.16.3 Evaluation of Existing Data	53
4.17 Temporary Waste Storage Areas (Buildings 279 and 305)	
4.17.1 Potential Contaminant Sources	54
4.17.2 Evaluation of Contaminant Pathways	54
4.17.3 Evaluation of Existing Data	55
4.18 Yellow Sulfur Disposal Area	55
4.18.1 Potential Contaminant Sources	55
4.18.2 Evaluation of Contaminant Pathways	55
4.18.3 Evaluation of Existing Data	57
4.19 Burn Area South of New Incinerator	57
4.19.1 Potential Contaminant Sources	57
4.19.2 Evaluation of Contaminant Pathways	57
4.19.3 Evaluation of Existing Data	57
4.20 Potential Ammo Dump Site	57
4.20.1 Potential Contaminant Sources	57
4.20.2 Evaluation of Contaminant Pathways	60
4.20.3 Evaluation of Existing Data	60
4.21 Asbestos-Containing Materials	60
4.21.1 Potential Contaminant Sources	60
4.21.2 Evaluation of Contaminant Pathways	60
4.21.3 Evaluation of Existing Data	60
4.22 Underground Storage Tanks	61
4.22.1 Potential Contaminant Sources	61
4.22.2 Evaluation of Contaminant Pathways	61
4.22.3 Evaluation of Existing Data	61
4.23 Off-Site Water Supply Wells	61
4.23.1 Potential Contaminant Sources	61
4.23.2 Evaluation of Contaminant Pathways	66
4.23.3 Evaluation of Existing Data	66
5.0 DATA NEEDS, DATA QUALITY OBJECTIVES, AND TECHNICAL APPROACH	66
5.1 Building 185 Incinerator	67
5.1.1 Data Needs	67
5.1.2 Data Quality Objectives	67
5.1.3 Technical Approach	67
5.2 Building 177 Sewage Treatment Plant	67
5.2.1 Data Needs	67
5.2.2 Data Quality Objectives	69
5.2.3 Technical Approach	69

Contents (continued)

	<u>Page</u>
5.3 Explosive Burning Area	69
5.3.1 Data Needs	69
5.3.2 Data Quality Objectives	70
5.3.3 Technical Approach	70
5.4 Abandoned Landfill	70
5.4.1 Data Needs	70
5.4.2 Data Quality Objectives	71
5.4.3 Technical Approach	71
5.5 Wood-Storage Pile and Wood-Burning Area	71
5.5.1 Data Needs	71
5.5.2 Data Quality Objectives	72
5.5.3 Technical Approach	72
5.6 Red Lead Disposal Area	72
5.6.1 Data Needs	72
5.6.2 Data Quality Objectives	72
5.6.3 Technical Approach	73
5.7 Small Arms Firing Range	73
5.7.1 Data Needs	73
5.7.2 Data Quality Objectives	73
5.7.3 Technical Approach	74
5.8 Burning Ground (South of Gate 19 Landfill)	74
5.8.1 Data Needs	74
5.8.2 Data Quality Objectives	74
5.8.3 Technical Approach	75
5.9 Gate 19 Landfill	75
5.9.1 Data Needs	75
5.9.2 Data Quality Objectives	76
5.9.3 Technical Approach	76
5.10 Burning Area For Explosive Residue	77
5.10.1 Data Needs	77
5.10.2 Data Quality Objectives	77
5.10.3 Technical Approach	77
5.11 Building Solvent Pits (Buildings 602, 617, and 279)	78
5.11.1 Data Needs	78
5.11.2 Data Quality Objectives	78
5.11.3 Technical Approach	79
5.12 Old Fire Training Pit	79
5.12.1 Data Needs	79
5.12.2 Data Quality Objectives	79
5.12.3 Technical Approach	80

Contents (continued)

	<u>Page</u>
5.13 Temporary Storage Areas (Buildings 105, 186, 204, 211, and 227)	80
5.13.1 Data Needs	80
5.13.2 Data Quality Objectives	80
5.13.3 Technical Approach	80
5.14 Temporary Waste Storage Areas (Buildings 279 and 305)	82
5.14.1 Data Needs	82
5.14.2 Data Quality Objectives	82
5.14.3 Technical Approach	82
5.15 Yellow Sulfur Disposal Area	82
5.15.1 Data Needs	82
5.15.2 Data Quality Objectives	84
5.15.3 Technical Approach	84
5.16 Burn Area South of New Incinerator	85
5.16.1 Data Needs	85
5.16.2 Data Quality Objectives	85
5.16.3 Technical Approach	85
5.17 Asbestos Containing Materials	86
5.17.1 Data Needs	86
5.17.2 Data Quality Objectives	86
5.17.3 Technical Approach	86
5.18 Underground Storage Tanks	87
5.18.1 Data Needs	87
5.18.2 Data Quality Objectives	87
5.18.3 Technical Approach	87
5.19 Potential Ammo Dump Site	87
5.19.1 Data Needs	87
5.19.2 Data Quality Objectives	88
5.19.3 Technical Approach	88
5.20 Off-Site Water Supply Wells	88
5.20.1 Data Needs	88
5.20.2 Data Quality Objectives	88
5.20.3 Technical Approach	88
5.21 Groundwater System South of the Firing Line	89
5.21.1 Data Needs	89
5.21.2 Data Quality Objectives	89
5.21.3 Technical Approach	89
6.0 RI WORK TASKS	89
6.1 Task 1 - Project Planning	89
6.1.1 Subtask 1 - Technical Plan	90

Contents (continued)

	<u>Page</u>
6.1.2 Subtask 2 - Sampling Design Plan	90
6.1.3 Subtask 3 - Quality Control Plan	90
6.1.4 Subtask 4 - Health and Safety Plan	90
6.2 Task 2 - Field Investigations	91
6.3 Task 3 - Sample Analysis/Validation	91
6.4 Task 4 - Data Evaluation	91
6.5 Task 5 - Assessment of Risks	93
6.6 RI Report	94
6.7 Task 6 - Alternative Development and Screening	95
6.7.1 Interim Remedial Action	95
6.7.2 Developing a Range of Remedial Action Alternatives	95
6.7.3 Alternative Screening	96
6.7.4 Detailed Analysis of Alternatives	96
6.7.5 Proposed Plan	97
6.7.6 Decision Document/Responsiveness Summary	97
7.0 PROJECT SCHEDULE	98
8.0 REFERENCES	100

Appendices

APPENDIX A.	Inspection for Asbestos Exposure Assessment	A-1
B.	Analytical Results of Petroleum Contaminated Soil Samples Collected from UST Locations	B-1

Figures

	<u>Page</u>
FIGURE 1. Previously Identified SWMUs at Jefferson Proving Ground	3
2. Location Map of Jefferson Proving Ground	7
3. Location Map of RI/FS Sites South of the Firing Line, Jefferson Proving Ground, Indiana	8
4. Soil Associations of Jefferson Proving Ground	14
5. Stream Drainages at Jefferson Proving Ground	16
6. Location of Building 185 Incinerator, Water Quality Laboratory, and Sewage Treatment Plant	25
7. Location of the Explosives Burn Area and the Abandoned Landfill	28
8. Location of the Wood-Storage Pile and the Wood-Burning Area	32
9. Location of the Red Lead Disposal Area	34
10. Location of the Building 208 Main Photographic Laboratory	35
11. Location of Building 333 Incinerator	37
12. Location of the Building 295 Small Arms Indoor Range	39
13. Location of the Gate 19 Landfill and Burning Ground South of the Gate 19 Landfill	41
14. Location Map of Open Burning Area for Explosive Residue	44
15. Location of Building 602, Solvent Disposal Pit	46
16. Location of Building 617, Solvent Disposal Pit	47
17. Location of Building 279, Solvent Disposal Pit	48
18. Location of Old Fire Training Pit	51
19. Location of Yellow Sulfur Disposal Area	56
20. Location of Burning Area Southwest (SW) of Building 333 (New Incinerator)	58
21. Approximate Location of the Potential Ammo Dump Site	59
22. Off-Site Water Wells at JPG	62
23. Temporary Storage Areas at JPG	81
24. Temporary Waste Storage Areas	83

Tables

Table 1.	Sites Known or Suspected To Contain Contaminants at JPG South of the Firing Line	4
2.	MSP-Identified Sites Not Specified in Task Order 0005	5
3.	General Soil Characteristics of JPG	12
4.	Preliminary ARARS for JPG	18
5.	Wastes Stored at Facility-Support Buildings at JPG	52
6.	JPG Undergorund Fuel Storage Tanks	63
7.	USATHAMA Methods Correlation to EPA Methods	68
7.	Summary of Proposed RI/FS Field Activities	92
8.	Proposed Work Schedule	99

Acronyms and Abbreviations

AHERA	Asbestos Hazardous Emergency Response Act
ARARs	Applicable or Relevant and Appropriate Requirements
AREEs	Areas Requiring Environmental Evaluation
BTEX	benzene, toluene, ethylbenzene, and xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
DU	depleted uranium
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
GPR	ground-penetrating radar
HSP	Health and Safety Plan
IRP	Installation Restoration Program
JPG	Jefferson Proving Ground
MCL	Maximum Contaminant Level
MEP	Master Environmental Plan
MSDS	Material Safety Data Sheets
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Health and Safety Administration
PbO	red lead
PCP	pentachlorophenol
PID	photoionization detector
QA/QC	quality assurance/quality control
QCP	Quality Control Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
SARA	Superfund Amendments and Reauthorization Act
SDP	Sampling Design Plan
semi-VOCs	semi-Volatile Organic Compounds
SSSA	Site Specific Sampling and Analysis
SWMU	Solid Waste Management Units
TCE	trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
TPH	total petroleum hydrocarbons
TSD	treatment storage disposal
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USTs	Underground Storage Tanks
UXO	Unexploded Ordnance
VOCs	Volatile Organic Compounds

1.0 INTRODUCTION

This Remedial Investigation/Feasibility Study (RI/FS) Technical Plan outlines the overall approach and defines the activities required to provide a comprehensive study of previously identified sites (including 22 Solid Waste Management Units (SWMUs)) and 3 additional sites (the yellow sulfur disposal area, the burn area south of the new incinerator, and the potential ammo dump site) at the U.S. Army Jefferson Proving Ground (JPG) in Madison, Indiana. The Work Plans were developed and provided to the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) under Contract No. DAAA15-90-D-0007, Task Order 0002. The RI/FS work is being performed in support of USATHAMA under Contract No. DAAA15-90-D-0007, Task Order 0005. The sites to be characterized under this plan generally represent those sites located in the area south of the Firing Line that require additional studies to satisfy the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by The Superfund Amendments and Reauthorization Act (SARA 1986), the National Contingency Plan (NCP, see 40 CFR 300), and the National Environmental Policy Act (NEPA). The RI/FS to be conducted is required to:

- define extent and magnitude of environmental contamination at JPG in the area south of the firing line,
- assess human health and environmental risk associated with contamination at the identified sites at JPG,
- determine needs for remedial action at JPG, and
- develop and evaluate remedial action alternatives.

This Technical Plan has been designated Volume I. In addition to this plan, the following supporting documents have also been prepared:

- Sampling Design Plan (Volume II).
- Quality Control Plan (Volume III).
- Health and Safety Plan (Volume IV).

Although there have been previous environmental investigations performed at JPG, little to no site-characterization work has been conducted; therefore, data concerning the presence and extent of contamination are lacking. This Work Plan describes the work tasks necessary to provide site-characterization information to support the completion of an assessment of risk to human health and the environment, to complete a Feasibility Study of remedial action alternatives, and to ensure JPG compliance with applicable federal and state laws and regulations.

The Base Realignment and Closure Commission established by the Secretary of Defense in 1988 recommended the closure of JPG. As part of this closure process, the Army proposes to conduct the RI/FS outlined in this plan to evaluate the area south of the firing line and

perform cleanup activities as required. Closure activities were estimated to be completed in 1995. Initiation of RI/FS activities north of the firing line was deferred pending more definitive land reuse planning.

1.1 Plan Organization

This plan, designated *Volume I, Remedial Investigation/Feasibility Study Technical Plan*, provides the overall plan for conducting an RI/FS for the south portion of JPG. Details of sampling and analysis, quality assurance, and health and safety procedures are presented in the accompanying documents (Volumes II through IV, respectively). The Work Plan is organized as follows:

- Section 1.0 Introduction
- Section 2.0 Site Background and Environmental Setting
- Section 3.0 Regulatory Setting
- Section 4.0 Conceptual Site Models
- Section 5.0 Data Needs, Quality Objectives and Technical Approach
- Section 6.0 RI Work Tasks
- Section 7.0 Estimated Schedule/Task Durations
- Section 8.0 References

1.2 Scope of Work

As previously stated, the scope of the RI/FS at JPG is limited to those sites identified in the area south of the Firing Line that are known or suspected to contain contaminants with the potential for affecting human health or the environment. These sites include the following SWMUs identified in the Master Environmental Plan (MEP) and specified in the Task Order 0005 statement of work as shown in Table 1. Other previously identified SWMUs located north of the firing line that are not included in the current RI/FS for JPG are shown in Table 2. All of the previously identified SWMUs are shown in Figure 1.

Additional sites that have been added to the RI/FS based on initial environmental studies or facility-wide investigations include:

- Yellow Sulfur Disposal Area—Site Number 14
- Burn Area South of New Incinerator—Site Number 15
- Potential Ammo Dump Site—Site Number 16
- Asbestos Containing Materials—Site Number 17
- Underground Storage Tanks—Site Number 18
- Off-site Water Supply Wells—Site Number 19

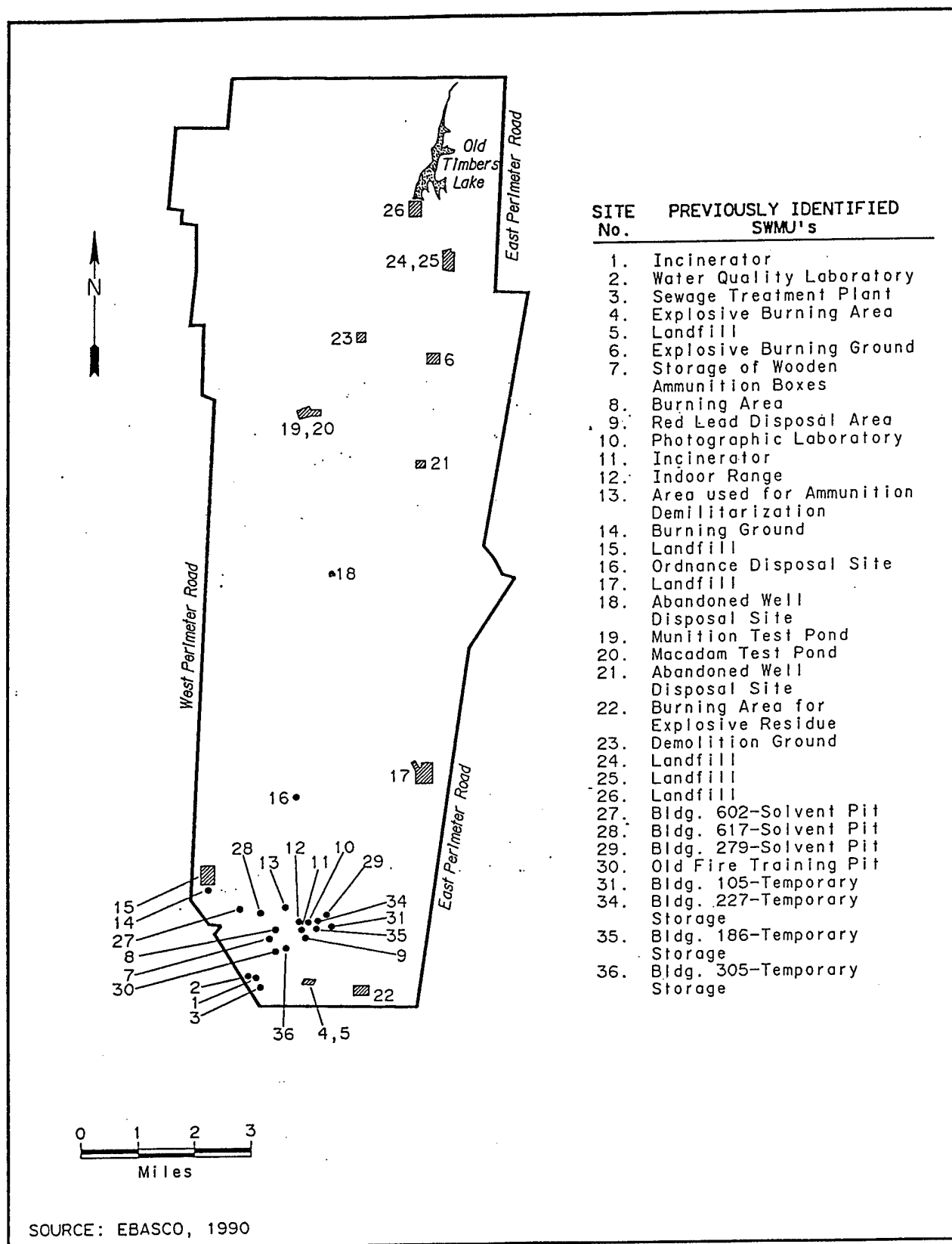


Figure 1. Previously Identified SWMUs at Jefferson Proving Ground

*Table 1. Sites Known or Suspected To Contain Contaminants
at JPG South of the Firing Line*

Task Order Site No. ^a	MEP Site No.	Name
1	1	Building 185 Incinerator (old)
NA ^b	2	Water Quality Laboratory
2	3	Building 177 Sewage Treatment Plant
3	4	Explosive Burning Area
4	5	Landfill
5	7	Wood Storage Pile
6	8	Wood Burning Area
7	9	Red Lead Disposal Area
NA	10	Photographic Laboratory
NA	11	Building 333 Incinerator (new)
8	12	Small arms indoor range
9	14	Burning Ground (South of Gate 19 Landfill)
10	15	Gate 19 Landfill
11	22	Burning Area for Explosive Residue
12	27	Building 602 Solvent Pit
12	28	Building 617 Solvent Pit
12	29	Building 279 Solvent Pit
13	30	Old Fire Training Pit
21	31	Building 105 Temporary Storage
21	35	Building 186 Temporary Storage
21	NA	Building 204 Temporary Storage
21	NA	Building 211 Temporary Storage
21	34	Building 227 Temporary Storage
20	NA	Building 279 Temporary Waste Storage
20	36	Building 305 Temporary Waste Storage

^aWill be used in place of the corresponding MEP site numbers.

^bNot available; the site was not listed in the respective document.

Table 2. MEP-Identified Sites Not Specified in Task Order 0005

MEP Site No.	Name
6	Explosive Burning Ground
13	Ammunition Demilitarization Area
16	Ordnance Disposal Site
17	Landfill
18	Abandoned Well
19	Munition Test Pond
20	Macadam Test Pond
21	Abandoned Well Disposal Site
23	Demolition Ground
24	Landfill
25	Landfill
26	Landfill

The work described in this plan and the accompanying plans are based on an initial evaluation of the results of previous investigations, wherein data gaps were identified. Individual work tasks are described in this document with respect to specific rationale, objectives, and technical approach to be used to fill these data gaps. All work tasks will be designed to provide information that will satisfy any standard requirements, criteria, or limitations promulgated under federal or State of Indiana environmental laws that apply to JPG. These include, but are not limited to:

- The Safe Drinking Water Act [42 U.S.C. 30 et seq]
- The Toxic Substances Control Act [15 U.S.C. 2601 et seq]
- The Clean Air Act [42 U.S.C. 7401 et seq]
- The Clean Water Act [33 U.S.C. 1251 et seq]
- The Solid Waste Disposal Act [42 U.S.C. 6901 et seq]
- Endangered Species Act [16 U.S.C 1531 et seq]
- State laws that are more stringent than the equivalent Federal Standard

A more comprehensive list of potentially applicable or relevant and appropriate requirements (ARARs) is presented in Section 3.0 of this plan.

2.0 SITE BACKGROUND AND ENVIRONMENTAL SETTING

2.1 Location

JPG occupies 55,265 acres of land along U.S. Highway 421 north of Madison, Indiana (Figure 2). The facility is located in portions of three counties (Ripley, Jennings, and Jefferson Counties). The installation is approximately 18 miles long (north-south) and 5 miles wide (east-west). The major portion of JPG is wooded. Industrial buildings and workshops as well as administrative buildings and personnel housing are located in the southern portion of the facility. A line of 268 gun positions run east-west across the southern portion of JPG. Weapons are fired at targets located to the north of these gun positions. It is the immediate area of the gun positions that is referred to as the Firing Line (see Figure 3). In addition to the gun positions, there are 50 impact areas, 13 permanent test complexes, and 7 ammunition assembly plants. The sites of investigation are shown on Figure 3 and are referenced by the Task Order Numbers listed in Section 1.2.

2.2 Site History

JPG has been used as a testing proving ground since May 1941. A wide assortment of conventional munitions and weapons have been tested at the facility. These include propellants, projectiles, cartridges, mortars, grenades, fuses, primers, boosters, rockets, tank ammunition, mines, and weapon components. The mission of JPG has been to plan and conduct production acceptance tests, reconditioning tests, surveillance tests, and other studies of ammunition and weapons systems.

Past and present activities at JPG have resulted in the detonation, burning, and disposal of many types of waste propellants, explosives, and pyrotechnic substances at the facility. These activities have resulted in the generation of several physically and chemically hazardous substances throughout the facility. Physical hazards involve mainly unexploded ordnance (UXO). Chemically hazardous substances include various explosive compounds, waste propellants, lead, chlorinated solvents, wood preservatives, sulfur, silver, photographic development wastes, sanitary wastes, and petroleum products. Some of these wastes are known to have been released into the soil. As a result, the groundwater and surface-water pathways may have also been contaminated. Previous environmental investigations have been limited in scope and have not adequately characterized the nature and extent of contamination at JPG.

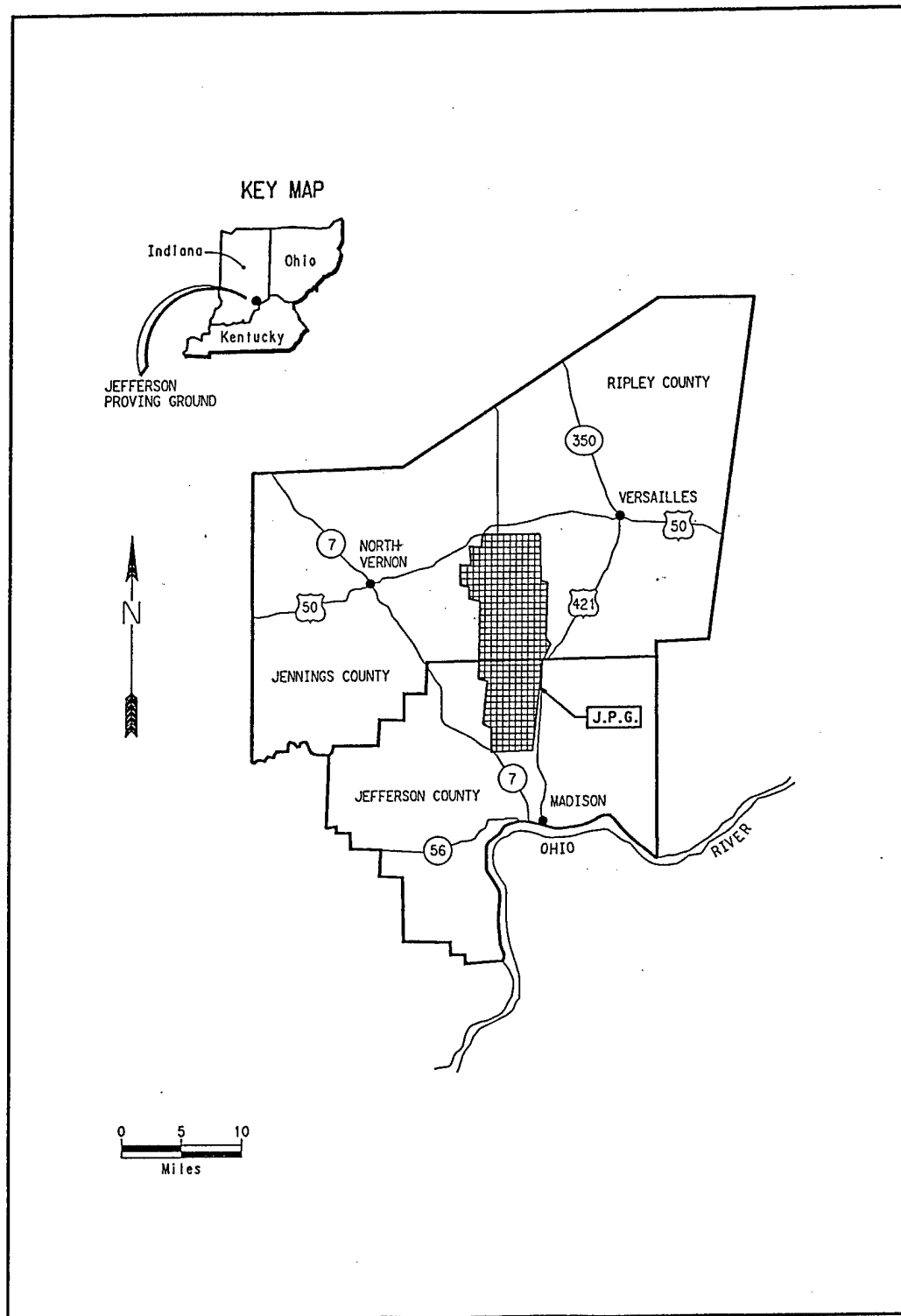


Figure 2. Location Map of Jefferson Proving Ground

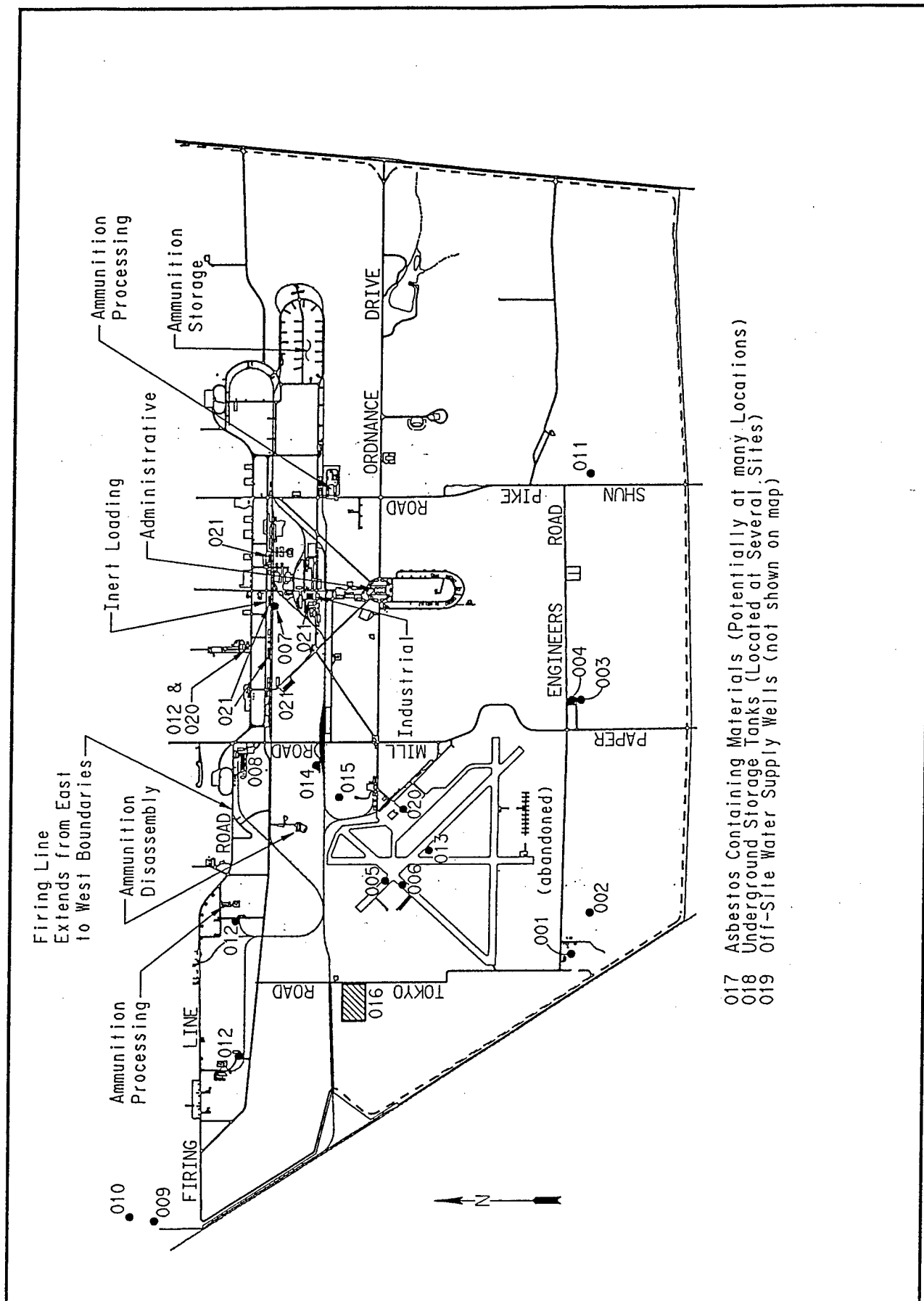


Figure 3. Location Map of RI/FS Sites South of the Firing Line, Jefferson Proving Ground, Indiana

Impact areas at JPG include high impact targets, asphalt- and sediment-bottom ponds for testing proximity fuses, a gunnery range, mine fields, and a depleted uranium (DU) impact area. Surrounding the impact areas are safety fans where wide, long, or short rounds may fall. These areas are all considered to be contaminated with explosive ordnance. The impact areas are kept clear of vegetation by herbicide application. None of the impact areas, including the DU impact area, are included in this RI/FS because they are located north of the firing line. However, the DU impact area has been investigated previously in accordance with the Nuclear Regulatory Agency required permit, and groundwater monitoring is periodically conducted at the site. The groundwater sampling data are regularly transmitted to the Indiana State Department of Environmental Protection. The results indicate that there is currently no DU contamination in the groundwater at the area. The possibility of DU south of the firing line resulting from ammunition assembly or disassembly is considered minor; however, radiological surveys will be included as part of the routine Health and Safety monitoring conducted during field work.

The Defense Secretary's Commission on Base Realignment and Closure recommended JPG among other bases for closure and/or realignment in December 1988. The Congress mandated JPG be closed and its mission be realigned with Yuma Proving Ground in April 1989. As a result, USATHAMA was given the responsibility for managing and conducting environmental investigations at JPG in association with the Base Closure Program. Under the base-closure plan, testing activities are expected to stop in 1994, and land disposition is expected to be accomplished by 1995 (Ebasco, 1990).

2.3 Previous Investigations

Section 8.0 of this plan provides a list of references to previous investigations conducted at JPG. Several reports regarding various environmental aspects of JPG have been written over the years. Many were site-specific, while others were facility-wide investigations. The facility-wide investigations included an Environmental Impact Assessment of JPG (O'Neill, 1978), Installation Assessment of JPG (USATHAMA, 1980), Update of the Initial Assessment (Environmental Science and Engineering, 1988), and a Report to the Governor (Indiana Department of Environmental Management, 1989). Another significant report dealing with environmental practices at JPG was a Resource Conservation and Recovery Act (RCRA) Part B Application for Open Burning/Open Detonation (U.S. Army Corps of Engineers, 1988).

In October 1989, Ebasco Environmental (Ebasco, 1990a) began an enhanced Preliminary Assessment (PA) through Argonne National Laboratory to support the Base Realignment and Closure Program. This PA was based on a review of the above described existing information, which included JPG records, reports, and aerial photographs. The enhanced PA, through review and analysis of previous data, identified and characterized areas requiring environmental evaluation (AREEs), defined potential pathways for contaminant migration, identified potential receptors of contamination, and provided recommendations for further study.

A follow-on report to the enhanced PA was prepared by Ebasco (1990b) in November 1990. This report, the MEP, was designed to support the Base Closure process by providing additional information required to characterize areas of concern at JPG, supporting the Installation Restoration Program (IRP) activities, providing information to be used to prioritize site actions, and assisting in the development of cost-effective response actions. The MEP described, in detail, the existing conditions at 46 SWMUs, 10 AREEs, additional general concerns at JPG, additional data required, and proposed activities to provide the required data.

A Site Specific Sampling and Analysis (SSSA) program was performed by SEC Donohue in January 1992. The scope of this program included sampling at the Gate 19 Landfill, the Depleted Uranium Impact Area, and entrance and exit streams at JPG. The results were published in a Letter Report in August 1992.

This RI/FS Technical Plan and associated planning documents (Sampling Design Plan (SDP), Health and Safety Plan (HSP), and Quality Control Plan (QCP)) were prepared on the basis of the findings and recommendations of the PA, the MEP, and the Letter Report. Work tasks presented in the RI/FS Technical Plan are designed to meet the following objectives:

- define extent and magnitude of environmental contamination at JPG in the area south of the firing line,
- assess human health and environmental risk associated with the closure and transfer of JPG for other uses,
- determine needs for remedial actions, and
- develop and evaluate remedial action alternatives (to include potential for property release by the U.S. Army).

2.4 Environmental Setting

2.4.1 *Physiography*

JPG is located in the Till Plains section of the Central Lowlands Physiographic Province, which is characterized by young till plains with no pronounced morainic features. Topography of JPG is flat to rolling, with most relief due to stream incision. Seven streams and their tributaries drain the JPG area.

2.4.2 *Climate*

The climate at JPG is mid-continental with frequent changes in temperature and humidity. During the summer, the temperatures average from the mid 70s to the mid 80s (°F). On an average, the temperature exceeds 90°F for 39 days a year. Winter temperatures generally range from 22 to 35 °F. The total annual precipitation is approximately 42 to 44 inches with nearly 50 percent of it occurring during the growing season. On the average, 28 days of the year have precipitation greater than or equal to 0.5 inch. The region of JPG is subject to

tornadoes and severe thunderstorms. In 1974, tornadoes reportedly caused nine deaths and many injuries in the communities of Madison and Hanover. No damage has been reported for JPG from these storms.

2.4.3 Geology

JPG lies on the western limb of a plunging anticline known as the Cincinnati Arch. The geology is characterized by glacial tills that overlie Ordovician and Silurian limestones and dolomites interbedded with shales.

Surficial deposits consist of glacially derived soils over glacial till of Illinoian and Wisconsinan Age and are characterized by silts and clays with only minor amounts of gravel and rock fragments. The two major soil associations present at JPG are the Cincinnati-Rossmoyne-Hickory and the Avonburg-Clermont. The Cincinnati-Rossmoyne-Hickory soils are generally deep, moderately well to well drained, whereas the Clermont-Avonburg soils are somewhat poorly drained. The Cincinnati-Rossmoyne-Hickory soils are found mainly on ridgetops, breaks, and hillsides at JPG. The Clermont-Avonburg soils are gently sloping soils located on broad ridges. Both associations contain fragipan layers (low permeability, firm and brittle) which restrict the downward movement of water. A combination of different soil types occur on or adjacent to stream beds. These soils include Ryker, Grayford, Holton, Eden, Elkinsville, and Wirt soil types. The soil types at JPG are summarized in Table 3 and are shown in Figure 4. The underlying unconsolidated glacial tills are typically 25 to 30 feet thick, but are generally absent in the stream valleys at JPG.

Bedrock at JPG consists of thick sequences of interbedded limestones, dolomites, and shales of Ordovician and Silurian periods. In general, rock outcrops at JPG are Silurian-period Salamon dolomite. Outcrops of thinly bedded limestones and shales seen in some stream drainages at JPG are from the Ordovician period Maquoketa Formation. The Maquoketa Formation is composed of gray calcareous shale with thin limestone interbeds (up to 50 percent). The sequence contains joints and fractures.

2.4.4 Hydrology

Water-table depths within JPG are relatively shallow, generally less than 20 feet. The water table varies according to the season. There are several flat areas where the water is at the surface and remains for extended periods. The apparent direction of groundwater flow is to the west-southwest, which coincides with the direction of surface drainage and regional dip of the bedrock. A strong fracture-set orientation is also directed to the west-southwest (Greeman 1981).

Although little hydrologic information is available for JPG, outcrops of the limestone bedrock show vertical joints and fractures in addition to abundant bedding planes, which most likely results in some downward migration of water from the unconfined alluvial aquifer. Evaluation of the logs for the wells installed at the Gate 19 Landfill and the DU

Table 3. General Soil Characteristics of Jefferson Proving Ground

Soil name (map symbol)	Depth (inches)	USDA Textures	Liquid Limit	Plasticity Index	Permeability (in/hr)	Shrink-swell potential	Erosion factors		High Water Table (ft)
							K	T	
Avonburg (Ava, AvB2)	0 - 10	Silt loam	20 - 30	2 - 10	0.6 - 2.0	Low	0.43	4	1.0-3.0
	10 - 30	Silty clay loam, silt loam	30 - 45	10 - 20	0.6 - 2.0	Moderate	0.43		
	30 - 80	Silty clay loam	30 - 45	10 - 20	<0.06	Moderate	0.43		
Cincinnati CnB2, CnC2, CnC3)	0 - 6	Silt loam	25 - 40	3 - 16	0.6 - 2.0	Low	0.37	4 - 3	>4
	6 - 33	Silty clay loam, loam	26 - 40	8 - 15	0.6 - 2.0	Low	0.37		
	33 - 56	Clay loam, loam	25 - 40	6 - 20	0.06 - 0.6	Moderate	0.37		
	56 - 80	Silty clay loam, clay loam	25 - 40	5 - 20	0.06 - 0.6	Moderate	0.37		
Cobb's fork (CO)	0 - 12	Silt loam	15 - 30	3 - 10	0.06 - 0.2	Low	0.37	4	0.5 - 1.0
	12 - 27	Silt loam	15 - 30	3 - 10	0.06 - 0.2	Low	0.37		
	27 - 50	Silt loam, silty clay loam	20 - 35	5 - 15	<0.06	Low	0.37		
	50 - 77	Silt loam, silty clay loam	20 - 35	5 - 15	0.06 - 0.2	Low	0.37		
Eden (Ec, D2)	77 - 80	Clay loam	30 - 40	10 - 15	0.06 - 0.2	Moderate	0.37		
	0 - 5	Silty clay loam	35 - 65	12 - 35	0.06 - 0.6	Moderate	0.43	7	>6.0
	5 - 21	Flaggy silty clay, flaggy clay, silty clay	45 - 75	20 - 45	0.06 - 0.2	Moderate	0.28		
	21	Weathered bedrock					0.17		
Elkinsville (EKA, EkB)	0 - 8	Silt loam	25 - 40	5 - 15	0.6 - 2.0	Low	0.37	5	<6.0
	8 - 36	Silty clay loam, silt loam	35 - 40	8 - 18	0.6 - 2.0	Moderate	0.37		
	36 - 60	Silty clay loam, sandy clay loam	30 - 40	8 - 18	0.6 - 2.0	Moderate	0.37		
Grayford (GrC2, GrC3, GrD2, GrD3)	0 - 12	Silt loam	18 - 30	4 - 10	0.6 - 2.0	Low	0.37	5 - 4	>6.0
	12 - 22	Silty clay loam, clay loam	25 - 35	8 - 13	0.6 - 0.2	Moderate	0.37		
	22 - 45	Clay loam, loam	25 - 40	8 - 15	0.6 - 2.0	Moderate	0.37		
	45 - 52 52	Clay, silty clay Unweathered bedrock	45 - 55	20 - 30	0.6 - 2.0	High	0.37		

Table 3. General Soil Characteristics of Jefferson Proving Ground (concluded)

Soil name (map symbol)	Depth (inches)	USDA Textures	Liquid Limit	Plasticity Index	Permeability (in/hr)	Shrink-swell potential	Erosion factors		High Water Table (ft)
							K	T	
Hickory (HkC2, HkC3, HkD2, HkD3, HkE)	0 - 9	Silt loam	20 - 35	8 - 15	0.6 - 2.0	Low	0.37	5	>6.0
	9 - 54	Clay loam, silty clay loam, silt loam	30 - 50	15 - 30	0.6 - 2.0	Moderate	0.37		
	54 - 60	Clay loam sandy loam, loam	20 - 40	5 - 20	0.6 - 2.0	Low	0.37		
Holton (Ho)	0 - 8	Loam	<25	2 - 10	0.6 - 2.0	Low	0.37	5	1.0 - 3.0
	8 - 32	Fine sandy loam loamy sand	<25	4 - 12	0.6 - 2.0	Low	0.24		
	32 - 60	Stratified loamy sand to sandy clay loam	<25	2 - 14	0.6 - 2.0	Low	0.24		
Ryker (RyA, RyB2, RyC2, RyC3)	0 - 6	Silt loam	20 - 30	5 - 15	0.6 - 2.0	Low	0.37	5	>6.0
	6 - 67	Silt loam, silty clay loam clay loam	25 - 40	10 - 15	0.6 - 2.0	Moderate	0.37		
	67 - 80	Silt loam, silty clay loam clay loam	25 - 45	10 - 20	0.6 - 2.0	Moderate	0.37		
Rossmoyne silt loam (RoA, RoB2)	0 - 8	Silt loam	30 - 40	4 - 10	0.6 - 2.0	Low	0.37	4	1.5 - 3.0
	8 - 25	Silty clay loam, silt loam, clay loam	30 - 48	8 - 20	0.6 - 2.0	Moderate	0.37		
	25 - 80	Clay loam, silt loam, silty clay loam	25 - 40	9 - 19	0.06 - 0.6	Moderate	0.37		
Wirt silt loam (W1)	0 - 15	Silt loam	<25	3 - 7	0.6 - 2.0	Low	0.37	5	>6.0
	15 - 50	Silt loam, loam	<25	3 - 7	0.6 - 2.0	Low	0.24		
	50 - 60	Stratified loam to loamy fine sand	<25	7	2.0 - 6.0	Low	0.24		

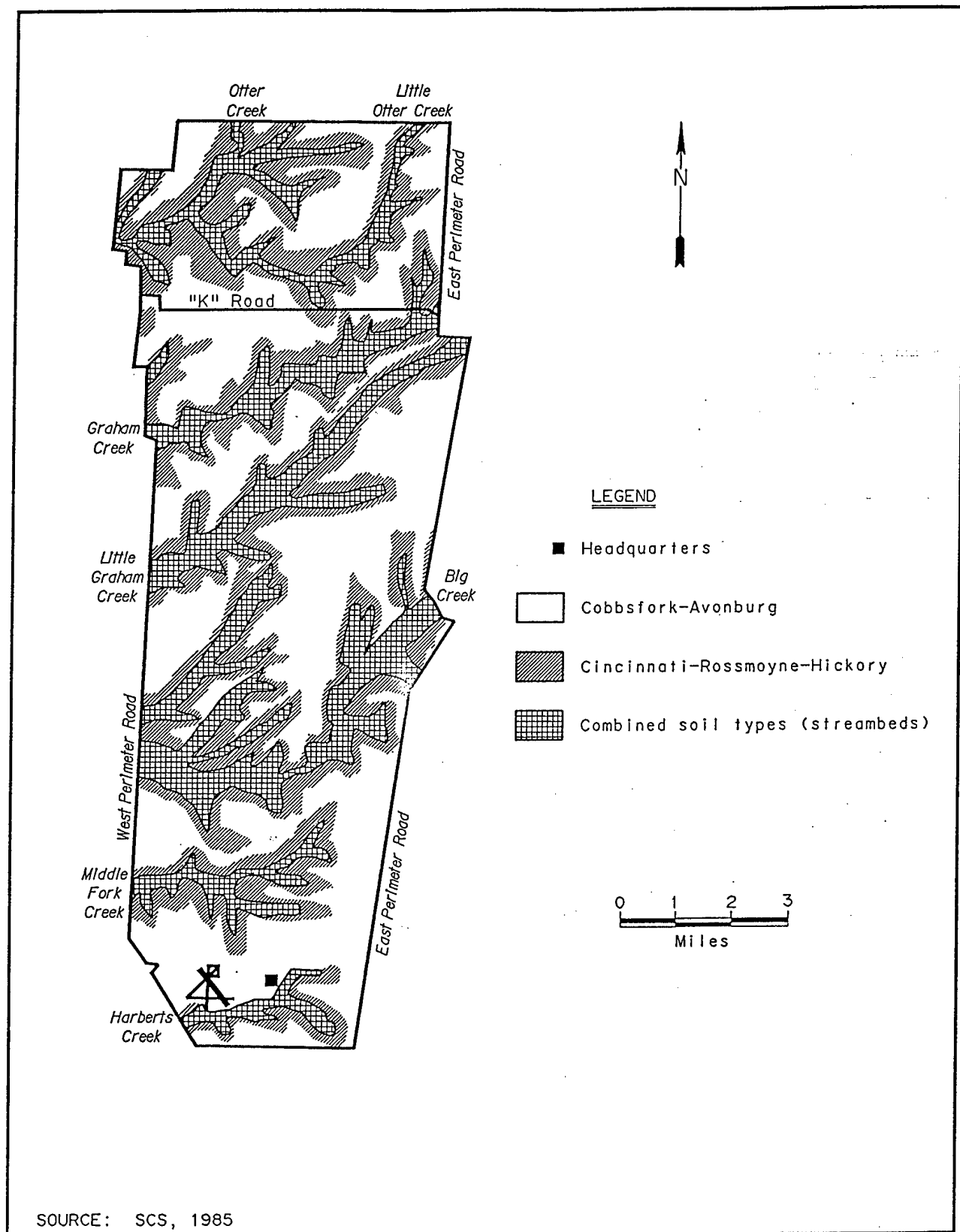


Figure 4. Soil Associations of Jefferson Proving Ground

Impact area reveal artesian-groundwater gradients in the shallow bedrock aquifer. The most productive wells in the JPG area are located at intersections of regional fracture lineaments indicating that groundwater flow in the bedrock aquifer is primarily controlled by fractures (Greeman 1981). Karst features such as sinkholes have been recognized along the Otter Creek and Big Graham Creek drainages a few miles west of JPG; however, no karst features have been mapped on JPG (Greeman 1981).

Surface water at JPG flows in several northeast-to-southwest-trending stream drainages across JPG toward the Ohio River. These drainages appear to have developed along major fracture lineaments (Greeman 1981). There are also at least 10 ponds on the facility (most of which are stocked with fish and used for recreational purposes). Figure 5 shows the major stream drainages at JPG.

The southern portion of JPG is drained by Harberts Creek, which leaves the installation at the southwest corner. Middle Fork Creek and its tributaries drain the south-central portion of JPG.

Big Creek traverses JPG north of Middle Fork Creek and has tributaries originating both on and off the installation. To the north and west of Big Creek is Marble Creek, which originates on JPG.

Little Graham Creek originates off the installation and traverses the north-central portion of the installation along with its major tributaries, Horse and Poplar Branch. Big Graham Creek also originates off the installation, traversing JPG nearly parallel to and north of Little Graham Creek. The two major tributaries of Big Graham Creek are Grapevine Branch and Rush Branch which originate on the installation.

Little Otter Creek, Otter Creek and its tributaries, Falling Timber Branch, and Vernon Fork join in the northwestern corner of JPG before exiting the installation at the western boundary.

2.5 Land Use/Demography

JPG is surrounded by several small rural towns including New Marian, Holton, Nebraska, Rexville, Grantsburg, Bellevue, Middlefork, San Jacinto, and Wirt. The area immediately adjacent to the installation is farmland consisting primarily of crops of sorghum, tobacco, corn, and wheat.

Most of JPG is wooded with the exception of impact areas and clear areas surrounding building complexes. As a result, the installation has an active forest and wildlife management program. Limited hunting and timber sales are a part of this management program.

Employment at JPG ranged from 1,774 in 1953 to 386 in 1990.

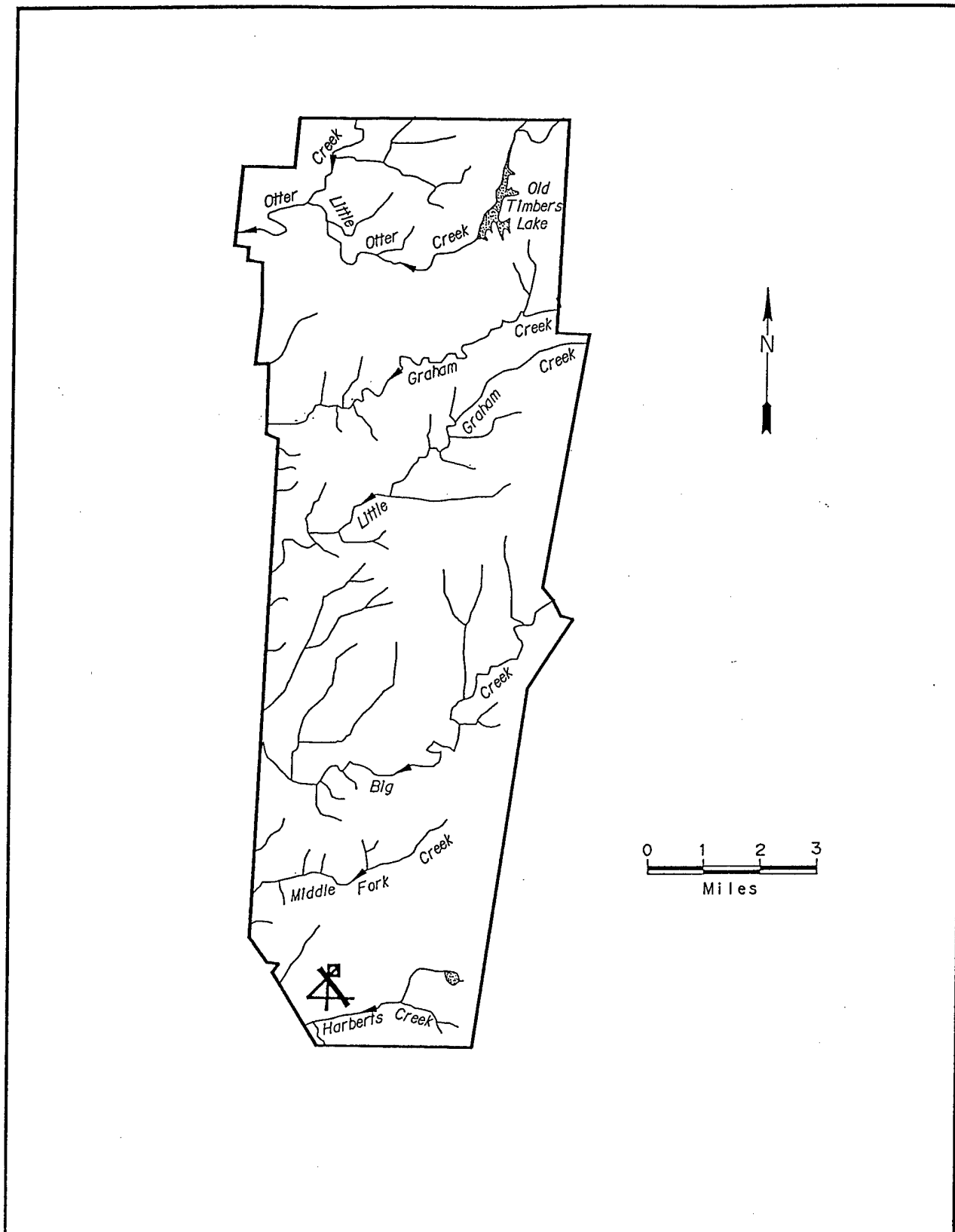


Figure 5. Stream Drainages at Jefferson Proving Ground

3.0 REGULATORY SETTING

Guidelines for the remediation of hazardous constituents released from federal facilities is provided in Section 120 of the CERCLA. Essentially, all guidelines, rules, regulations, and criteria carried out under CERCLA apply to federal facilities. In that context, environmental studies and future remediation activities conducted at JPG are governed by CERCLA under the review and approval of the U.S. Environmental Protection Agency (EPA), Region V, and the State of Indiana. The U.S. Army through USATHAMA is responsible for the study and cleanup of waste sites at JPG.

A preliminary list of ARARs for RI/FS activities at JPG outlined in this Work Plan is presented in Table 4. Generally, these ARARs represent federal requirements except those areas where state requirements are more stringent than the federal requirements. In addition to federal or state CERCLA requirements, there are also USATHAMA and Department of Defense requirements that must be met (i.e., regulations governing UXO). Where the potential for UXO exists, site work must comply with the following regulations:

- Department of Defense (DOD) 6055.9-STD Ammunition and Explosive Safety Standards,
- AR 385-64 Ammunition and Explosive Safety Standards,
- AR 50-6 Chemical Surety Program, and
- AR 75-15 Responsibilities and Procedures for Explosive Ordnance Disposal (EOD).

State of Indiana regulations will be reviewed to determine which requirements are more stringent than those listed in Table 4.

Current JPG activities require the following major permits:

- RCRA Permit (Part A Interim and Part B Application),
- NPDES Permit (State Permit),
- Fire Training Permit (State Variance),
- Open Burning/Open Detonation Permit (State Variance), and
- Air Permit (State Variance).

JPG requires a RCRA Interim Permit because pyrotechnics, explosives, and propellants are stored and thermally treated at the facility. These items are also detonated on open ground. A RCRA Interim Permit application has been submitted, but is still under review by EPA, Region V.

Table 4. Preliminary ARARS for JPG

Standard Requirements, Criteria, or Limitation	Citation	Description
SAFE DRINKING WATER ACT	40 U.S.C 300	
National Primary Drinking Water Standards	40 CFR 141	Establishes health-based standards for public-water systems (maximum contaminant levels (MCL)).
National Secondary Drinking Water Standards	40 CFR 143	Establishes welfare-based standards for public-water systems.
CLEAN AIR ACT (CAA)	42 U.S.C. 7401	
National Ambient Air Quality Standards (NAAQS)	40 CFR 50	Establishes primary and secondary standards for six pollutants to protect public health and welfare.
NATIONAL HISTORIC PRESERVATION ACT	49 U.S.C. 470 40 CFR 6301(b) 36 CFR 800	
ARCHAEOLOGICAL AND HISTORICAL PRESERVATION ACT	16 U.S.C 469 40 CFR 6301(c)	Establishes procedures to provide preservation of historical and archaeological data that might be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program.
HISTORIC SITES, BUILDINGS AND ANTIQUITIES ACT	16 U.S.C. 461- 467 40 CFR 6301(a)	Requires federal agencies to consider the existence of Landmarks on the National Registry and of Natural Landmarks to avoid undesirable impacts on such landmarks.

Table 4. Preliminary ARARS for JPG (continued)

Standard Requirements, Criteria, or Limitation	Citation	Description
FISH AND WILDLIFE COORDINATION ACT	16 U.S.C 661	Requires consultation when federal department or agency proposes or authorizes any modification of any stream or other water body and adequate provision for protection of fish and wildlife resources.
ENDANGERED SPECIES ACT	16 U.S.C. 1531 50 CFR 200 and 402	Requires action to conserve endangered species within critical habitats upon which endangered species depend (includes consultation with Department of Interior).
CLEAN WATER ACT Dredge or Fill Requirements	33 U.S.C. 1251- 1376, 40 CFR 230-231	Requires discharges to address impact of dredge discharge or fill material on the aquatic ecosystem.
National Pollutant Discharge Elimination System (NPDES)	40 CFR 122 and 125, 230-231	Requires permits for discharge of pollutants for any point source into waters of the United States.
Effluent Guidelines Standards for the Point Source Category	40 CFR 414	Requires specific effluent characteristics for discharge under NPDES permits.
National Pretreatment Standards	40 CFR 403	Sets standards to control pollutants that pass through or interfere with treatment processes in public treatment works or that may contaminate sewage sludge.
Water Quality Criteria	40 CFR 131	Sets criteria for water quality based on toxicity to human health.

Table 4. Preliminary ARARS for JPG (continued)

Standard Requirements, Criteria, or Limitation	Citation	Description
Ambient Water Quality	40 CFR 131	Sets criteria for ambient water quality based on toxicity to aquatic organisms.
SOLID WASTE DISPOSAL ACT		
Criteria for Classification Solid Waste Disposal Facilities and Practices	40 CFR 257	Establishes criteria for use in which solid-waste-disposal-facilities practices pose a reasonable probability of adverse effects on public health or the environment and, thereby, constitutes prohibiting open dumps.
Groundwater Protection	40 CFR 264.90 - 264.101	
Standards Applicable to Generators of Hazardous Waste	40 CFR 262	Establishes standards for generators of hazardous waste.
Standards Applicable to Transporters of Hazardous Waste	40 CFR 263	Establishes standards that apply to transporters of hazardous waste within the U.S., if the transportation requires a manifest under 40 CFR part 262.
Standards for Owners and Operators of Hazardous Waste Treatment, Storage Disposal (TSD) Facilities	40 CFR 264	Establishes minimum national standards that define the acceptable management of hazardous waste for operators of facilities that treat, store, or dispose of hazardous wastes.

Table 4. Preliminary ARARS for JPG (continued)

Standard Requirements, Criteria, or Limitation	Citation	Description
General Facility Standards	Subpart B	Provides standards for general waste analysis, security, inspection requirements, personnel training, location standards and requirements for the handling of ignitable, reactive or incompatible wastes.
Preparedness and Prevention	Subpart C	Provides standards for facility design, required equipment testing and maintenance, and arrangements with local authorities for owners and operators of all hazardous-waste facilities.
Contingency Plan	Subpart D	Provides contingency-plan requirements and emergency procedures for hazardous-waste-management facilities.
Releases from Solid Waste	Subpart F	Imposes general groundwater-management-units monitoring and protecting requirements to detect and respond to releases in the upper aquifer from "regulated" hazardous-waste-management units.
Closure and Post-Closure	Subpart G	Provides general closure-performance standards and requires removal or decontamination of all hazardous wastes from hazardous-waste-management facilities.
Use and Management of Containers	Subpart I	Provides standards for the condition, compatibility, management, inspection, containment, and closure for containers used in hazardous-waste-related activities.

Table 4. Preliminary ARARS for JPG (continued)

Standard Requirements, Criteria, or Limitation	Citation	Description
Tanks	Subpart J	Provides integrity, design, installation, secondary containment, operating, inspection, corrective action, and closure standards for tanks to be used in hazardous-waste-management facilities.
Surface Impoundments	Subpart K	Provides design, general operating, and inspection requirements for the use of surface impoundments to treat, store, or dispose of hazardous waste.
Waste Piles	Subpart L	Provides containment, design closure, and post-closure care requirements for facilities that treat or store hazardous wastes in piles.
Land Treatment	Subpart M	Prohibits placement of hazardous waste in or on a land treatment facility unless the waste can be made less hazardous or nonhazardous by degradation, transportation, or immobilization processes occurring in or on the soil. Establishes requirements for unsaturated zone monitoring, closure and post-closure waste analysis, and special requirements for ignitable or reactive waste.

Table 4. Preliminary ARARS for JPG (concluded)

Standard Requirements, Criteria, or Limitation	Citation	Description
Landfills	Subpart N	Establishes requirements for design, operation, closure, and post-closure care for landfills that handle hazardous wastes. Also provides requirements for the handling of bulk and containerized liquors and incompatible wastes.
Land Disposal	40 CFR 268	Identifies hazardous wastes that are restricted from land disposal and describes those circumstances under which an otherwise prohibited waste may be land disposed.
Underground Injection Control Regulations	40 CFR 144-147	Provides for protection of underground sources of drinking water.
Hazardous Materials Transportation Regs.	49 CFR 107,171-177	Regulates transportation of hazardous materials.
GENERAL	RCRA Section 3020	Regulates reinjection of hazardous wastes during remediation.
	29 CFR 1910.120	OSHA Worker Safety
	29 CFR 1926 Subpart P	Excavation
	10 CFR 20	Establishes permissible levels of radiation in unrestricted areas and waste-disposal requirements.
	40 CFR 190	Regulates cleanup of radioactively contaminated sites.
	40 CFR 440	Regulates discharges of radionuclides to surface waters.

A National Pollutant Discharge Elimination System (NPDES) permit is required at JPG to discharge the effluent from the sewage treatment plant. The permit was recently renewed by the State of Indiana.

A local Fire Training Permit is required for JPG to provide fire-fighting training to JPG personnel. This training is conducted under the supervision of state and local fire-fighting agencies.

An Open Burning Permit from the Indiana Department of Environmental Management is required for JPG to burn excess propellants, explosives, vegetation, and scrap wood. The permit is renewed annually.

An air permit would normally be required to operate an incinerator. In the case of JPG, local regulations require an air permit only if at least 10 tons per day of solid wastes are incinerated. JPG's new incinerator capacity is only 4 tons per day. Consequently, no air permit is required to operate the incinerator. JPG does, however, have a permit from the Indiana Department of Environmental Management for the open burning of excess propellants and explosives.

4.0 CONCEPTUAL SITE MODELS

On the basis of all presently available data, the following conceptual site models have been developed to provide a preliminary understanding of the sources of contamination in the south area of JPG, the migration pathways of contaminants, and potential receptors of contaminants at or near JPG. These models are used to assess the adequacy of present information and the need for further investigations to provide data necessary for proper remedial-action decisions. Where data gaps exist, the types, quality, and quantity of data to be collected are determined, and the uses for the data are described. These additional data needs are described in Section 5.0, Data Needs, Data Quality Objectives, and Technical Approach, of this plan. The following contains a preliminary assessment of the contaminant pathways at each site. A more detailed evaluation of contaminant fate and transport as related to potential receptors will be conducted as one of the RI/FS work tasks as described in Section 6.0 of this plan. The development of conceptual site models has resulted in the identification of several sites to be recommended for "No Action." Supporting data and rationale for the "No Action" decision are presented in this section.

4.1 Building 185 Incinerator

4.1.1 *Potential Contaminant Sources*

The Building 185 incinerator (see Figure 6) consists of a Morse-Bouler, single-chamber, single-burner, single-stack incinerator without an afterburner unit. The incinerator was used

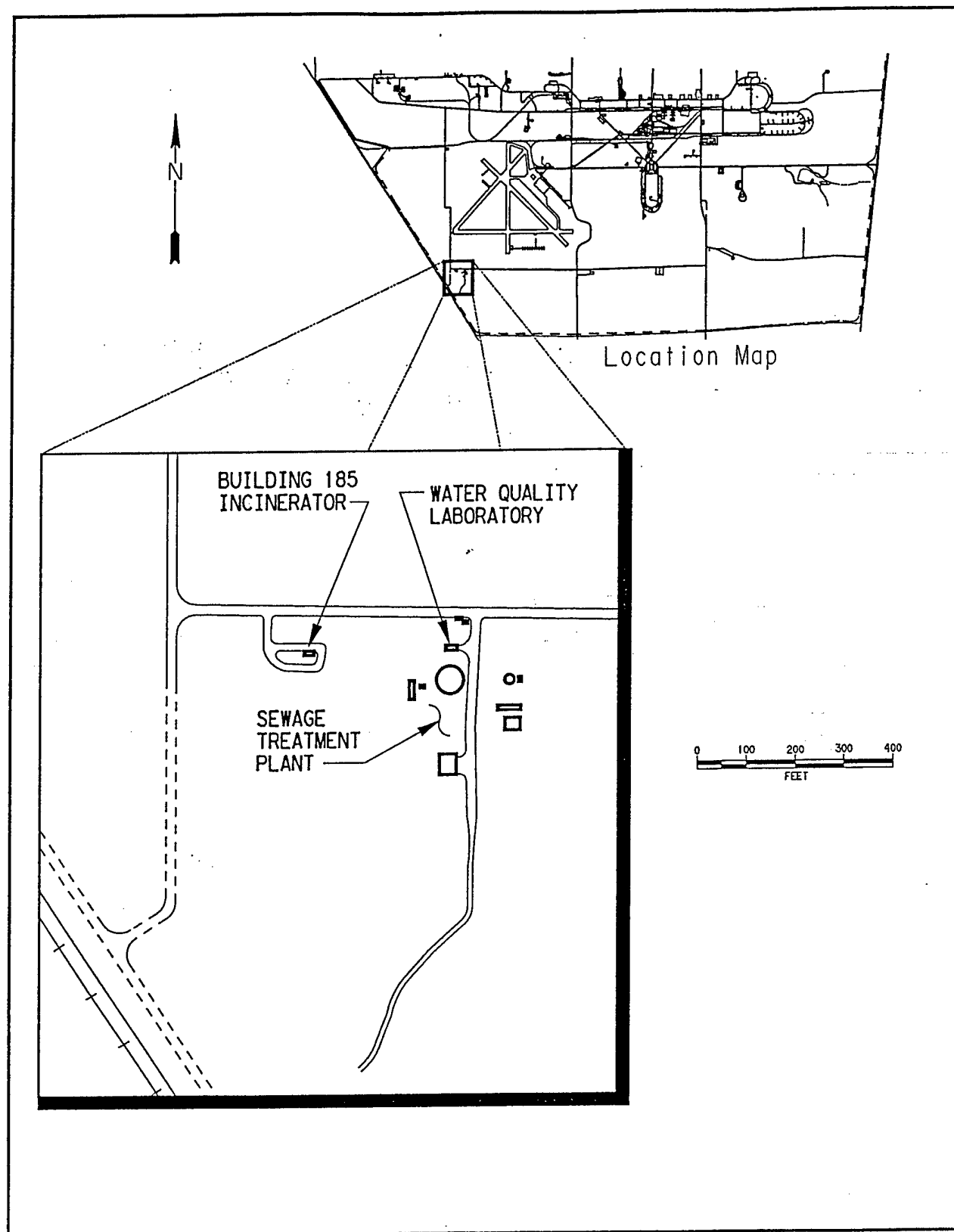


Figure 6. Location of Building 185 Incinerator, Water Quality Laboratory, and Sewage Treatment Plant

from approximately 1941 to 1978 to burn debris, small ammunition, and paper products at the installation.

It is not known whether toxic or hazardous materials were ever burned in the old incinerator. Operational, particulate matter suspended in air potentially may have settled on the surrounding soil surface. In addition, contaminants may have accumulated in the incinerator stack. Likely contaminants from this process include Toxicity Characteristic Leaching Procedure (TCLP) metals. Although information on the disposal of ash from the incinerator during the period of operation is lacking, it is likely that the ash was hauled to one of the on-site landfills such as the Gate 19 Landfill or the abandoned landfill referred to as SWMU-005. Both of these sites will be evaluated for contaminants during the RI/FS.

4.1.2 Evaluation of Contaminant Pathways

Although the pathway of concern during operation of the incinerator would have been particulates and vapors in the air pathway, there is currently no risk to the air pathway since the site has been inactive for approximately 13 years.

Particulates settling on the ground surface may have resulted in surface-soil contamination in the downwind direction of the incinerator. There are two prevailing wind directions reported for JPG; light southerly breezes predominate except when low-pressure systems advance from the northwest. At these times, wind speeds increase and are predominately from the west-northwest. Thus, particulates from the incinerator would likely be dispersed over a wide area, and it is unlikely that significant concentrations of contaminants would have accumulated. Leaching of the soils during periods of precipitation would further disperse any contaminants present in the surface soils.

If, during base closure operations, the incinerator is to be dismantled and removed, a potential exists for human (worker) exposure as a result of direct contact with contaminated ash or inhalation of contaminated dusts (i.e., metals). Until that time, access to the incinerator should continue to be restricted (i.e., the building kept locked), to minimize the risk to human health.

4.1.3 Evaluation of Existing Data

No previous data exist for the Building 185 incinerator. Although a lack of evidence for significant risk to human health or the environment exists, two near-surface soil samples (from 0 to 1 foot deep) are warranted to determine if metal contaminants are present in soils surrounding the abandoned incinerator.

4.2 Water Quality Laboratory

4.2.1 *Potential Contaminant Sources*

The Water Quality Laboratory has been used for testing water quality at the sewage-treatment plant since the 1960s. The laboratory, located on the first floor of Building 177 (see Figure 6), generates small quantities of spent chemicals from conducting laboratory analyses. In the past, some of the chemicals appear to have been improperly disposed. Currently, however, chemicals from the laboratory are being properly stored, handled, and disposed of according to revised standard operating procedures. The exact nature and quantity of chemicals released to the environment in the past are unknown. However, the amount of spent chemicals generated during laboratory analyses is thought to be small.

4.2.2 *Evaluation of Contaminant Pathways*

It is suspected that the spent chemicals were previously processed through the sewage-treatment plant. This would result in the potential for contamination of the surface-water pathway if removal of the contaminants through the primary and secondary treatment processes were incomplete.

4.2.3 *Evaluation of Existing Data*

Routine monitoring data from sampling of the NPDES-permitted outfall and analyses of sewage sludge prior to offsite disposal have not contained significant concentrations of chemical contaminants. No evidence exists that would indicate that the previous disposal practices at the Water Quality Laboratory resulted in significant risk to human health and the environment. Results of an EPA "Environmental Audit" (EPA, 1990) indicated that no further investigations are required for the Water Quality Laboratory. Since discharge from the laboratory passes through the sewage-treatment plant, sediment samples collected below the plant's outfall (Section 4.3 below) will also provide information on the Water Quality Laboratory discharge. Thus, the Water Quality Laboratory is no longer considered an area requiring environmental evaluation.

4.3 Building 177 Sewage Treatment Plant

4.3.1 *Potential Contaminant Sources*

The sewage-treatment-plant building covers an area of approximately 682 square feet with a capacity to process approximately 280,000 gallons of waste water per day. The pumping station is located in the basement of Building 177 (see Figure 6). The treatment facility consists of a settling tank (Imhoff tank), a trickling filter system, and sludge-drying beds wherein the processed water is recirculated several times prior to discharge to an NPDES-permitted outfall.

Although the majority of the waste water is domestic sewage, a small quantity of industrial waste water, boiler blowdown water, rinses from Building 208, and Building 186 oil/water separator are also treated in the plant. The industrial waste water consists of photographic wastes (approximately 170 gallons per day) which, prior to 1980, contained silver and cyanides. Currently, the silver is being reclaimed, and cyanides are no longer used. Therefore, silver and cyanides are no longer present in the waste stream sent to the sewage-treatment plant.

Sludge from the Imhoff tank is pumped to a drying bed consisting of concrete walls and sand floors. The area under the drying bed may contain contaminants that originated from the photographic laboratory. Sludge from the waste-water-treatment plant was reportedly disposed of in the past on what was described as a "clay bank" south of the old incinerator (Building 185). Sludge was also reportedly spread on fields within the installation. Sludge has also been stockpiled just east of the sludge-drying beds. These areas of sludge storage and disposal may have resulted in the contamination of soils with contaminants such as silver and cyanide.

4.3.2 Evaluation of Contaminant Pathways

The environmental pathway of concern at the sewage-treatment plant is the surface-water pathway. In the past, untreated wastewater has bypassed the treatment system and has been discharged directly into Harberts Creek especially during periods of heavy precipitation. Any contaminants contained in the untreated bypass water would enter Harberts Creek, resulting in possible contamination of surface water and sediments.

Contamination of surface soils may also have occurred as a result of leaching of sludge that was either stored or disposed of on surface soils. Contaminants in soils could present a risk to human health through direct contact, soil ingestion, or inhalation of particulates (i.e., dust). Since access to the site is restricted to authorized JPG personnel, human exposure to contaminated soils would be minimal.

Leaching of contaminated soils could also result in the contamination of the groundwater and surface-water pathways, depending on the relative mobility of the contaminants present.

4.3.3 Evaluation of Existing Data

Routine laboratory analysis is required under the NPDES permit for the sewage-treatment facility. Effluent has exceeded maximum limitations for total suspended solids several times in the past, and fecal-coliform limits have also been exceeded. Analyses for EPA toxicity heavy metals indicate that effluent metal concentrations have not exceeded water-quality standards. However, untreated water entering Harberts Creek during periods of bypass may have resulted in the release of contaminants to the surface-water pathway. The estimated amount and frequency of untreated waste-water discharge is unknown.

4.4 Explosive Burning Area

4.4.1 *Potential Contaminant Sources*

The Explosive Burning Area (see Figure 7) consists of a 2-acre thermal treatment area formerly used in the mid-1970s for open burning of explosives and other burnable materials. Materials burned at this site included fuses, waste propellant, boxes, lumber, and paint residues. Waste materials resulting from incomplete combustion of explosives includes TNT, DNT, and heavy metals. In addition, it was reported by a former JPG employee that red lead (so called because lead oxide has a characteristic red color) may have been disposed of at the site. The area is inactive and is presently overgrown with vegetation. The specific location(s) of the burning-area trenches is not readily discernable.

4.4.2 *Evaluation of Contaminant Pathways*

Surface and subsurface soils may be contaminated with explosives and heavy metals. Leaching of the soils by infiltration of precipitation could result in the migration of contaminants to the groundwater pathway. Surface runoff could also result in the contamination of the surface-water pathway. A potential physical hazard may also exist due to the potential for contact with explosive residues. If vegetation is removed in the future, a potential exists for airborne particulate contamination from wind-blown soils, which would pose an inhalation hazard. Currently, the potential for airborne particulates is minimal. If soils are exposed, a potential may exist in the future for direct (dermal) contact with, or ingestion of, contaminated soils.

4.4.3 *Evaluation of Existing Data*

Little information exists concerning the nature of the contaminants thought to be present in the former explosives-burning area. To date, no data have been collected to determine the type(s) and extent of surface or subsurface contamination.

4.5 Abandoned Landfill

4.5.1 *Potential Contaminant Sources*

The southern landfill, located just south of Engineers Road and east of Paper Mill Road (see Figure 7) consists of a one-acre landfill, which was used from 1941 to 1970 primarily as a dumping ground for film refuse from the photographic laboratory. In addition, spent solvents and red lead were also reportedly disposed of in this area. No records were maintained of the materials disposed of in the landfill. Currently, the area is totally overgrown with vegetation and is barely discernable. The landfill was described as being comprised of filled-in trenches.

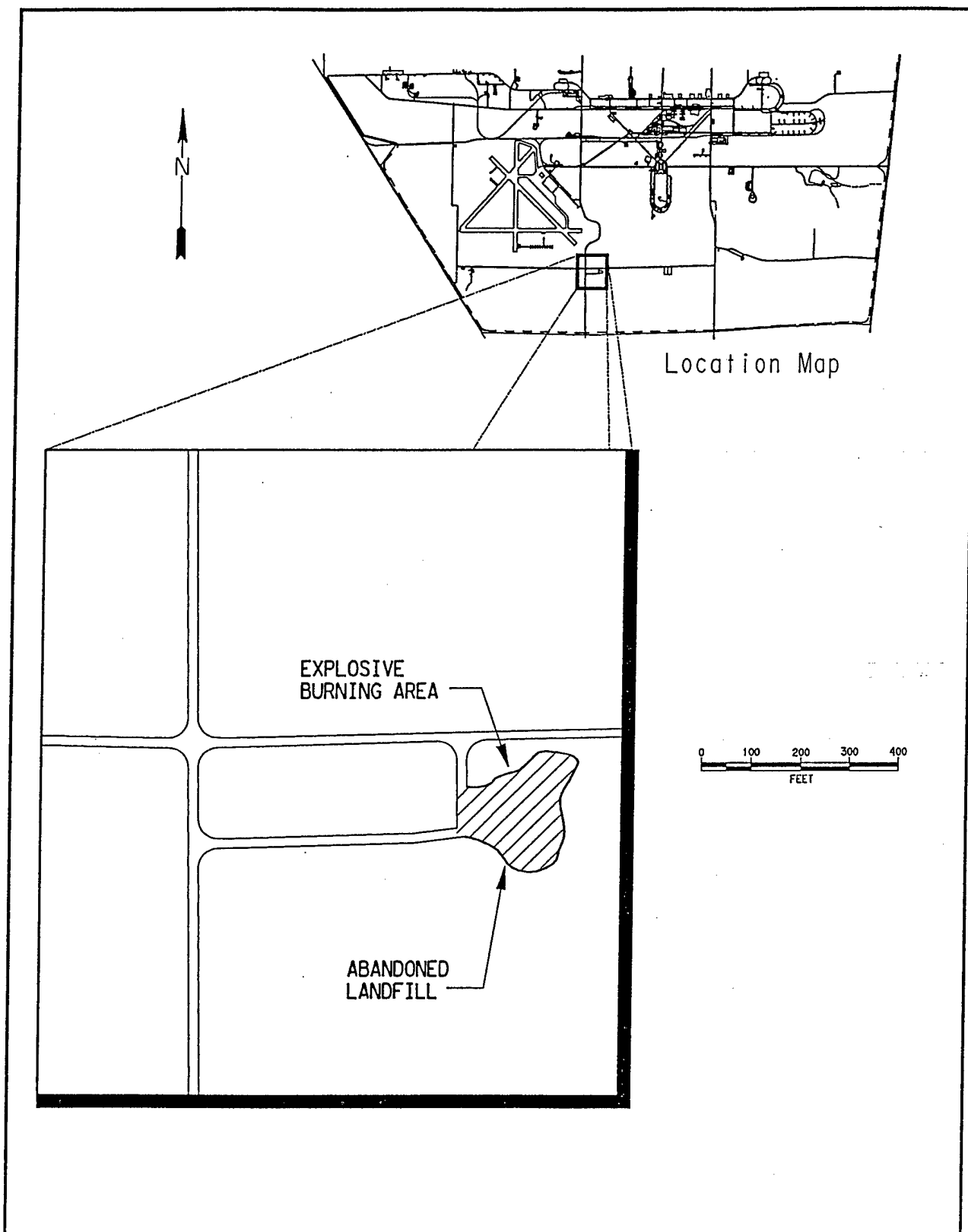


Figure 7. Location of the Explosives Burn Area and the Abandoned Landfill

Acetate-based waste from photographic film was disposed of in this area and likely contained silver and cyanides. Pesticide containers, ash from the incineration of small arms ammunition, and paint wastes were likely disposed of in this landfill since it was the only landfill identified to be in operation between 1941 and the early 1960s. A sign that reads "Closed - Deliver Combustible Waste to Building 333 Post Incinerator" suggests that combustible materials were also disposed of in the landfill. Due to the unknown nature of the materials disposed of in the landfill, contaminants could include metals, explosives, Volatile Organic Compounds (VOCs), and semi-Volatile Organic Compounds (semi-VOCs).

4.5.2 *Evaluation of Contaminant Pathways*

The pathway of concern at the abandoned landfill is the groundwater pathway as a result of potential leaching of contaminants from buried hazardous materials. Migration from subsurface soils to the groundwater pathway is likely. Since the landfill has a soil cover, the likelihood of contamination of the surface-water pathway through precipitation and erosion is small. If erosion of the surface cover occurs to the depth of buried landfill materials, a potential for contamination of the surface-water pathway would exist. Also, since a soil cover is in place, the likelihood of contamination of the air pathway is also small. Direct contact, ingestion, or inhalation of contaminants is only likely in the event of any future excavation activities at the site.

4.5.3 *Evaluation of Existing Data*

No data have been collected from this area to establish the nature and extent of potential contamination.

4.6 Wood-Storage Pile and Wood-Burning Area

4.6.1 *Potential Contaminant Sources*

The Wood-Storage Pile consists of a 10-foot-high used wood stockpile covering approximately 300 square feet on an abandoned airport runway (see Figure 8). The stockpile consists of wood debris, plywood struts, boxes, pallets, and used crates that have been placed on the runway since about 1975. The second wood pile, referred to as the Wood-Burning Area, is an open-waste pile on the abandoned runway that received pentachlorophenol (PCP)-treated wood from about 1975 through 1990. The size of the pile varies as portions of it are periodically removed for off-site disposal; however, the size of the pile will be determined at the time of sampling and reported in the RI Report. A portion of the PCP-treated-wood pile was reportedly burned as a result of a lightning strike. It is suspected that residue PCP and dioxin may be present in areas where wood has been burned. Ash and other evidence indicates that previous burning of the wood pile may have occurred. Current practice for PCP-contaminated wood is to crush the wood and dispose of it in an off-site sanitary landfill.

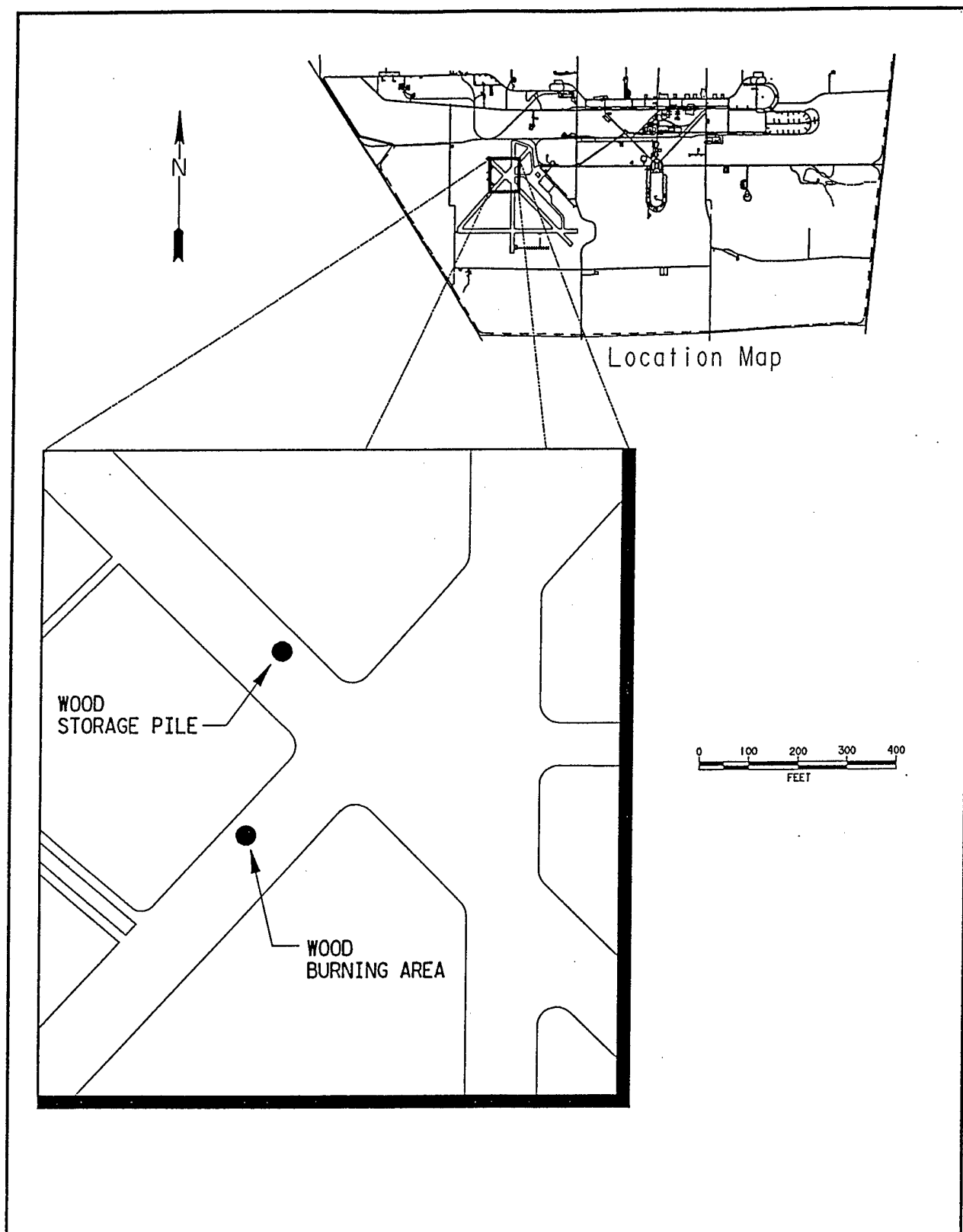


Figure 8. Location of the Wood-Storage Pile and the Wood-Burning Area

4.6.2 *Evaluation of Contaminant Pathways*

Storage and burning of PCP-contaminated woods or other scrap-wood materials could result in the release of PCP, heavy metals, and dioxin to environmental pathways. Soils beneath and adjacent to the abandoned runway may contain residual contaminants leached from ash resulting from the burning activities at the site. Further migration of contaminants in the soils could result in potential groundwater contamination. A potential also exists for airborne-particulate contamination that could pose an inhalation hazard.

4.6.3 *Evaluation of Existing Data*

No data currently exist for the two wood-storage sites. A previous report (Ebasco, 1990b) recommended that no further action was needed for these two locations. However, limited soil contaminants may have been released and transported to surface soils via storm runoff.

4.7 *Red Lead Disposal Area*

4.7.1 *Potential Contaminant Sources*

Little is known of the Red Lead Disposal Area. The exact location is unknown, but it is believed to be near Building 211 (see Figure 9). This area was reportedly used in 1957 to dispose of red lead and barium sulfate. The red lead and barium may have been waste from the inert munitions-loading process conducted in Building 211. Historically, red lead (PbO) has been used as a paint pigment. Both lead and barium are contaminants of concern related to this disposal area.

4.7.2 *Evaluation of Contaminant Pathways*

Although lead generally has low mobility in soils, a potential exists for human exposure by direct contact with, or inhalation of, particulates from contaminated soils. Some potential also exists for the migration of barium and lead to the groundwater pathway. Other TCLP metals may also be present in the red-lead-disposal area.

4.7.3 *Evaluation of Existing Data*

No previous data have been collected for the red lead disposal area; however, red-stained soil between Building 211 and the railroad tracks is assumed to be caused by red lead.

4.8 *Photographic Laboratory*

4.8.1 *Potential Contaminant Sources*

Building 208 (see Figure 10) contains the main photographic laboratory at JPG. The building is a 4,929-square-foot laboratory used for processing, developing, and printing large

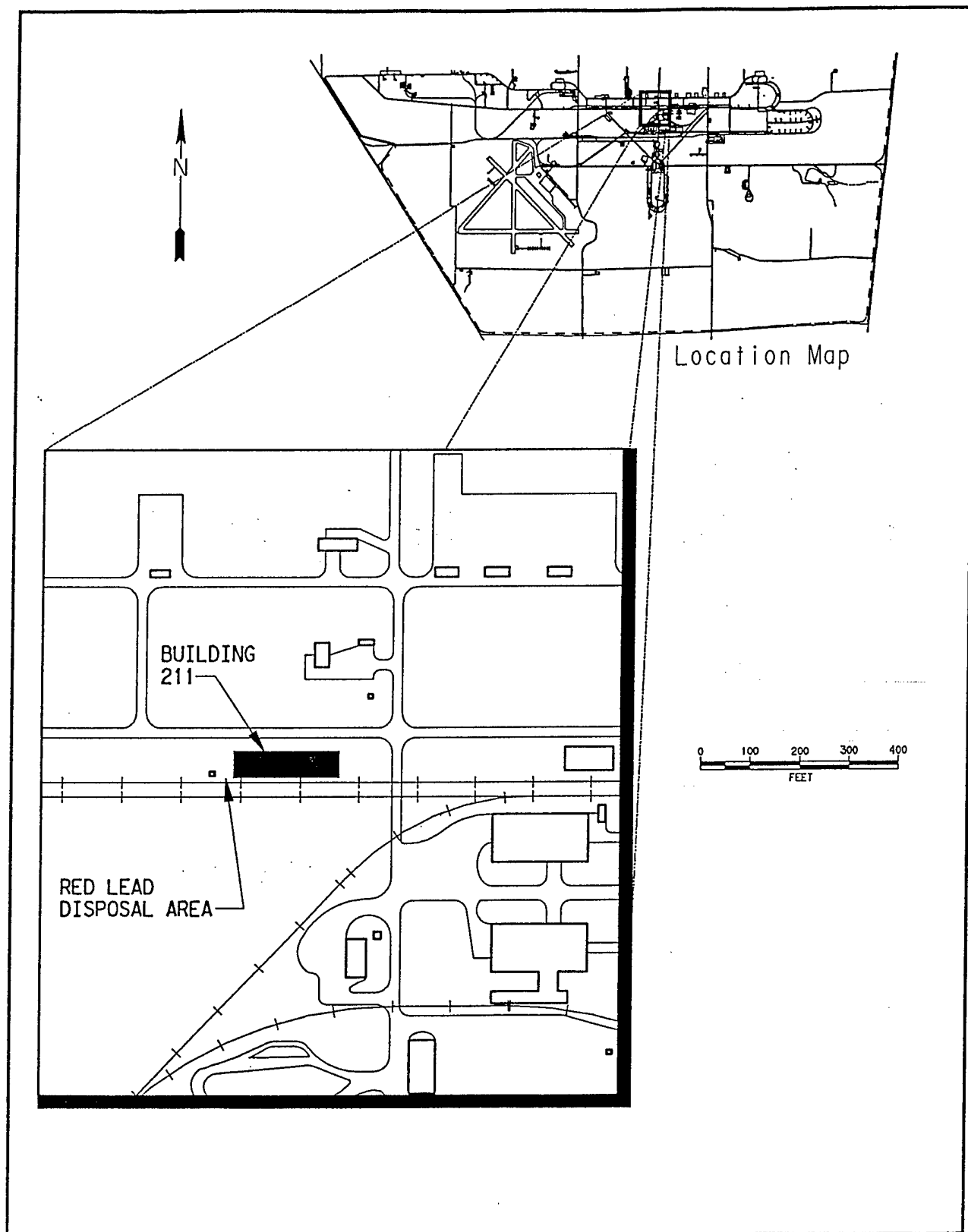


Figure 9. Location of the Red Lead Disposal Area

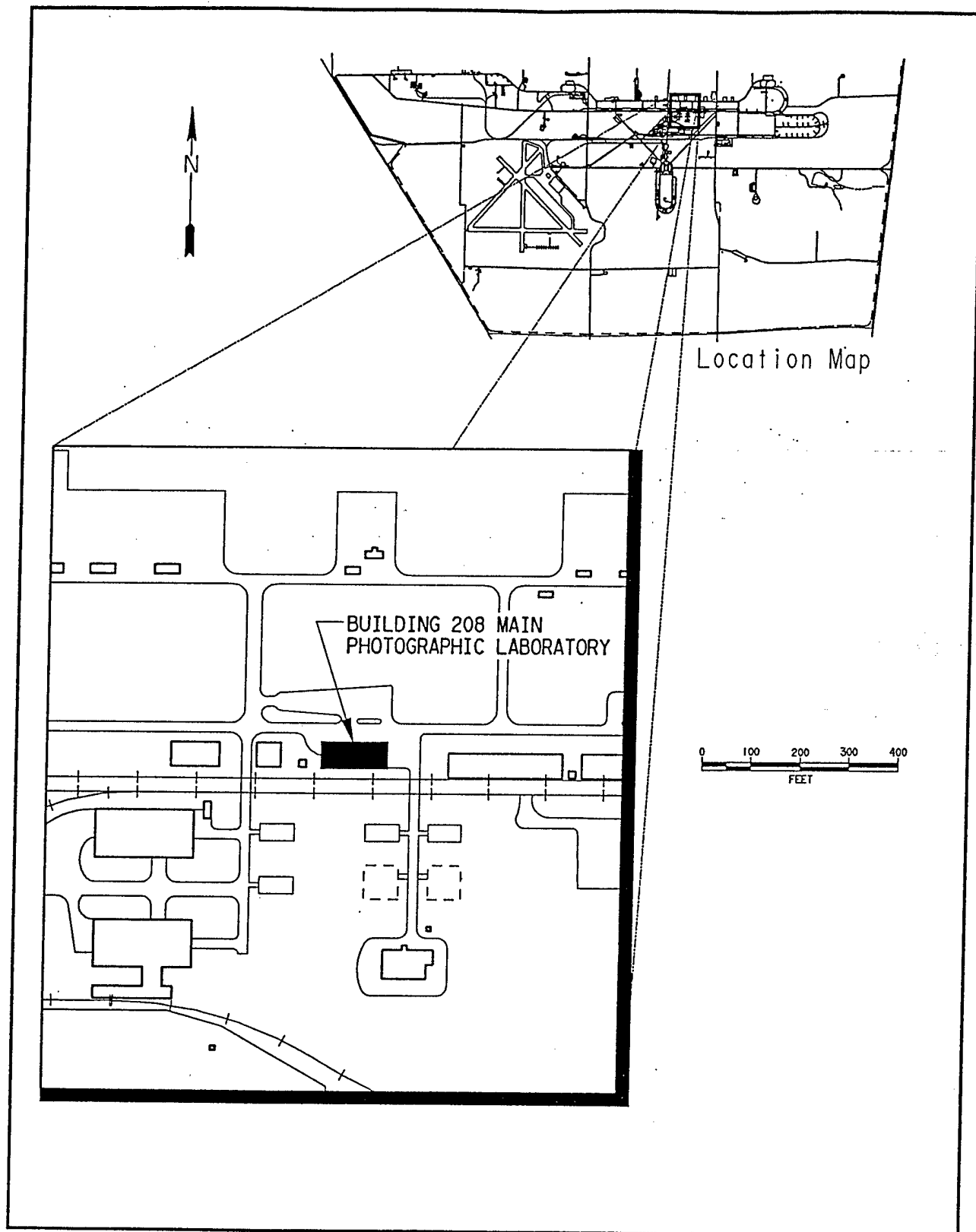


Figure 10. Location of the Building 208 Main Photographic Laboratory

quantities of black-and-white and color film for JPG activities since the 1940s. Silver is currently being recovered from spent photo-developing solution. Previously, waste toners and silver-bearing developer waste were discharged to the sanitary sewer. Following removal of the silver, spent photographic chemicals are discharged to the sanitary sewer system for treatment at the waste-water-treatment facility. Prior to 1980, cyanides and bleaches were utilized and also discharged to the waste-water-treatment plant. All wastes presently discharged to the sewer are diluted at least 20:1. The main contaminants of concern as a result of previous disposal practices are silver and cyanide.

4.8.2 *Evaluation of Contaminant Pathways*

Spent wastes are discharged directly to floor drains that are connected to the sewage system for JPG. If leakage occurred from the floor drains, a potential exists for contamination of the soils underlying Building 208. If sewer traps exist, accumulation of silver and cyanide may have occurred. The floor of the building may also be contaminated with metals. Leakage from the floor drains could result in eventual contamination of the groundwater pathway. Contaminated soils beneath the building would not be exposed to the surface-water pathway and would not pose a threat to the air pathway. Direct contact or ingestion of contaminated soils would also be unlikely unless future removal of the building and floor occur. Inhalation or dermal contact may be possible if the floor of the building is contaminated with metals. These exposure pathways can be controlled, however, through cleaning of the floor and through dust control.

4.8.3 *Evaluation of Existing Data*

No data exist for this site. However, as indicated above, the wastes are diluted 20:1 prior to entering the sewer system. Data from analysis of waste waters at the treatment plant indicate that the resulting effluent does not contain significant concentrations of contaminants.

No additional investigation appears to be warranted. This site is recommended for "No Action."

4.9 Building 333 Incinerator (New)

4.9.1 *Potential Contaminant Sources*

The Building 333 incinerator (see Figure 11), which has been in operation since 1978, is used to burn primarily paper and paper products. The incinerator is a fuel-oil-fired single-chamber unit with an afterburner. In 1988-89, polyurethane foams used as inert filler and wastes containing iron oxide were also incinerated. The resulting ash was characterized and properly disposed of. The test burn of these materials was unsuccessful and the practice was discontinued. Ash from the incinerator is placed in fiber drums and taken to the Gate 19 Landfill. Potential contaminants in the ash of the incinerator are primarily heavy metals.

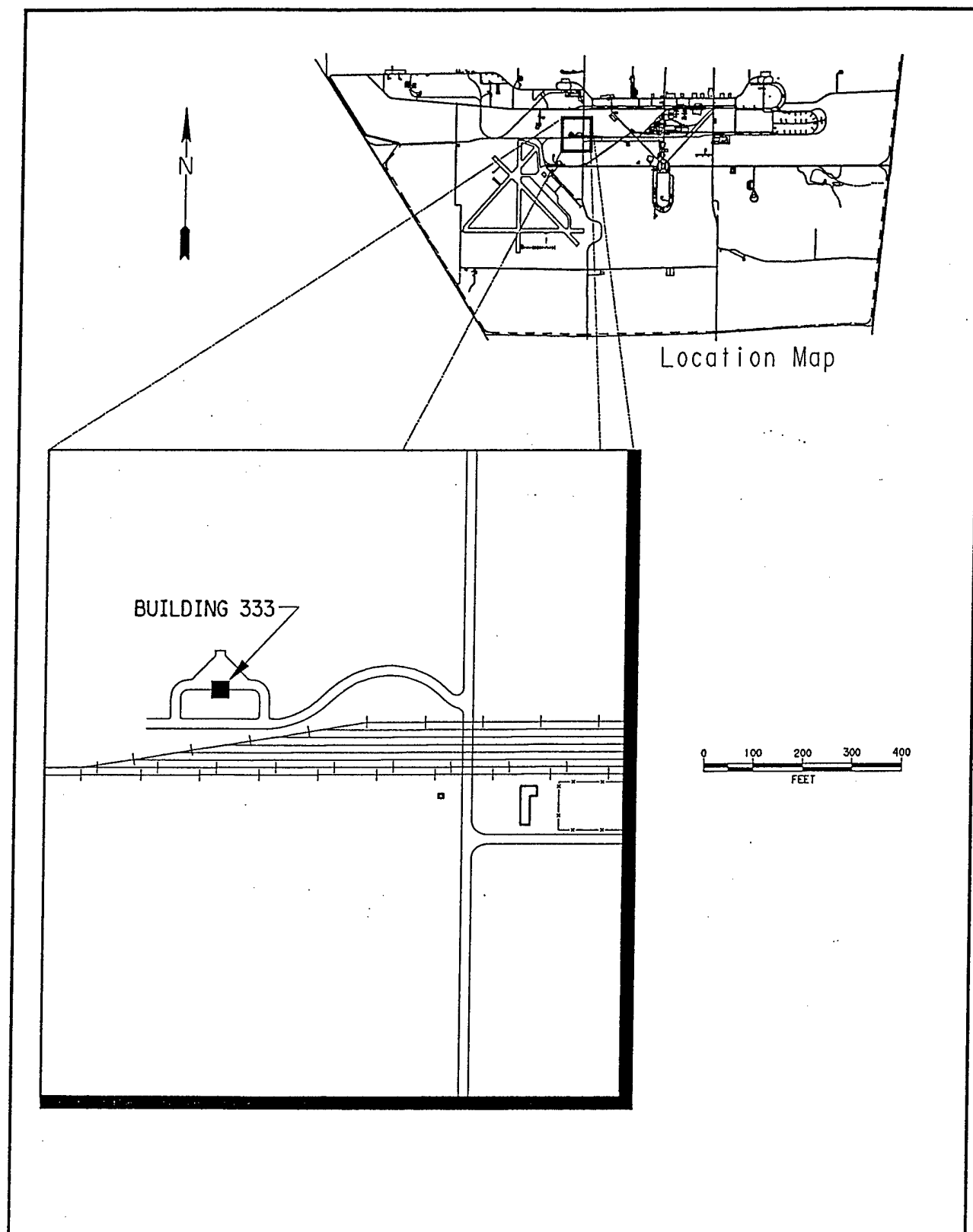


Figure 11. Location of Building 333 Incinerator

4.9.2 Evaluation of Contaminant Pathways

Although a potential exists for airborne contamination in the form of particulates (ash) from the incinerator stack, the major pathway of concern would be related to the landfill disposal of contaminated ash. Landfill burial of contaminated ash could result in soils and groundwater contamination.

4.9.3 Evaluation of Existing Data

Ash from the incinerator is currently being monitored through analysis of RCRA characteristics, including total sulfide, ignitability, pH, and TCLP metals. As a result of the current waste-characterization program, it appears that no further investigations are needed for this site unless the site is scheduled for removal or release for unrestricted use. In this case, data from the incinerator stack and interior would be needed. This site is recommended for "No Action."

4.10 Small Arms Firing Range

4.10.1 Potential Contaminant Sources

The indoor range (see Figure 12) was primarily used to test small arms and for training purposes. The range was closed several years ago due to concerns of lead-dust contamination derived from lead bullets used in the range. In addition to the potential lead contamination, one lane was found to contain a test facility used for testing-trip flares (on the basis of procedures found in the control room) during a site visit by SEC Donohue personnel in October 1991. The walls and floor of the test facility are covered with an unidentified white powdery substance. Tiles observed on the walls of the building are thought to contain asbestos (chrysotile).

4.10.2 Evaluation of Contaminant Pathways

The pathway of concern at the Small Arms Indoor Range is the air pathway due to the potential for exposure to lead oxides, lead dust, and asbestos. Currently, the building is inactive and only used for storage. Other pathways are not a concern since any contaminants would be contained within the building.

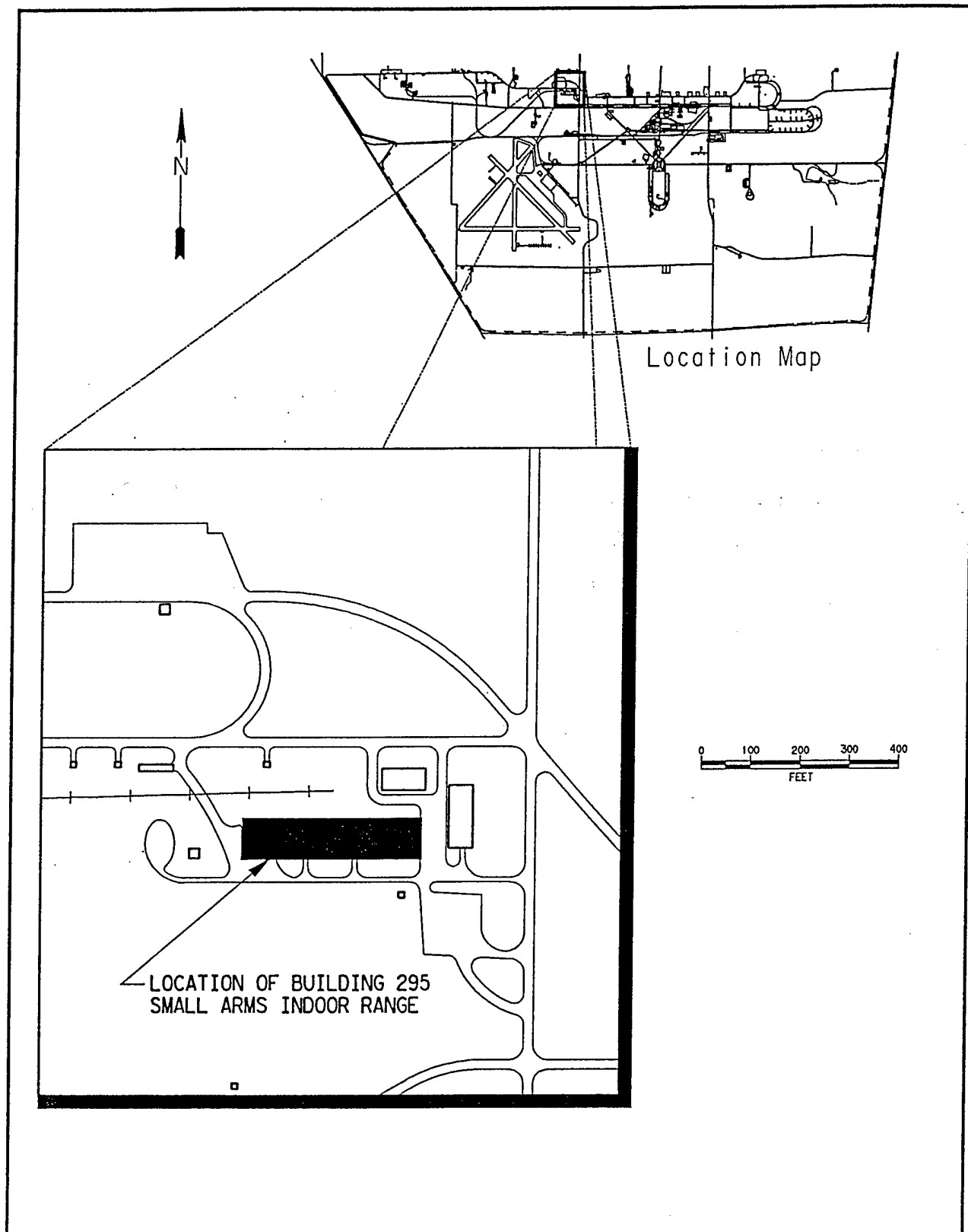


Figure 12. Location of the Building 295 Small Arms Indoor Range

4.10.3 *Evaluation of Existing Data*

No previous data are available for this site.

4.11 Burning Ground (South of Gate 19 Landfill)

4.11.1 *Potential Contaminant Sources*

The Burning Ground, a 1/2-acre thermal-treatment area used for the open burning of construction debris and waste propellants, is located immediately south of the Gate 19 Landfill (see Figure 13). The burning area, which was used between the 1950s and 1970s, reportedly also received trichloroethylene (TCE) and paint waste. Aerial photographs of the site show liquid-filled trenches and mounded material present. The area is currently overgrown with vegetation, and the burning area is not readily discernable. Contaminants of concern are tetrachloroethylene and metals.

4.11.2 *Evaluation of Contaminant Pathways*

Surface- and subsurface-soil contamination related to solvents, paint residue, and ash from open burning is likely to be present at the site. Adjacent to the site is a pond that appears to be a discharge point for shallow groundwater. Contact of groundwater with the materials present in the former trenches would result in the contamination of both the surface and groundwater pathway. The spent solvents and metals are likely to be highly mobile in the groundwater environment. The air pathway may be contaminated through volatilization of VOCs or through airborne particulates resulting in an inhalation hazard. In addition, surface runoff during precipitation events might result in mobilization of contaminants to the surface-water pathway.

4.11.3 *Evaluation of Existing Data*

Groundwater-monitoring wells are present at the Gate 19 Landfill (see Figure 13) immediately adjacent to the burning area. However, groundwater-flow information is insufficient to determine whether the open burning site is being adequately monitored. Monitoring wells located along the West Perimeter Road were intended to detect any contamination plume originating from the burning ground. To date, data from these wells indicate that no such contaminant plume exists. Additional groundwater-flow information is needed to more accurately define groundwater-flow directions in the area of the burning ground. A potential exists for off-site migration of contaminated groundwater to private drinking-water supplies. Monitoring data collected to date do not indicate that contamination of the groundwater has occurred. No data have been collected to determine if contaminants are present in surface and subsurface soils at the site.

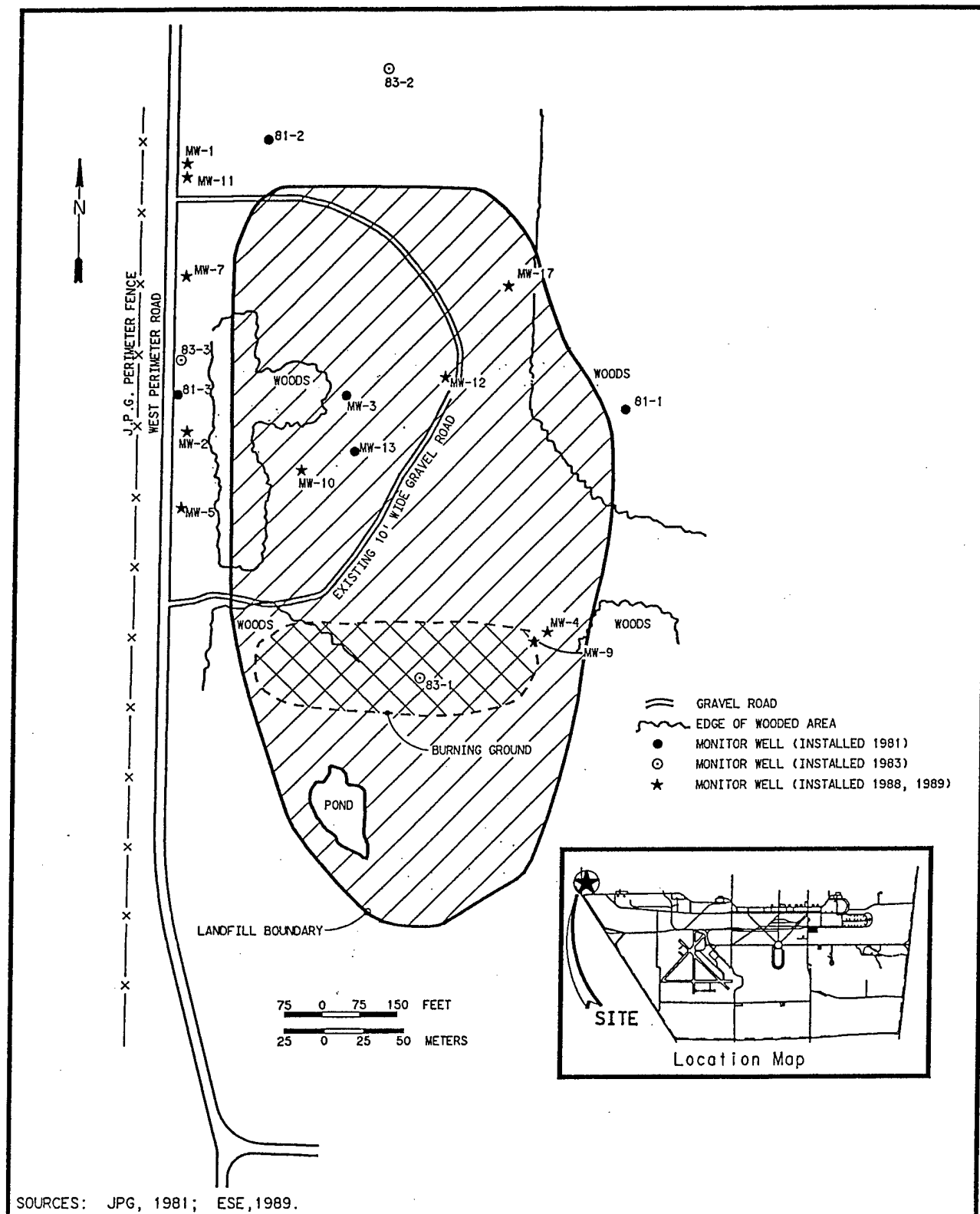


Figure 13. Location of the Gate 19 Landfill and Burning Ground South of the Gate 19 Landfill

4.12 Gate 19 Landfill

4.12.1 *Potential Contaminant Sources*

The Gate 19 Landfill (see Figure 13) is an active 12-acre landfill that includes an asbestos-disposal area and waste pile of construction debris. Disposal of asbestos is in a separate portion of the landfill than the construction debris. Construction debris reportedly consists mainly of concrete block, metal, wire, and a minor amount of wood debris, which was deposited on the ground surface over as much as 10 acres of the 12-acre area. The area also receives ash from the new incinerator and other non-combustible trash. Previously, however, the landfill reportedly received red lead paint and methylene chloride/polyurethane residues. Between 1960 and 1980, the site also reportedly received 1,000 to 10,000 gallons of TCE and paint. Contaminants of concern are primarily solvents and metals. Asbestos is double bagged and buried, which significantly reduces risk to exposure of asbestos.

4.12.2 *Evaluation of Contaminant Pathways*

Soil contamination as a result of improper disposal of solvents and paint residue is likely to be present. Exposure to these contaminants through direct contact or through inhalation of airborne contaminants is minimal due to the soil cover and vegetation over most of the landfill area. Some potential exists for exposure to asbestos due to improper handling of asbestos. No evidence for asbestos contamination, however, exists.

Contamination of the surface-water pathway is possible through leaching of contaminants during precipitation events and surface runoff. Erosion observed in small ditches leaving the landfill and in the soil cover indicates that off-site migration of contaminants via the surface-water pathway is possible.

Groundwater contamination due to past disposal practices at the landfill are likely particularly with the disposal of highly mobile spent solvents. Although they have a lower mobility, metals may also have migrated to the groundwater pathway. Groundwater flow is reportedly to the west-northwest (ESE, 1988), which could result in off-site migration of contaminants. The locations of local water wells and the presence of potentially affected residents are unknown.

If future activities at the landfill require excavation, engineering controls (i.e., dust control), and personal protective equipment will be required to minimize the potential for human exposure.

4.12.3 *Evaluation of Existing Data*

An RI/FS was previously conducted at the Gate 19 Landfill site by Environmental Science and Engineering (ESE, 1989). During this investigation, 12 groundwater-monitoring wells were installed to monitor any potential migration of contaminants from the landfill. Prior to

the ESE investigation, eight groundwater-monitoring wells had been installed at the site. Analytical results from the RI/FS indicate that groundwater contamination may not exist; however, because infiltration of precipitation presents ongoing potential for leachate generation and contaminant migration to the groundwater system, additional sampling of Gate 19 monitoring wells was conducted during the SSSA in January 1992. The results were published in a letter report in August 1992. Mercury at the Gate 19 Landfill exceeded federal criteria in wells MW2, MW4, and MW7. It was recommended that these wells be resampled to confirm the presence of mercury in the groundwater. Resampling of wells with detected VOCs should be considered to determine the validity of the acetone and methylene-chloride data.

Additional groundwater flow data are needed to adequately determine if the existing monitoring-well network is sufficient to detect any potential migration of contaminants from the landfill site. Most of the existing wells were completed in massive and relatively impermeable bedrock. Thus, near-surface contaminants may be present but undetected since the first water-producing zone in the bedrock is reported to be about 25 feet below the surface. An evaluation of previous well completions versus the water table indicates that the bedrock aquifer is under some artesian head. This artesian condition indicates that bedrock groundwater will most likely discharge into local surface streams along fractures and bedding planes. Additional groundwater data are needed to evaluate this potential pathway.

No soils data appear to be available for the landfill to evaluate the nature and extent of soil contamination beneath the landfill. Identification of specific areas of solvent and paint disposal within the landfill would allow a better evaluation of whether the location of existing monitoring wells is adequate in order to properly monitor possible contaminant migration.

There is currently no information on the presence of nearby water-supply wells or potentially affected populations. Identification of potentially affected wells and residents would allow for a thorough receptor/pathway analysis during the Baseline Risk Assessment.

4.13 Burning Area for Explosive Residue

4.13.1 *Potential Contaminant Sources*

This burning area is an active-powder burning area located in the southeast corner of the installation just east of Shun Pike Road (see Figure 14). The site has been used since the early 1950s to burn explosive waste and materials contaminated with explosive residues. Approximately 60,000 pounds per year have been open burned at this location. Currently, the burning is conducted in metal trays with locking covers, and the ash is being appropriately disposed of after analysis for hazardous characteristics. In the past, however, the open burning was performed on the ground. Analysis of ash in one report indicated the ash contained EPA toxic lead. This was believed to be the result of a failure to remove the

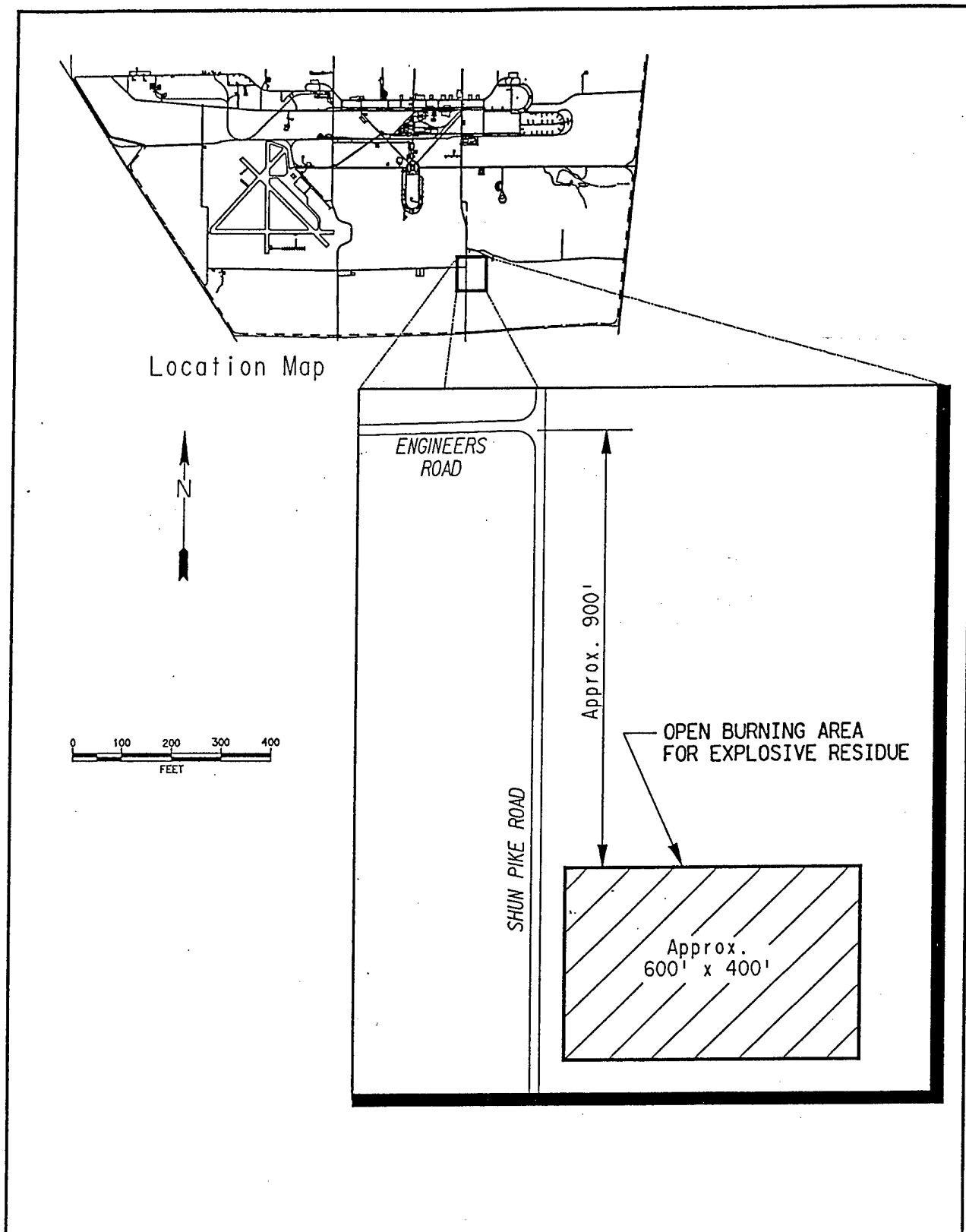


Figure 14. Location Map of Open Burning Area for Explosive Residue

lead jacket surrounding the propellant prior to burning. The ash-containing lead was reported to have been disposed of as a hazardous waste. All other ash has been taken to the Gate 19 Landfill for disposal.

The primary waste products resulting from the open burning of propellant include TNT, DNT, and heavy metals. Herbicides have been used extensively in the area to remove vegetation and may also have resulted in extensive soil contamination.

4.13.2 *Evaluation of Contaminant Pathways*

Potential contaminant releases to the environment include air transport (i.e., gases, vapors, and particulates) and leaching of contaminants from soils/gravel at the site. Previous burning operations that were conducted on the ground likely resulted in fairly widespread contamination of the soils. Mobile contaminants may be leached from the soils and transported to the surface-water and groundwater pathways via surface runoff and infiltration of precipitation. Since access to the site is restricted (by use of a locked gate) to authorized JPG personnel and safety precautions are taken during the burning operations, it is assumed that risk to human health as a result of present operations is minimal. The major risk is related to potential contamination of the surface-water and groundwater pathways.

If future uses for the site include unrestricted access, then the potential for dermal contact, ingestion, and inhalation of contaminants in surface soils would be considered a hazard to human health, and corrective action would likely be required.

4.13.3 *Evaluation of Existing Data*

Although analyses of ash disposed of in the Gate 19 Landfill show that contaminants are below maximum-concentration levels listed under 40 CFR 261, contaminants from previous open burning on the ground may be more concentrated, especially for heavy metals. No soil samples have been analyzed from the former burn areas at the site.

4.14 Building 602, 617, and 279 Solvent Pits

4.14.1 *Potential Contaminant Sources*

Buildings 602, 617, and 279 are all ammunition-assembly plants. Buildings 617 and 279 are inactive. The three solvent disposal pits of concern are located immediately adjacent to Buildings 602 (Figure 15), 617 (Figure 16), and 279 (Figure 17). The pits consist of 3-foot-diameter by 3-foot-deep gravel-filled (crushed rock) pits. They were used from 1970 to 1978 to dispose of waste solvents/degreasers, including TCE used during routine maintenance and sonic cleaning of gauges. It is estimated that from 4 gallons to 500 gallons of TCE were disposed of in these pits. Other unknown solvents and degreasers were likely disposed of in the pits. This disposal practice would result in VOC contamination of the surrounding soils.

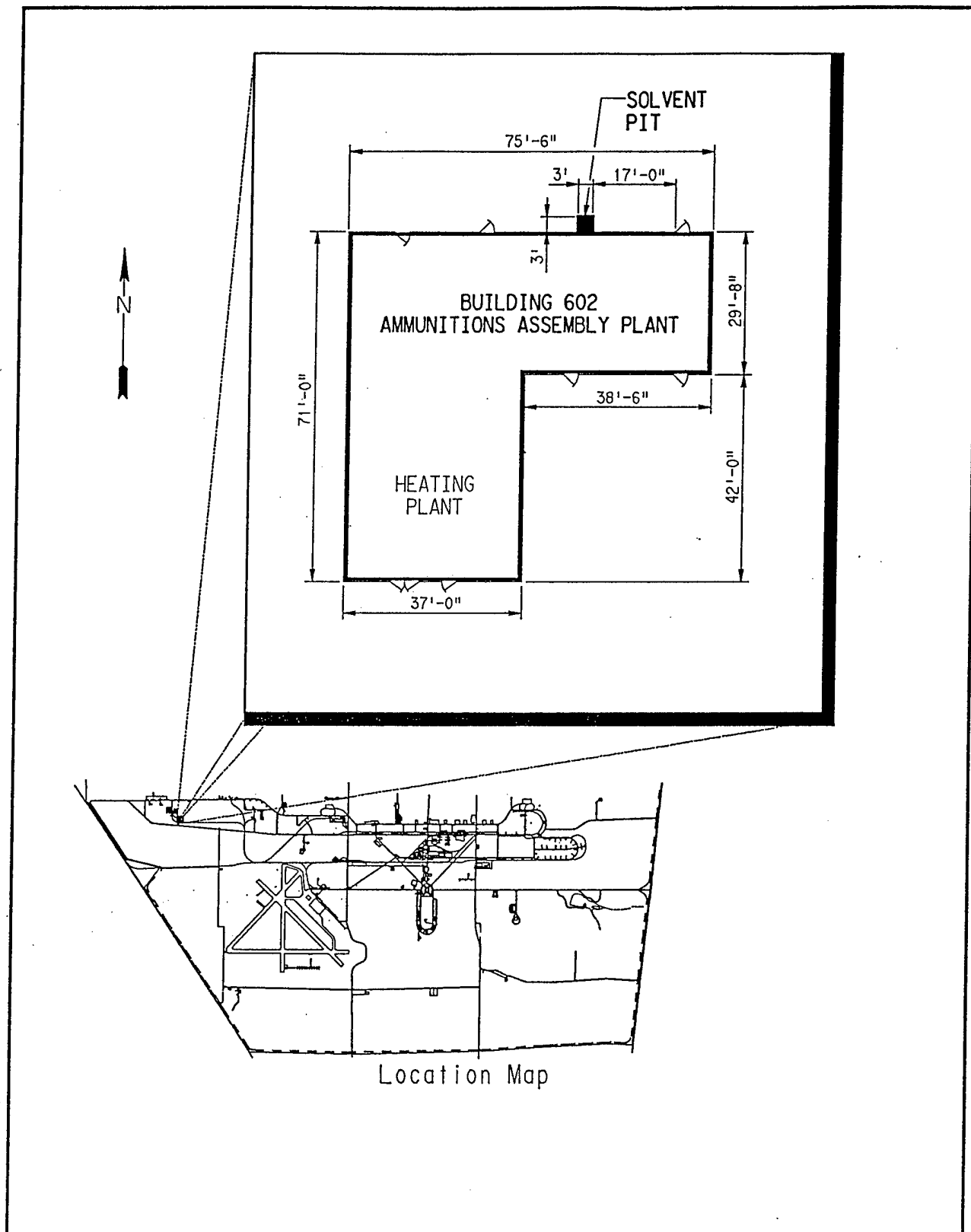


Figure 15. Location of Building 602, Solvent Disposal Pit

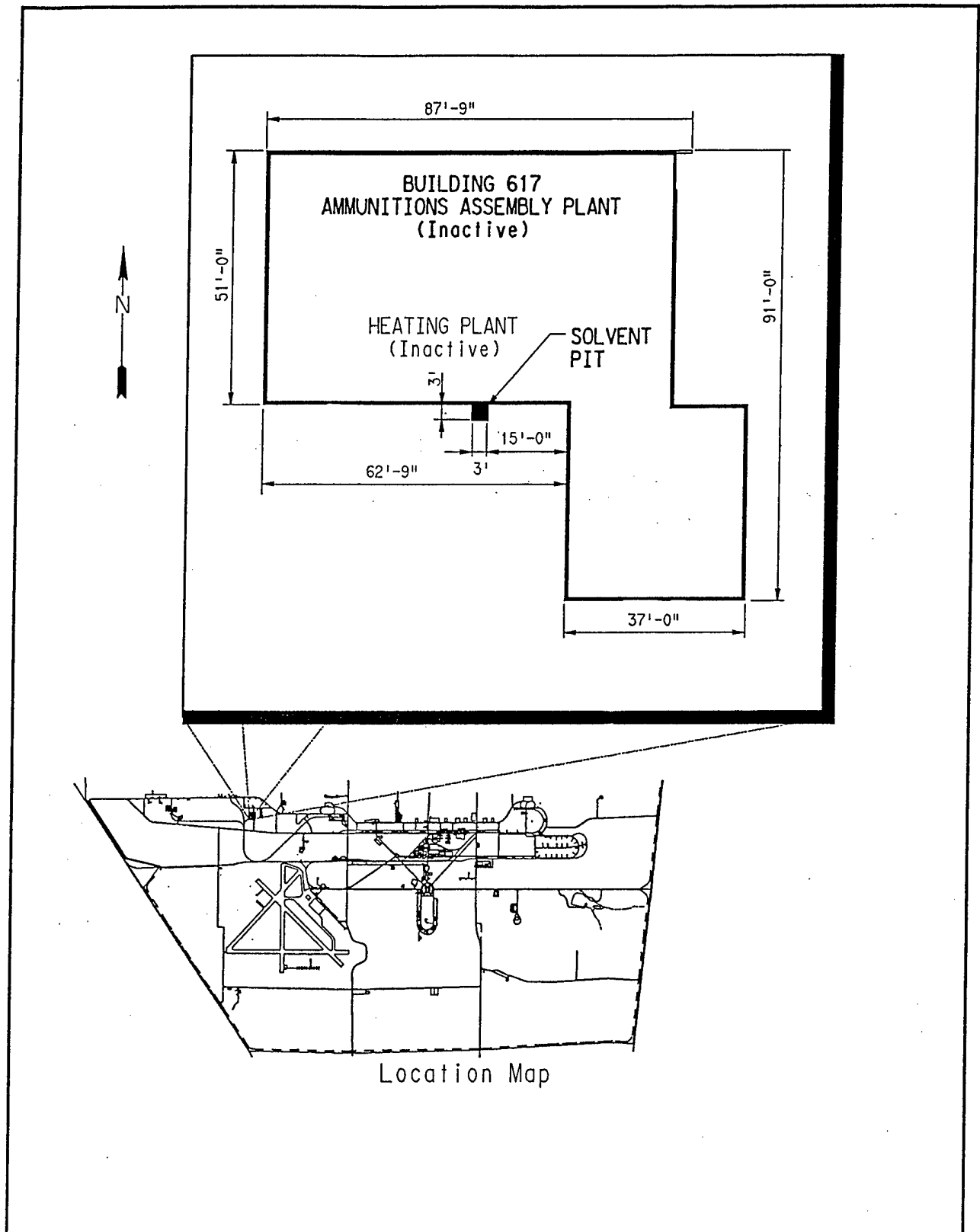


Figure 16. Location of Building 617, Solvent Disposal Pit

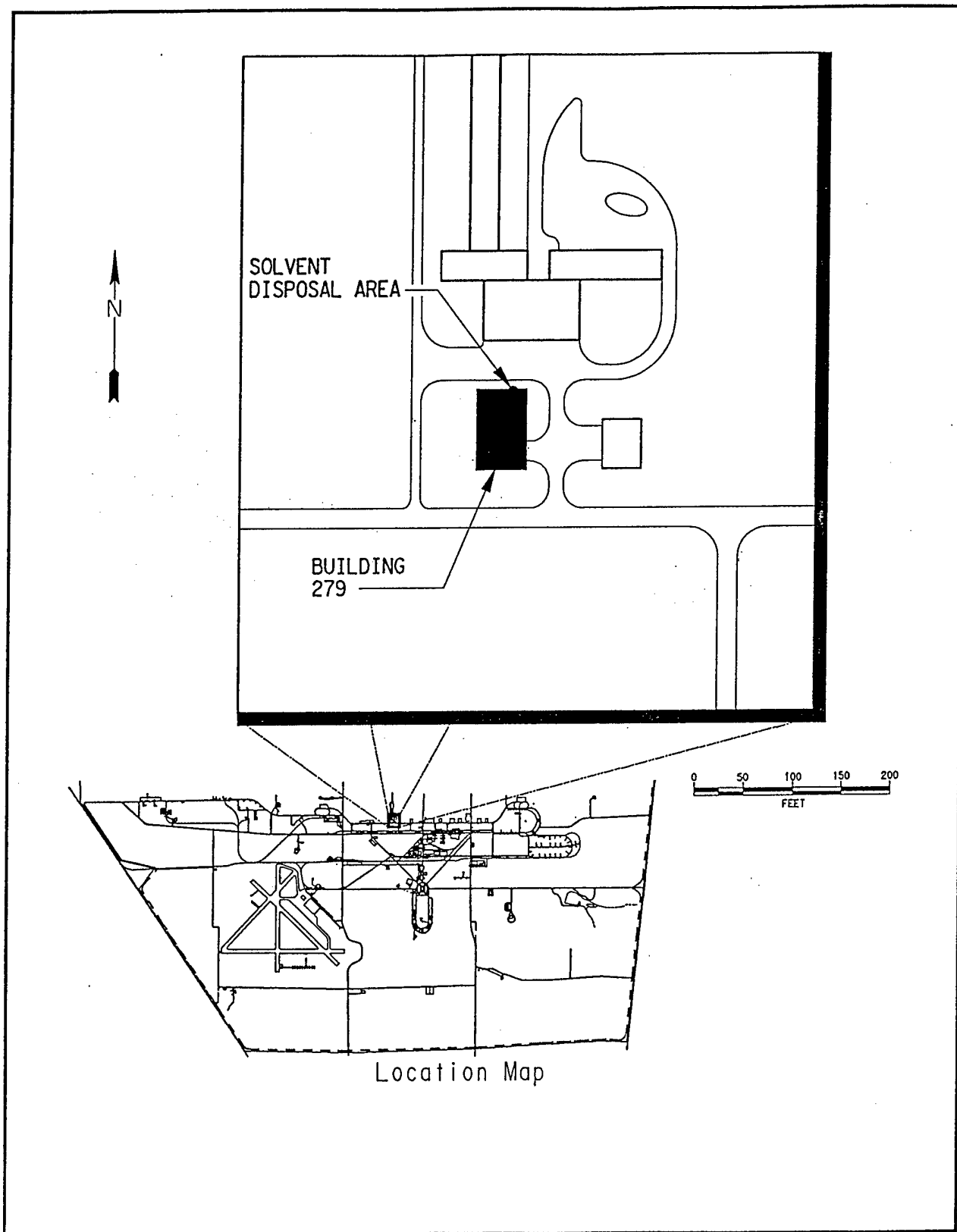


Figure 17. Location of Building 279, Solvent Disposal Pit

4.14.2 *Evaluation of Contaminant Pathways*

Since the disposal of solvents and degreasers was in rock-lined pits, the contaminants would be present in subsurface soils with the potential for downward migration of VOCs to the groundwater pathway. In addition, volatilization of the VOCs could result in contamination of the air pathway resulting in an inhalation hazard.

4.14.3 *Evaluation of Existing Data*

RI/FS investigations were conducted at the three locations. These investigations consisted of soil-gas surveys, soil sampling, and groundwater sampling (Building 279 only). Results of the soil-gas sampling indicated VOC contamination at all three locations. Soil samples collected immediately adjacent to the pits (2 to 3 feet) contained the following contaminants:

- Building 602 - acetone
1,1,1 trichloroethane
1,1,2 trichloroethane
1,1 dichloroethane
1,2 dichloroethane
toluene
trichloroethene
- Building 617 - acetone
benzene
chloroform
1,1 dichloroethane
1,2 dichloroethane
1,1 dichloroethene
1,2 dichloroethene
toluene
1,1,1 trichloroethane
trichloroethene
- Building 279 - 1,1,1 trichloroethane
hexane
trichlorofluoromethane
1,1 dichloroethene

In addition to the soil sampling, three groundwater-monitoring wells were installed at Building 279 to determine if groundwater contamination exists at the site. Of the three monitoring wells, only water samples from one well, MW15 (see Figure 17) contained elevated concentrations of VOCs. This well is located within 10 feet of the disposal pit. Contaminants detected in groundwater at MW15 included 1,1 dichloroethane; 1,1,1

trichloroethane; and trichloroethene. The absence of contaminants in the other two wells indicates that the contamination has not migrated very far from the source area.

The lateral and vertical extent of contamination have not been defined by the limited sampling performed at the three sites. The sampling did confirm, however, that the contamination may be migrating to the groundwater pathway. Additional sampling and analysis are needed to further characterize the nature and extent of contamination related to the disposal pits.

4.15 Old Fire Training Pit

4.15.1 *Potential Contaminant Sources*

The old fire training pit is an unlined 200-square-foot (20 x 10 feet) pit that is approximately two feet deep. It is located adjacent to the abandoned runway (see Figure 18) and was used for fire-training exercises from the 1970s through the 1980s. The standard practice for this fire training included soaking wood debris with diesel and other petroleum products and igniting the wood. Fire fighters then extinguished the resulting fire. Due to incomplete combustion of the fuel, it is likely that petroleum hydrocarbons entered subsurface soils. The fuels used may have also contained lead or other heavy metals. Semi-volatile organic compounds (including PCBs) may also have entered the soils at the fire-training pit.

4.15.2 *Evaluation of Contaminant Pathways*

Groundwater is estimated to be approximately 20 feet below the surface at the fire-training site. Migration of contaminants from the pit to the groundwater pathway is likely. During periods of heavy precipitation, the pit fills with water and may overflow resulting in a release of contaminants to the surface-water pathway. Since the pit is currently inactive, its floor is covered with vegetation. The vegetation minimizes the risk of human exposure due to airborne particulates. Since the site is no longer in use, the risk of direct contact with contaminants is also minimal. The major pathway of concern is the groundwater pathway. Direct contact, ingestion, and inhalation through the air pathway may be a concern if conditions change (i.e., removal of vegetation) in the future.

4.15.3 *Evaluation of Existing Data*

No previous investigations have been conducted at the fire-training pit. Both soil and groundwater data are needed to evaluate whether significant contaminant releases have occurred.

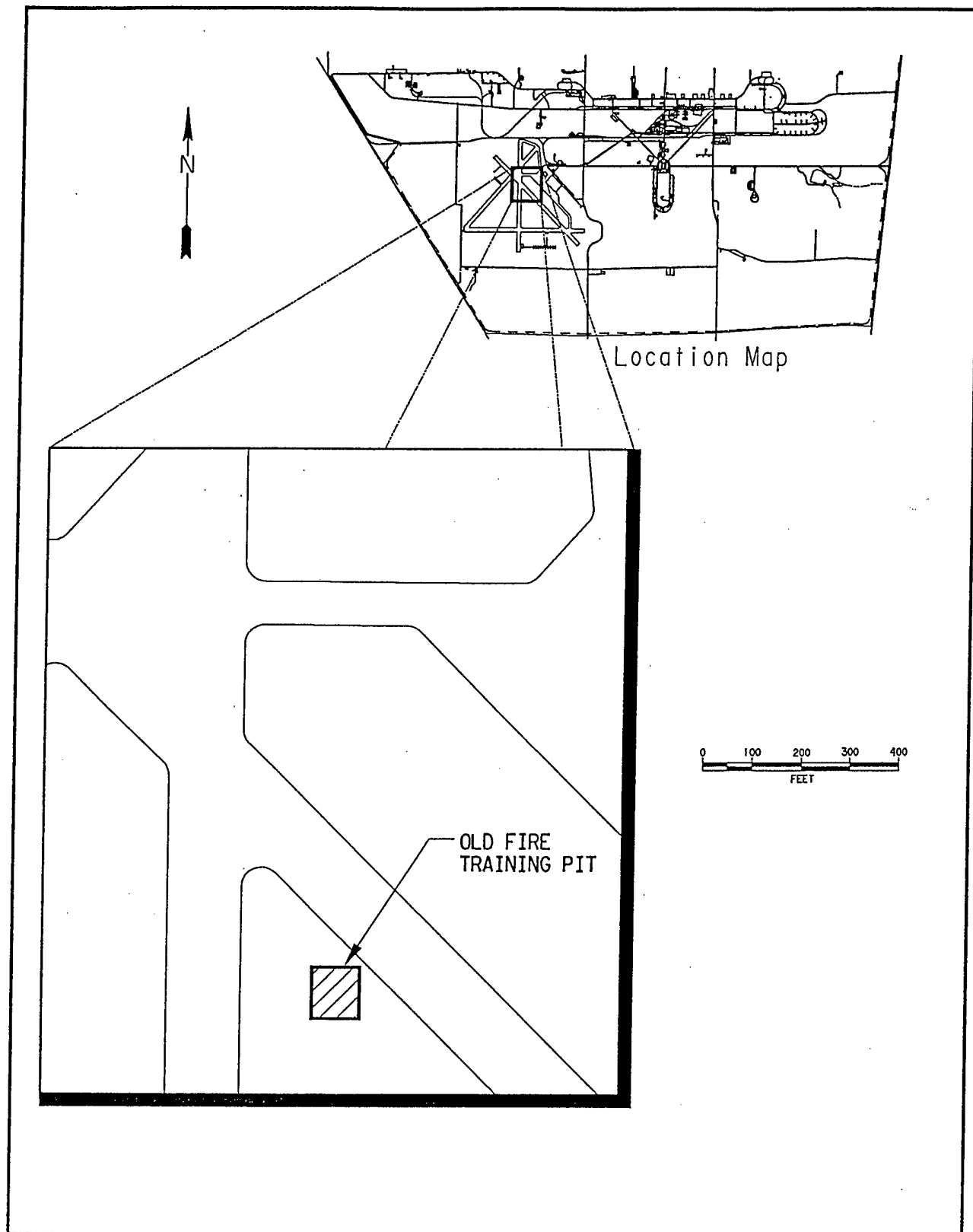


Figure 18. Location of Old Fire Training Pit

4.16 Temporary Storage Areas (Buildings 105, 186, 204, 211, and 227)

4.16.1 Potential Contaminant Sources

Facility-support buildings at JPG use, or have used, a variety of oils, solvents, lubricants, and other process materials that are routinely collected and temporarily stored pending on-site or off-site disposal. The wastes shown in Table 5 are, or have been, stored at each of the five identified buildings. Spills of stored materials during loading, unloading, or storage could result in release of contaminants to environmental pathways. From observations made during a site visit on October 16, 1991, the chance of major spills from any of these storage facilities is small. It appears that only minor releases may have occurred as a result of poor handling practices in the past.

*Table 5. Wastes Stored at Facility-Support Buildings at JPG
(Buildings 105, 186, 204, 211, and 227)*

Building	Wastes Generated/Stored	Storage Location
105—Metal Working Division	Stoddard solvent Used hydraulic oil	Inside building
186—Equipment Maintenance Shop	Waste diesel fuel Waste oil Stoddard solvent Ethylene glycol Lead-acid batteries	Drums west of of building (outside) and underground tank (used oil)
204—Pest Control Shop	Various herbicides Various pesticides	Inside of cans in building
211—Inert Loading	Methylene Chloride mixed in Pelron A&B	Drums west of building (outside)
227—Weapons Maintenance Workshop	Stoddard solvent Waste oil Paint waste Lubricants	Shed northeast of building

4.16.2 Evaluation of Contaminant Pathways

Building 105 has a typical wood-block-type floor that has absorbed many spills over the years. Any contaminants not absorbed by the wood floor may have reached the soils beneath the building. The migration of contaminants in the soil could eventually reach the groundwater pathway. However, it is anticipated that any previous spills would have been small and, since the soils beneath the building would be protected from significant amounts of precipitation, migration of contaminants through the soils would be slow.

Wastes from Building 186 are stored in the parking lot west of the building. The drum-accumulation area has a partially bermed concrete base that directs drainage to an oil/water separator. The separator is part of the building sanitary/floor-drain-collection system, which drains to the waste-water-treatment plant. Spills from the drums would be directed to the oil/water separator, which is cleaned as required to remove sludge. Used oil from Building 186 is stored in a 1,000-gallon underground storage tank. The potential for contaminant release is small unless leaks occur in the tank or associated piping. Testing of the tank has recently been conducted, and the tank was found to be tight.

Building 204 has a concrete floor, and containers of pesticides are stored inside. The mixing and rinsing area has a concrete berm to prevent spills. Quantities of wastes are small, and any spills in the facility would be contained and would not pose a significant risk to human health or the environment. The facility was found to be in compliance with applicable regulations during the 1990 environmental audit (EPA 1990).

Building 211 has a concrete floor, and drums of methylene-chloride-contaminated Pelron A&B are stored inside. Only small amounts of methylene chloride are disposed of in this manner, and the potential for a release is slight other than through atmospheric volatilization. There is little likelihood of a hazard to human health or the environment from such a release.

Building 227 wastes are stored in a shed (Shed 11) that consists of a roof and three walls. Since there is no containment at this storage site, spills could migrate to the surrounding soils. Migration of contaminants in the soils could eventually reach the groundwater pathway. Quantities of wastes stored in the shed are small, and any spills from the facility would not pose a significant risk to human health or the environment.

4.16.3 Evaluation of Existing Data

No previous environmental investigations have been conducted at Buildings 105, 186, 204, 211, and 227. Sampling at Buildings 105, 186, 204, 211, and 227 does not appear to be warranted unless evidence of past spills can be found (e.g., staining of surface soils). Note that the stained area at building 211 is suspected to be a red-lead-disposal area and is discussed in section 4.7.

4.17 Temporary Waste Storage Areas (Buildings 279 and 305)

4.17.1 Potential Contaminant Sources

Facility-support buildings at JPG use, or have used, a variety of oils, solvents, lubricants, and other process materials. The used wastes are routinely collected and temporarily stored pending on-site or off-site disposal. The wastes shown in Table 6 are, or have been, stored at each of the two identified buildings. Spills of stored materials during loading, unloading, or storage could result in release of contaminants to environmental pathways. From observations made during a site visit on October 16, 1991, the chance of major spills from any of these storage facilities is small. It appears that only minor releases have occurred as a result of poor handling practices in the past. Currently, JPG is in the process of developing a closure plan, as required under RCRA for Building 279 and 305.

*Table 6. Wastes Stored at Facility-Support Buildings at JPG
(Buildings 279 and 305)*

Building	Wastes Stored	Storage Location
279 - Hazardous Waste Storage	Warfarin (rodenticide) Cyanides Trichloroethane	Inside building
305 - Hazardous Waste Storage	Stoddard solvent PCB-contaminated oil Electrical transformers Asbestos Copper slats Scrap propellant Bagged ash	Inside building with waste stored in metal trays (secondary containment)

4.17.2 Evaluation of Contaminant Pathways

Building 279 was used for temporary storage of RCRA hazardous waste generated at JPG during the 1981-1982 period and was listed on RCRA, Part A. It is a one-story concrete-walled structure, approximately 77 feet by 36 feet, with an asphalt-tiled floor on a 6-inch concrete slab. The slab does not have a spill containment berm. Drummed wastes were stored in the southwestern section of the building in a 30-foot-by-17-foot area. This area contains a centralized 3-inch floor drain. Building 279 is presently occupied on a daily basis.

Building 305 is used for the temporary storage (less than 90 days) of RCRA hazardous waste

generated at JPG. It is a one-story wood-framed structure, approximately 25 feet by 30 feet, built on a 6-inch concrete slab. The slab does not have a spill containment berm. Two-inch-by-six-inch boards are secured to the walls and sealed to the concrete floor. The concrete floor of the building is cracked in several locations. Much of the waste is stored in metal trays that provide secondary containment for any materials spilled from the storage containers, which are generally small in volume. Spills could occur outside the building during loading and unloading operations. No evidence exists that any such spills have occurred.

4.17.3 Evaluation of Existing Data

An RI/FS investigation was previously conducted at Building 279 to investigate the solvent pit adjacent to the building. Results of this investigation are discussed in section 4.14.3 of this plan.

Sampling of Buildings 279 and 305 storage facilities is addressed in the RCRA Closure Plans for Buildings 279 and 305 (January 1992 and March 1992, respectively). The subject RCRA Closure Plans were developed by JPG and are subject to modification. The RI/FS will address only those sampling requirements of the closure plans that investigate the presence of contaminants prior to decontamination or removal activities.

4.18 Yellow Sulfur Disposal Area

4.18.1 Potential Contaminant Sources

Previous investigations by Ebasco (1990b) resulted in the identification of an area of yellow sulfur disposal in what appears to be a former landfill area (see Figure 19). In addition to the sulfur, other debris such as melted glass is present. The source of these materials is presently unknown. Sulfur extended to a drainage ditch. As a result of sulfur, the pH of the surrounding soils has been lowered. Due to the lack of information concerning the source of the sulfur waste and associated debris, the exact nature of the potential contamination cannot be determined.

4.18.2 Evaluation of Contaminant Pathways

Since the disposal area is located adjacent to a drainage ditch, the potential for contamination of the surface-water pathway is high. Runoff and seepage water from the sulfur disposal area are likely to have a low pH, which could affect the vegetation and aquatic life of downstream drainage areas. Other contaminants may be entering the surface water pathway from this suspected landfill area.

Leaching of contaminated soils beneath the sulfur-disposal site may also result in the contamination of the groundwater pathway.

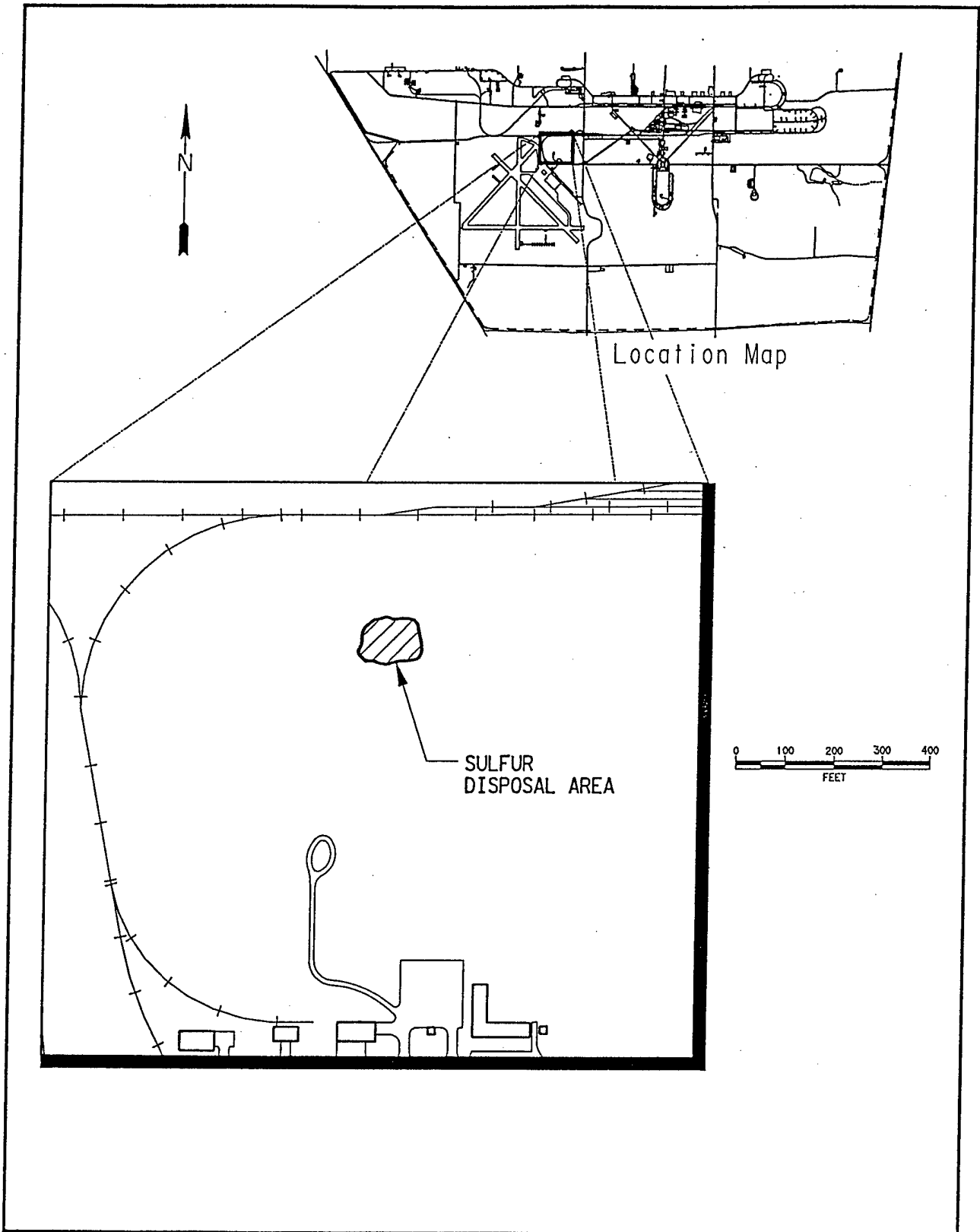


Figure 19. Location of Yellow Sulfur Disposal Area

Several exposed areas where contaminants can be seen at the surface pose an inhalation hazard as a result of wind-blown airborne particulates. Also, although current activity in the area is minimal, a potential exists for direct (dermal) contact with ingestion of contaminated soils.

4.18.3 *Evaluation of Existing Data*

Samples of the sulfur were analyzed and confirmed to be sulphur with the samples generally having a pH of less than 2. No soil samples, however, were collected during previous investigations.

4.19 Burn Area South of New Incinerator

4.19.1 *Potential Contaminant Sources*

Near the yellow-sulphur-disposal area, Ebasco (1990b) identified a burned area on the ground surface south of the new incinerator (see Figure 20). In addition, a concrete-pad area contained burned electrical wiring and components. Burned debris covers both the ground surface and concrete pad at this site. As a result of these burning activities, the contaminants of concern would likely be heavy metals released from the oxidation and corrosion of the metal debris on the surface and in the soils.

4.19.2 *Evaluation of Contaminant Pathways*

Surface runoff and infiltration of precipitation could result in the migration of metal contaminants to the surface-water and groundwater pathways, respectively. Many of the metals have a low solubility and would remain in the soils. Since this site is not in an active area, the risk of human exposure by direct contact is minimal. The ground surface at this location is covered with vegetation, which minimizes the potential for exposure due to inhalation of particulates. However, burned debris present on the concrete pad may pose a risk through inhalation of airborne particulates, ingestion, or direct contact.

4.19.3 *Evaluation of Existing Data*

No data currently exist for this site. No records of previous burning activities at this site exist.

4.20 Potential Ammo Dump Site

4.20.1 *Potential Contaminant Sources*

A historical installation map indicated an area near the intersection of Tokyo Road and the railroad tracks (see Figure 21) that was used for the dumping of ammunition. A visual inspection of the area failed to locate the site. The area is heavily vegetated. The dumping

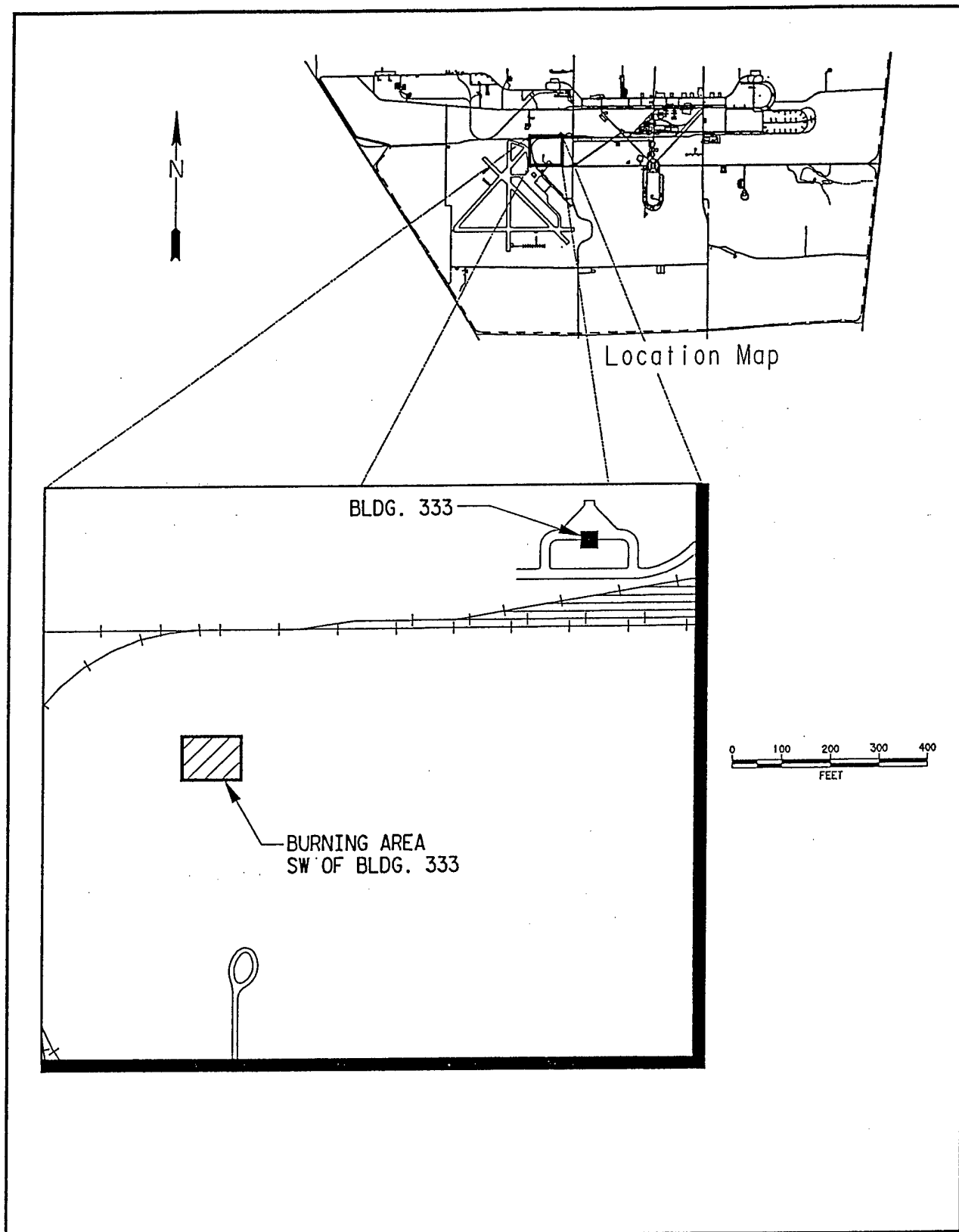


Figure 20. Location of Burning Area Southwest (SW) of Building 333 (New Incinerator)

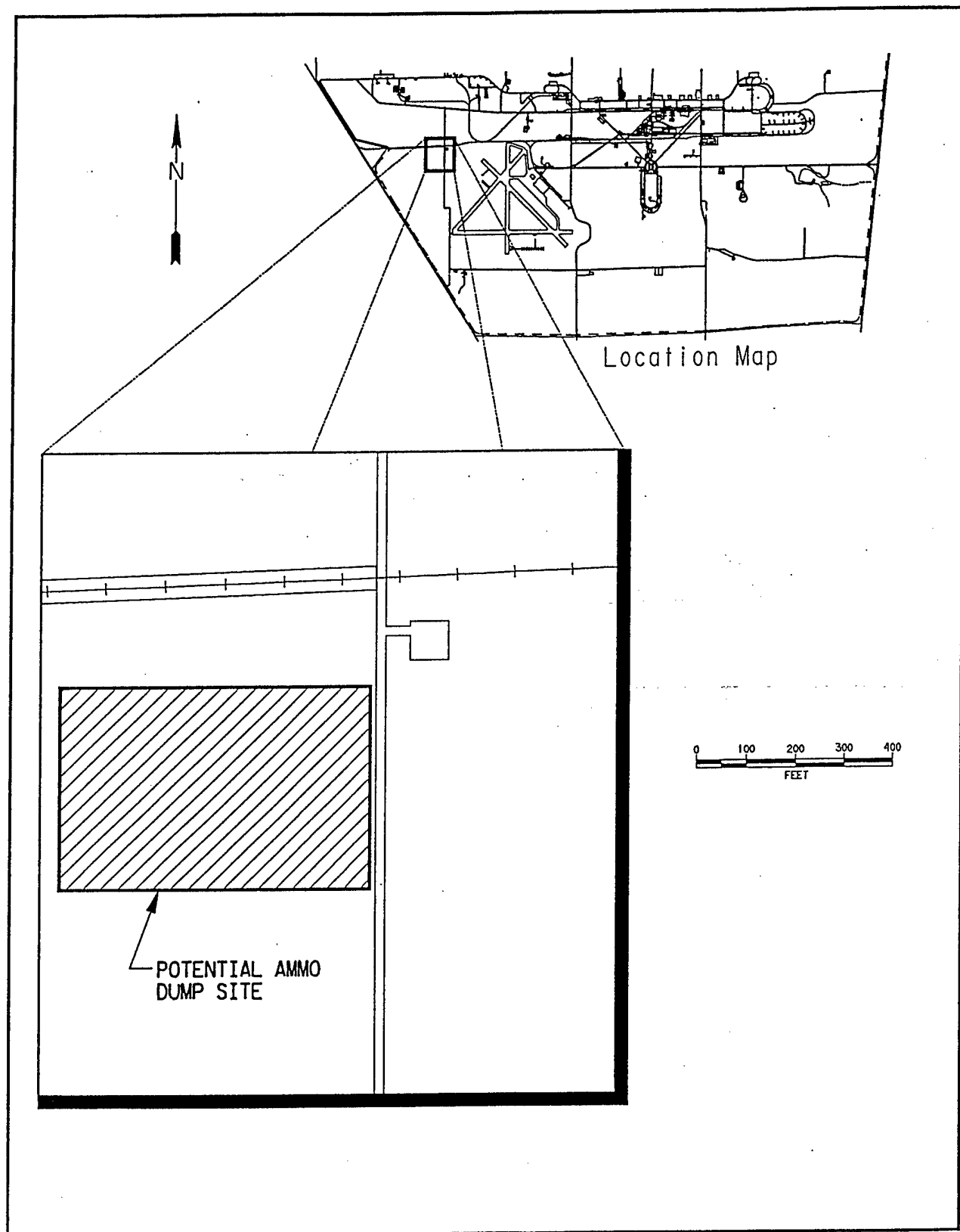


Figure 21. Approximate Location of the Potential Ammo Dump Site

of ammunition would pose a potential for both chemical and physical hazards. The chemical hazard of concern would be the release of heavy metals and explosives.

4.20.2 Evaluation of Contaminant Pathways

Buried ammunition could result in the release of metals and explosives to the surrounding soils. Leaching of the soils could result in the contamination of the groundwater pathway.

4.20.3 Evaluation of Existing Data

The accuracy of the map showing the location of the disposal area is questionable. In addition, no records exist that would indicate the type and quantity of materials dumped at this location. An initial geophysical survey may be required to determine if the site really exists.

4.21 Asbestos-Containing Materials

4.21.1 Potential Contaminant Sources

Asbestos-containing materials have been identified in several buildings at JPG. These include pipe insulation, roofing, siding, and tiles. An asbestos-exposure assessment was conducted by JPG in 1988 wherein the type and percentage of asbestos fibers were determined for a variety of materials throughout the installation. Some asbestos abatement has occurred and the materials have been disposed of at the Gate 19 Landfill. The 1988 asbestos-exposure-assessment survey should be completed by JPG to ensure that risk to human health is minimized (i.e., encapsulation of piping joints found to be in friable condition). Initial locations and bulk sampling results are presented in Appendix A of this plan.

4.21.2 Evaluation of Contaminant Pathways

A significant risk to human health exists from the abundance of asbestos-containing materials identified at JPG. The major risk is through the inhalation of asbestos fibers. Many of the asbestos-containing materials have been exposed to wind, heat, or water, which has increased the potential for human exposure from friable asbestos materials.

4.21.3 Evaluation of Existing Data

Although an active asbestos-abatement program is in place at JPG, it is suspected that not all of the potential asbestos-containing materials have been characterized. An additional survey by the installation appears to be warranted to properly identify, classify, and assess hazards associated with asbestos-containing materials at JPG.

4.22 Underground Storage Tanks

4.22.1 *Potential Contaminant Sources*

Currently there are 54 USTs that were installed between 1941 and 1955 with capacities ranging from 300 to 25,000 gallons (see Table 7). The tanks have been used for the storage of fuel oil, diesel fuel, leaded and unleaded gasoline, kerosene, and white gas. JPG has begun a program to ensure compliance with federal, state, and local regulations. In 1988, 10 inactive tanks were removed, and soil sampling in the excavation indicated that leakage of tank contents has occurred. Analytical results are presented in Appendix B. Due to the age of the tanks, it is likely that more tanks have leaked over the years, resulting in soils contamination and possible groundwater contamination. The major contaminants of concern are VOCs related to fuels (e.g., benzene). Some metals contamination may also have occurred (e.g., lead).

4.22.2 *Evaluation of Contaminant Pathways*

The major pathway of concern associated with potentially leaking USTs is the groundwater pathway. Leaking fuel could result in contaminant plumes on top of the water table with some soluble fraction of contaminants entering the groundwater itself.

4.22.3 *Evaluation of Existing Data*

Soil samples collected during the removal of tanks in 1988 were shown to contain petroleum contaminants ranging from 137 to 4,378 mg/kg. These results indicate that several of the tanks have leaked or that spills have occurred in the past. In June of 1990, the large 25,000-gallon tanks were leak tested and were found not to leak. Additional leak testing has been completed, but the results were not yet available to SEC Donohue. Evaluation of all leak-test data plus records of fuel inventory is needed to determine which of the remaining tanks, if any, have potentially released fuel contamination to the environment.

4.23 Off-Site Water Supply Wells

4.23.1 *Potential Contaminant Sources*

Two drinking-water wells (Wells 1 and 2 as shown in Figure 22), located near the Madison Country Club in downtown Madison, were formerly used to supply drinking water to JPG. Presently, JPG receives its water from the City of Madison, and the wells are no longer used. A generator was housed in the building to supply emergency power to the pumps. Associated with this generator were two underground storage tanks (USTs), one 500 gallons and one 1,000 gallons, for storage of diesel fuel. A potential exists for leakage from these tanks. The pumps for the two wells reportedly leaked oil onto the base plate and may have

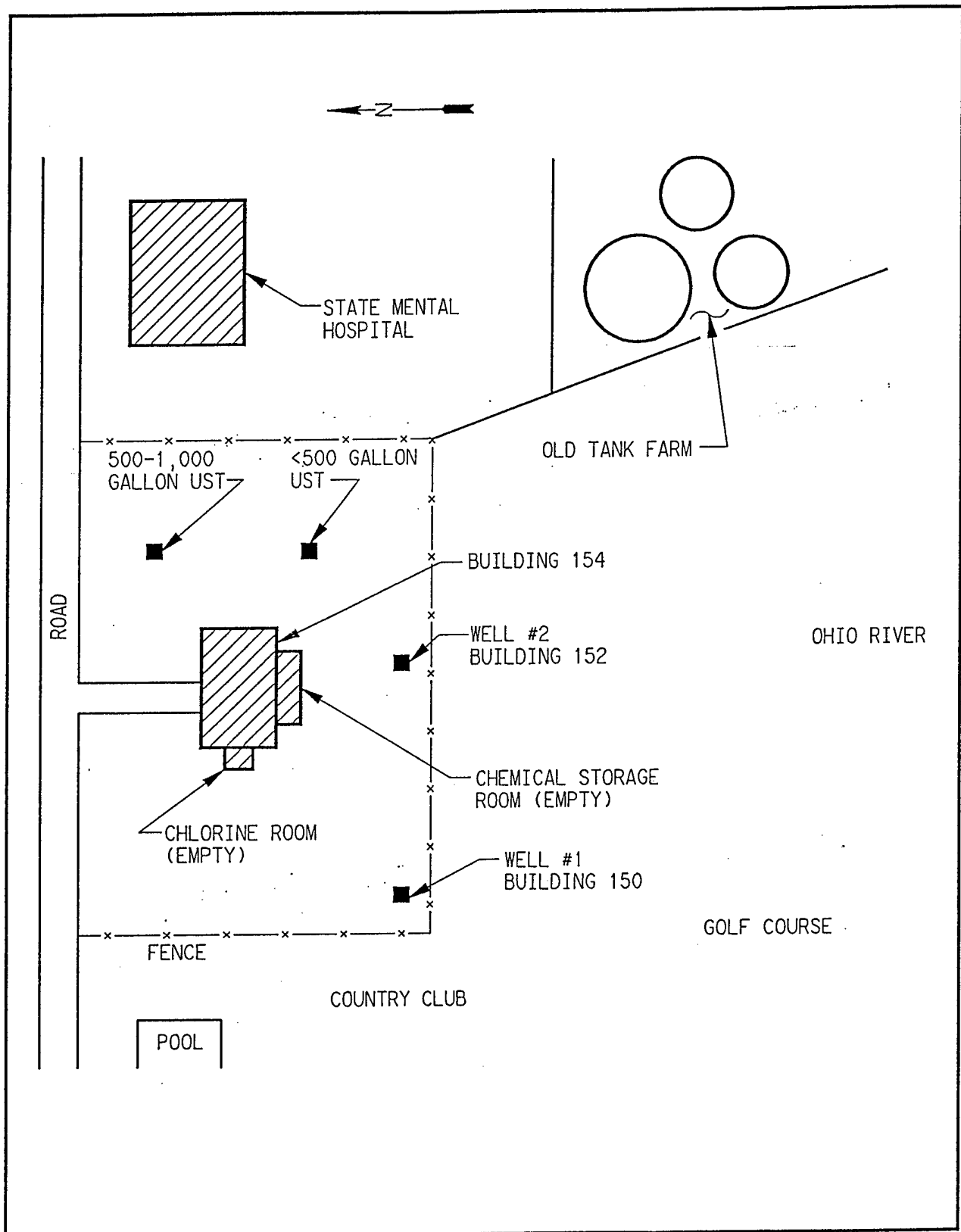


Figure 22. Off-Site Water Wells at JPG

Table 7. JPG Underground Fuel Storage Tanks*

Location	Capacity (gallon)	Installed	Fuel Type	Material
Underground Storage Tanks in Active Use (September 1987)				
B-602	1,000	**	Fuel oil number 2	steel
B-617	25,000	**	Fuel oil number 2	steel
B-103	25,000	1941	Fuel oil number 2	steel
	25,000	1941	Fuel oil number 2	steel
	25,000	1952	Fuel oil number 2	steel
	25,000	1952	Fuel oil number 2	steel
	550	1985	Diesel fuel number 2	steel
B-333	10,000	1975	Fuel oil number 2	steel
B-530	4,000	1978	Fuel oil number 2	steel
B-156	1,000	1983	Fuel oil number 2	steel
B-184	300	1968	Fuel oil number 2	steel
B-118	12,000	1942	Unleaded gas	steel
	12,000	1942	Unleaded gas	steel
	12,000	1942	Diesel fuel	steel
	25,000	1942	Fuel oil number 2	steel
	1,000	1942	Leaded gas	steel
B-236	1,000	1943	Fuel oil number 2	steel
B-125	1,000	1941	Fuel oil number 2	steel
B-313	1,000	1941	Fuel oil number 2	**
B-481	1,000	1941	Fuel oil number 2	**
B-488	500	**	Fuel oil number 2	**
B-33	1,000	**	Fuel oil number 2	**
B-127	1,000	1941	Fuel oil number 2	**
B-325	1,000	1953	Fuel oil number 2	**
B-189	500	1953	Fuel oil number 2	**
	500	1953	Fuel oil number 2	**
B-211	500	1942	Fuel oil number 2	**
B-149	500	**	Fuel oil number 2	**

*As listed in the JPG, January 1988, JPG Spill Prevention Control and Countermeasure Plan.

**Unknown at current time.

Table 7. JPG Underground Fuel Storage Tanks* (continued)

Location	Capacity (gallon)	Installed	Fuel Type	Material
Underground Storage Tanks in Active Use (September 1987)				
B-322	1,000	1942	Fuel oil number 2	**
B-281	500	1942	Fuel oil number 2	**
B-23	500	**	Fuel oil number 2	**
B-21	500	**	Fuel oil number 2	**
B-17	500	**	Fuel oil number 2	**
B-15	500	**	Fuel oil number 2	**
B-11	500	**	Fuel oil number 2	**
B-7	500	**	Fuel oil number 2	**
B-3	500	**	Fuel oil number 2	**
B-1	500	**	Fuel oil number 2	**
B-2	500	**	Fuel oil number 2	**
B-8	500	**	Fuel oil number 2	**
B-12	500	**	Fuel oil number 2	**
B-16	500	**	Fuel oil number 2	**
B-20	500	**	Fuel oil number 2	**
B-510	500	1941	Fuel oil number 2	**
B-266	500	1941	Fuel oil number 2	**
B-265	500	1941	Fuel oil number 2	**
Underground Storage Tanks Temporarily Out of Service (September 1987)				
B-602	25,000	1952	Fuel oil number 2	steel
	25,000	1952	Fuel oil number 2	steel
B-617	25,000	1952	Fuel oil number 2	steel
	25,000	1952	Fuel oil number 2	steel
B-310	25,000	1941	Fuel oil number 2	steel
Airport	25,000	1941	Fuel oil number 2	steel
	25,000	1941	Fuel oil number 2	steel

*As listed in the JPG, January 1988, JPG Spill Prevention Control and Countermeasure Plan.

**Unknown at current time.

Table 7. JPG Underground Fuel Storage Tanks (continued)*

Location	Capacity (gallon)	Installed	Fuel Type	Material
B-118	1,000	1952	Fuel oil number 2	steel
Underground Storage Tanks Permanently Out of Service (September 1987)				
B-118	625	1943	Kerosene (registered with state)	steel
	550	1943	White gas (registered)	steel
	550	1943	Fuel oil number 1 (registered)	steel
B-291	14,000	1943	B-291's tanks not registered	steel
	14,000	1943	with state	steel

*As listed in the JPG, January 1988, JPG Spill Prevention Control and Countermeasure Plan.

leaked oil into the well casings. Paint in the pump houses may contain lead. Of these potential sources of contamination, the USTs pose the greatest threat for contaminant release to environmental pathways.

4.23.2 Evaluation of Contaminant Pathways

Since the wells, pump houses, and USTs are located adjacent to the Ohio River, a potential exists for contamination of both the groundwater and surface-water pathway. Contaminants originating from the USTs would likely discharge to the Ohio River prior to entering any drinking-water supplies. However, it has been reported that USTs have been removed from the site thereby eliminating the potential source of contamination.

4.23.3 Evaluation of Existing Data

Limited data are available for this site. JPG reportedly has removed three USTs on the property. Limited site-assessment sampling is needed, however, to determine if previous releases of contaminants have occurred.

5.0 DATA NEEDS, DATA QUALITY OBJECTIVES, AND TECHNICAL APPROACH

Section 4.0 provides an assessment of 28 SWMUs and AREEs in terms of their potential for releasing contaminants to environmental pathways and the corresponding risks to human health and the environment. A review of previous investigations was also conducted to determine the need for the collection of additional data. Section 5.0 provides a summary of the identified data needs, data-quality objectives, and the technical approach to data collection for those sites that may present a significant threat to human health or the environment. Other sites, on the basis of the conceptual site model, do not appear to pose such a threat and are recommended for "No Action." These sites include:

- Water Quality Laboratory
- Photographic Laboratory
- Building 333 Incinerator (New)
- Building 105 (Temporary Waste Storage)
- Building 186 (Temporary Waste Storage)
- Building 227 (Temporary Waste Storage)

The remaining sites require the collection of additional data to determine if contaminants have been released to the environment and, if released, the levels, extent, and potential risk to human health and the environment. Although the general technical approach to data collection is presented in this section, details of the field and laboratory procedures to be used are provided in the Sampling Design Plan (Volume II).

Data Quality in this section is expressed in terms of levels established by the EPA to describe analytical levels that are appropriate for the different data uses under the RI/FS process. A Level I refers primarily to field measurements and field-test kits that can provide an indication of contamination, but generally do not provide accurate concentration values. Level II uses instruments and techniques with the ability to identify specific analytes and to assign a concentration, but with a wide range in data quality depending upon equipment and procedures used. Level III generally corresponds to laboratory analysis using EPA Contract Laboratory Program (CLP) procedures with similar detection limits, but requiring less rigid QA/QC requirements than CLP. Level IV refers to laboratory analysis using CLP procedures and protocols with rigorous QA/QC. Data uses for these RI/FS sites are limited primarily to site- characterization and risk-assessment activities. Evaluation of remedial-action alternatives may require more data than proposed in this plan (i.e., accurate volume estimates of contaminants exceeding remedial-action standards). USATHAMA-certified analytical methods are to be used for this RI/FS; an example of a correlation table between EPA methods and USATHAMA methods has been prepared (see Table 8). Data Quality Levels III and IV also apply to USATHAMA-certified methods.

5.1 Building 185 Incinerator

5.1.1 Data Needs

Past operations may have contaminated soil downwind of the incinerator; thus, soil sampling is needed to determine if contamination exists.

5.1.2 Data Quality Objectives

Metals contamination to soils may have resulted from the settling and leaching of incinerator ash downwind of the facility. Evaluation of wind direction data indicates that prevailing winds are from two directions, south and west-northwest. TCLP metals are contaminants of concern.

5.1.3 Technical Approach

Two near surface soil samples should be collected to determine if metal contaminants are present downwind of the incinerator. One sample should be collected on the east-southeast side of the building and another on the north side of the building. Samples should be analyzed for TCLP metals.

5.2 Building 177 Sewage Treatment Plant

5.2.1 Data Needs

Although the outfall to Harberts Creek is monitored to satisfy NPDES permit requirements, bypass releases have occurred in the past that may have resulted in the release of hazardous

Table 8. USATHAMA Methods Correlation to EPA Methods

USATHAMA METHOD	DESCRIPTION	EPA METHOD
JS15, SS16	Metals by ICP	200.7 ^a
JD13, SD24	Metals (AS, SE, AG, PB) by AA GF	206.2, 270.2, 272.2, 239.2 ^a
JB03, SB03	Mercury by AA CV	245.2 ^a
KY02, TY12	Cyanide	335.5 ^a
KT04, TT08	Anions by IC	300 ^a
LM16, UM33	Volatiles Organics by GC/MS	8240 ^b , 624 ^c
LM15, UM16	Semivolatile Organics by GC/MS	8270 ^b , 625 ^c
LW26, UW26	Herbicides by HPCL	---
LN03, UN05	NP Pesticides by GC/NPD	507 ^d
Not Certified	Bromacil by GC/ECD	507 ^d

^aMethods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020.

^bTest Methods for Evaluating Solid Waste, SW-846, November 1986.

^c40 CFR 136.

^dMethods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water, September 1986.

Note.— The USATHAMA methods follow the basic procedures described in these cited EPA methods. Minor modifications have been developed in these methods to provide the low detection limits (certified reporting limits), maximum analytical concentration ranges, and specific quality control and acceptance criteria required by the USATHAMA programs.

contaminants to the surface-water pathway. Data are needed to determine if sediments in Harbert Creek contain potentially hazardous contaminants resulting from sewage-treatment-plant outfall discharges.

Previous storage and on-site disposal of sludge may have resulted in contamination of surface soils. No data have been collected to confirm whether contaminant releases have occurred as a result of previous storage and disposal practices. Soil samples at previous storage and disposal locations are needed to provide these initial data.

5.2.2 Data Quality Objectives

Industrial-waste discharges may have introduced metals contamination (Photographic Laboratory) and waste oil (oil/water separator, Building 186). The objective of the sampling of Harbert Creek is to confirm the presence or absence of potentially hazardous contaminants related to sewage-treatment-plant discharge. Therefore, the samples collected will be analyzed for TCLP metals, cyanide, and total petroleum hydrocarbons (TPH). An EPA Level III data quality will be obtained.

Areas where former on-site storage or disposal of sewage sludge occurred should be identified and sampled to determine if potentially hazardous contaminants have been released to soils as a result of leaching from the sludge. The contaminants of concern are heavy metals, which may remain after treatment. Soil samples are needed to confirm the presence or absence of metal contaminants in soils where sludge was stored or disposed of. Samples will be analyzed for TCLP metals and cyanide with the resulting data being a quality of EPA Level III. The following proposed sampling is not designed to characterize each site, but is designed to determine if further study is warranted.

5.2.3 Technical Approach

Three downstream and two upstream samples of sediment should be collected from Harbert Creek. The sample locations should be spaced 50 feet apart with the first upstream and downstream samples being located 50 feet from the sewage-treatment-plant outfall. The upstream samples will help define whether contaminants in the sediments (if any) are related to waste-water discharge or other upstream sources. Samples will consist of grab samplings from 0 to 6 inches in depth.

Following identification of specific areas where sludge storage or disposal have occurred, two surface soil samples (0 to 6 inches in depth), taken approximately 2 feet apart, should be collected near the approximate center of the identified area. Site personnel will be interviewed during the investigation in order to determine if the amount and frequency of untreated waste-water discharge can be estimated. Maintenance records and NPDES permit files will also be reviewed for pertinent information. If information about the frequency and amount of untreated releases is available, an estimate will be included in the RI Report.

5.3 Explosive Burning Area

5.3.1 Data Needs

No data currently exist for this site. Aerial photographs should be reviewed to determine if the location of the burning area(s) can be better defined. In addition, surface or near-surface soils (0 to 2 feet in depth) should be collected and analyzed for explosives and heavy metals

to determine if the previous burning activities have resulted in soil contamination. Soils should be scanned for VOCs with a photoionization detector at the time of collection. If VOCs are detected, the corresponding samples should also be analyzed for VOCs.

5.3.2 Data Quality Objectives

The data collected from surface or near-surface soils will be used to confirm the presence or absence of potentially hazardous contaminants in surface soils in the explosive-burning-ground site. If significant contamination is found on the basis of surface-soil sampling, future follow-on activities would be subsurface-soil sampling (test borings) and possible groundwater monitoring. Surface-soil samples proposed in this plan will be analyzed for explosives and TCLP metals, with the resulting data being EPA Level III quality data. Some analyses for VOCs may be required if field screening indicates VOCs are present.

5.3.3 Technical Approach

Since the exact location of the burn area(s) is not apparent due to the area being overgrown with vegetation, a review of the existing aerial photos will be performed. Once suspected burn areas are identified, a grid-sampling approach will be taken in the collection of surface or near-surface samples. Samples will be collected from a 200-by-200-foot grid system (with lines 50 feet apart), covering most of the 2-acre site. Sixteen grid locations will be sampled using a hand-coring device from the surface to a depth of 2 feet. The sample material will be a composite of the 2-foot interval. Corner points of the grid system will be surveyed and tied to a known coordinate system (i.e., state planar, UTM). Sample location coordinates will be determined by the use of a tape and line-of-sight with the surveyed points.

5.4 Abandoned Landfill

5.4.1 Data Needs

The 1-acre landfill at one time consisted of trenches of unknown depth. It received a variety of wastes from 1941 to 1970, but no records were maintained for the materials disposed of. The area is now covered, vegetated, and barely discernable. Due to the lack of information concerning the location of the trenches, geophysical surveys are needed to help define the locations of buried trenches.

Once the buried trenches are identified, at least four soil borings are needed around the perimeter of each of the former trenches for the collection and analysis of subsurface soils. A surface-soil sample will also be collected at each boring location. Drilling into the trenches will be avoided due to the potential for UXO. Since many different types of contaminants may be present, surface and subsurface soil samples need to be analyzed for explosives, TCLP metals, VOCs, and semi-VOCs.

On the basis of the subsurface-soil-sample analyses, installation of groundwater monitoring wells may be required. Initially, two downgradient and one upgradient well would be required. These wells should be monitored on a quarterly basis for specific contaminants of interest on the basis of soil-sample analyses.

5.4.2 *Data Quality Objectives*

The objectives of the proposed field activities are to first identify the location of each of the buried trenches and then evaluate whether there has been a release of potentially hazardous materials from the trenches to the surrounding soils and groundwater pathway. Geophysical surveys will provide EPA Level II data, which will be used for site characterization. Subsurface soil samples will be analyzed for VOCs, semi-VOCs, TCLP metals, and explosives and will provide EPA Level III quality data. These data will be used for site characterization and to provide preliminary information for the assessment of risk to human health and the environment.

If groundwater data are obtained, the water should be analyzed for major anions in addition to contaminants of interest, which can be compared with other areas to give an indication of changes in groundwater quality across the installation. EPA Level III data will be obtained.

5.4.3 *Technical Approach*

Magnetometry and ground-penetrating radar (GPR) will be used to delineate the location of buried trenches. These surveys will utilize a grid system with grid spacing at 20 feet. Results will be plotted and, on the basis of the geophysical surveys, soil-boring locations will be determined.

Soil borings will be drilled on each side of the former trenches (four per trench). Borings will be drilled to a nominal depth of 15 feet with samples collected at 5-foot intervals (three per boring at 5 feet, 10 feet, and 15 feet).

Groundwater-monitoring wells will be installed downgradient of any trenches where potentially hazardous contaminants are found to be contained in the soils. If contamination is encountered, a minimum of two downgradient wells and one upgradient well will be installed.

5.5 Wood-Storage Pile and Wood-Burning Area

5.5.1 *Data Needs*

No data currently exist for the wood-storage pile or the wood-burning area. Since wood was burned at the one area, a potential exists for contaminant release to environmental pathways.

Surface-soil samples are needed adjacent to the runway north and south of the wood-storage pile in order to determine if a contaminant release has occurred as a result of the storage of contaminated and/or potentially contaminated wood. Soil samples are needed adjacent to the runway to the west of the wood-burning area to determine if contaminants have migrated to the soils.

5.5.2 Data Quality Objectives

The soil samples will provide initial site-characterization data to determine if a contaminant release has occurred and to assess the need for further investigations. Level III quality data will be obtained.

5.5.3 Technical Approach

Two surface-soil samples will be collected adjacent to the runway, one north and one south of the wood-storage pile, and two surface-soil samples will be collected adjacent to the runway west of the wood-burning area. The four samples will be analyzed for VOCs, semi-VOCs, PCP, and dioxin.

5.6 Red Lead Disposal Area

5.6.1 Data Needs

Little is known of the Red Lead Disposal Area. There has been speculation about several areas of possible red-lead disposal; however, the area exhibiting characteristic red-soil staining is south of Building 211. A former JPG employee defined the area as being in the gravel between the railroad tracks behind Buildings 202, 148, and 211. Shallow test cores (0 to 3 feet) of soil below the gravel are needed to help define the disposal area. Visual inspection of soil cores for red or white (barium sulfate) coloration or yellow crystals (litharge) may help define the area of red lead and of barium-sulfate disposal prior to the collection of samples for analysis.

Once the area of potential contamination has been better defined through shallow-soil coring, soil samples will be needed to determine the presence of lead and barium in the soils. These samples should be collected from borings to determine if the contaminants have migrated from the disposal area toward the groundwater table. If contaminants are detected near the water table, downgradient groundwater-monitoring wells should be installed to determine if contaminants have entered the groundwater pathway.

5.6.2 Data Quality Objectives

The objective of the initial soil corings is to identify the area of potential red-lead and barium-sulfate contamination. These cores represent a site-inspection activity that provides EPA Level I data to be used only as a guide to other sample collection.

Soil samples collected from soil borings will provide preliminary site-characterization data that will provide information on the levels and vertical extent of contaminants at the site. Samples collected will be analyzed for TCLP metals and will provide Level III data.

5.6.3 *Technical Approach*

Initial soil corings will be obtained along three 100-foot-long parallel lines located between the railroad tracks and Building 211, with a coring every 20 feet beginning with the center line and continuing until evidence of the disposal site is found or until the end of each line is reached. Cores will be inspected for changes in coloration, staining, layering, or other evidence of previous disposal activities. Once evidence of the disposal site is found, soil-boring locations will be marked with a wooden stake.

A minimum of four soil borings will be drilled and sampled in the area where evidence of disposal is found. Borings will be drilled to a depth of 10 feet with samples collected for TCLP metals every 2 feet (for a total of 20 samples) to determine the vertical distribution of metals contaminants.

If samples collected from the 10-foot level indicate elevated concentrations of metals, two downgradient monitoring wells and one upgradient monitoring well will be installed at the site to monitor groundwater quality entering and exiting the site.

5.7 *Small Arms Firing Range*

5.7.1 *Data Needs*

Although lead contamination was the original environmental concern for the small arms firing range, potential asbestos contamination in wall tiles and an unknown white powder in a test facility have since been identified as potential problems. Currently, no data exist for the small-arms-firing-range site. Samples of each type of suspected contaminant need to be collected to determine if a risk to human health or the environment exists.

5.7.2 *Data Quality Objectives*

Since the small arms firing range is abandoned and access to the facility is restricted, the potential for exposure is limited to JPG personnel. However, limited sampling is needed to identify contaminants present and their relative concentrations. This would be particularly important at a later date if the building were to be removed or renovated. The initial sampling will provide site-inspection data with a quality of Level II or III depending on the analyte.

5.7.3 Technical Approach

Pieces of wall tile will be removed and sent to the laboratory for analysis of asbestos. In addition, approximately 10 wipe samples from the walls and floor of each firing lane will be collected and analyzed for TCLP metals. The unidentified white powder in the test facility at the end of one of the firing lanes will be collected and analyzed for explosives and metals (i.e., expected components of trip flares). In addition, since airborne particulates may have been discharged to the atmosphere through the buildings ventilation system, some potential exists for surface-soil contamination. Four surface-soil samples will be collected around the perimeter of the building with the samples being analyzed for TCLP metals.

5.8 Burning Ground (South of Gate 19 Landfill)

5.8.1 Data Needs

With the exception of groundwater quality data from downgradient monitoring wells along the West Perimeter Road, no data are available for the immediate area of the burning ground. Geophysical surveys using magnetometry and GPR are needed to help define the location of former trenches seen in aerial photographs from the 1950s to the 1970s.

Surface and subsurface soil samples are needed to determine the type of contaminants present, their relative concentrations, and vertical extent.

5.8.2 Data Quality Objectives

Geophysical surveys will be conducted to assist in the location of soil borings, which will provide site-characterization data on the nature and extent of contamination at the site. Geophysical data will provide Level II data.

Six soil borings will be drilled and sampled around the perimeter of trenches identified during the geophysical surveys to determine if potentially hazardous contaminants have been released from the former burn site and to provide preliminary information to be used in the assessment of risk to human health and the environment. Additional soil borings may be required depending on the number and spacing of trenches located. Soil samples collected will be analyzed for VOCs, semi-VOCs, metals, and explosives, and the resulting data will be Level III quality data.

If evidence of subsurface contamination is present at the burning ground, one of the soil borings in the downgradient direction (west-northwest) will be deepened to the water table and will be completed as a monitoring well to determine if contaminants from the burning ground have entered the groundwater pathway. The pond adjacent to the burning ground will also be sampled to determine if contaminants are entering the surface-water pathway either by surface runoff or groundwater discharge. Surface water and pond sediment will be collected and analyzed for VOCs, semi-VOCs, metals, and explosives.

5.8.3 Technical Approach

A magnetometer and/or GPR survey will be conducted to help define the location of the former burning area south of the Gate 19 Landfill. This survey will be conducted on a 20-foot grid spacing.

If trenches and pits are identified in the burning area, soil borings will be drilled around the perimeter of the trenches (with a maximum of four borings per trench or pit) to a depth of 10 feet with samples collected at the surface and at depths of 5 and 10 feet. Samples will be analyzed for VOCs, semi-VOCs, metals, and explosives. Drilling within the trenches or pits will be avoided due to the potential for UXO or other safety hazards. If evidence of contamination is observed (i.e., visual observation of cuttings or field screening with a PID), the downgradient boring will be deepened and completed as a groundwater-monitoring well, which will be sampled for VOCs, semi-VOCs, TCLP metals, and explosives.

If surface burning areas are identified, surface soil samples will be collected from four locations for each surface area identified. These samples will also be analyzed for VOCs, semi-VOCs, metals, and explosives.

The pond adjacent to the burning ground will be sampled on the east side of the pond (closest to the burning ground). Three surface water samples and three sediment samples will be collected and analyzed for VOCs, semi-VOCs, TCLP metals, and explosives (also see section 5.9.3).

5.9 Gate 19 Landfill

5.9.1 Data Needs

Data from existing groundwater-monitoring wells indicate that groundwater contamination related to the Gate 19 Landfill is inconsistent. Some of the previous wells were screened below the water table, which could result in an inability to detect any "light non-aqueous phase liquids" (LNAPLs), such as fuel-related liquids. Additional wells may be required to intercept possible contaminants at or near the water table.

No data currently exist that identifies the location of disposal areas for solvents, pesticide containers, incinerator ash, polyurethane/methylene chloride waste, and red lead.

No soil-sample data have been collected in areas of suspected contamination. A soil-gas investigation conducted by ESE (1988) detected small localized areas of low concentrations of VOCs. Data from the SSSA indicate that mercury and possibly acetone and methylene chloride may be present in the groundwater. However, the source and extent of suspected contamination was not determined.

5.9.2 Data Quality Objectives

There are three main objectives for the site: 1) confirm the detection of mercury and VOCs in the landfill wells, 2) determine if mercury is detectable as background in local groundwater, and 3) determine the potential for off-site migration of contaminants. Resampling of selected existing monitoring wells should be conducted. Results of this sampling effort will be evaluated along with results of previous sampling rounds to determine if routine groundwater monitoring is required. An evaluation of the existing wells made during the SSSA determined that current well logs were inadequate to determine if previous wells were properly located and constructed to yield the necessary hydrologic data. Thus, four additional wells are recommended around the south end of the landfill as defined on the historic aerial photos. The nearby surface-water drainages should be inspected for obvious seeps and springs as evidence of groundwater discharge to surface water. Three surface water and three sediment samples should be collected from the pond located south of the main landfill to determine if surface-water contamination is a concern. Level III data will be obtained from this sampling activity.

A geophysical survey across the landfill is needed to determine the depth of fill in the landfill and to locate specific areas within the landfill where metal containers (i.e., pesticide containers) or other metal debris have been disposed of.

5.9.3 Technical Approach

Resampling will be conducted at three existing wells to confirm the presence of mercury and at seven existing wells to confirm VOC contamination in the groundwater. The nearby surface-water drainages will be inspected for obvious seeps and springs as evidence of groundwater discharge to surface water. Three surface-water and three sediment samples will be collected from the pond located south of the main landfill to determine if surface-water contamination is a concern.

A geophysical survey will be conducted using magnetometry or GPR to identify locations that contain debris other than construction debris and depth of fill (i.e., drums, paint containers, or pesticide containers). The survey will be conducted using a 20-foot grid spacing. Anomalies will be identified on a map of the Gate 19 Landfill for additional investigation.

Ten soil borings will be drilled around the perimeter of trenches identified by geophysics. Three samples per boring will be collected for analysis.

Four additional wells will be installed around the perimeter of the south disposal areas identified through the geophysical survey and the aerial photo study (see Figure 13). Soil samples will be collected from the surface and at depths of 5 feet and 10 feet, and they will

be screened on-site for VOCs. Wells installed around the perimeter will allow detection of contaminants migrating laterally from the landfill. Groundwater samples will be analyzed for metals, VOCs, and semi-VOCs.

Data on nearby water supply wells and demographics will be collected as part of the receptor/pathway analysis.

5.10 Burning Area For Explosive Residue

5.10.1 Data Needs

Prior to 1986, propellant powder was burned in this area on gravel placed over soil. Discolored gravel in the area provides evidence of past burning activity. Soils at the site may contain heavy metals, propellants, and herbicides (which were used to keep the area clear of vegetation for many years). Currently, no soil-sample data exist. Analyses of ash from present burning operations have shown accumulations of EPA toxic lead. Soil-sample data from beneath the surface gravel are needed to determine if contaminants have been released to the subsurface as a result of past burning operations.

5.10.2 Data Quality Objectives

Soil sampling in areas of discolored gravel should be conducted to determine if significant releases of potentially hazardous contaminants have occurred as a result of previous surface open-burning operations. Soil samples should be analyzed for heavy metals, propellants (DNT and TNT), and herbicides. This sampling would provide Level III site characterization data that would be used to characterize the levels and extent of contaminants and the potential risk to human health and the environment. The sampling is not designed, however, to fully characterize the extent of contamination. Follow-on sampling may be required if significant concentrations of contaminants are found to be present. This follow-on sampling would include evaluation of the surface-water pathway as well as additional soil sampling and groundwater sampling.

5.10.3 Technical Approach

Soil sampling will be biased toward areas of surface staining or discoloration that indicate past areas of open burning. Approximately 10 surface-soil samples (at 0 to 6 inches) will be collected from surface-stained areas. In addition, four locations will be selected for the drilling of boreholes (one per location) to a depth of 10 feet. Samples from the boring locations will be collected at the surface, and at depths of 5 feet and 10 feet. All samples will be analyzed for TCLP metals, propellants, and herbicides.

If soil samples from the 10-foot depth are found to contain elevated concentrations of contaminants (i.e., above background), two downgradient wells and one upgradient monitoring well will be installed to assess the potential for groundwater contamination from

the open-burning site. Groundwater samples will be analyzed for VOCs, semi-VOCs, TCLP metals, explosives, and herbicides.

5.11 Building Solvent Pits (Buildings 602, 617, and 279)

5.11.1 Data Needs

The three solvent disposal pits were previously investigated under an RI/FS conducted by Environmental Science and Engineering, Inc. (1988). These investigations included soil-gas surveys at all three locations and monitoring-well installation, sampling, and testing at Building 279. Results of these investigations indicate that groundwater-VOC contamination exists at Building 279. In addition, soil-gas-survey results indicate that one location at Building 279 contains elevated concentrations of TCE, whereas none of the locations at Buildings 602 and 617 contained elevated concentrations of solvent-related contaminants. Soil boring data, however, revealed solvent contamination in the subsurface at Buildings 602 and 617.

Since groundwater contamination was detected at Building 279 and the effectiveness of the soil-gas surveys in detecting contaminants potentially present in the groundwater is questionable, additional groundwater data are required for Buildings 602 and 617.

Soil-sample data are needed from soils adjacent to the solvent pit at Building 279 to confirm the results of the soil-gas survey and to assist in determining the extent of contaminants contributing to the observed groundwater contamination at Building 279. Soil-sample data are needed for the areas surrounding the solvent pits at Buildings 602 and 617 in order to confirm the results of previous soil-gas sampling. Additional groundwater data are also recommended for all sites.

In addition, wipe samples are needed from the floors of Buildings 617 and 279 to determine if VOCs or explosive residues are present within the abandoned buildings.

5.11.2 Data Quality Objectives

Subsurface soil samples needed to further define the extent of VOC contamination surrounding the Building 279 solvent pit will be collected to provide data to be used in the assessment of risk to human health and the environment and to provide data that may be used in the screening of remedial-action alternatives for the site. Laboratory analysis of soil samples will provide Level III data. Soil samples collected at the Building 602 and 617 sites will provide data to confirm the presence or absence of soil contamination and provide initial information on the horizontal and vertical extent of contamination. These data will also be Level III quality.

Groundwater samples will be collected from the existing monitoring wells at Building 279 to confirm previous results. These samples will be analyzed for VOCs. Groundwater samples

will be collected to provide initial data on groundwater quality at the Building 602 and 617 sites and to determine if contamination from past solvent disposal has entered the groundwater pathway.

A minimum of two wipe samples will be collected from the floor of both Building 617 and 279 to determine if there are residual VOC and/or explosive contaminants in the building from past operations.

5.11.3 Technical Approach

Four soil borings will be drilled to a depth of 10 feet and will be sampled at depths of 0 to 1 foot, 4 to 5 feet, and 9 to 10 feet at the Building 602 and 617 locations. In addition, soil core/cuttings will be scanned using a photoionization detector for VOCs. If contaminated intervals are identified with the PID, a biased sample of the contaminated zone will also be collected. This will result in an estimated 12 to 20 soil samples per site to be analyzed for VOCs.

Three of the soil borings at Building 602 and at Building 617 may then be deepened to the groundwater table, where the borings will be completed as monitoring wells. If the soil borings do not represent the optimum locations for wells based on PID scanning during drilling, the wells may be installed in other more desirable locations.

At the Building 279 site, four soil borings will be drilled around the perimeter of the solvent pit to a depth of 15 feet with samples to be collected at depths of 5, 10, and 15 feet. The resulting 12 samples will be analyzed for VOCs. The three existing wells will be resampled, and two additional downgradient wells will be installed to establish groundwater-contaminant plume limits.

5.12 Old Fire Training Pit

5.12.1 Data Needs

No data currently exist for the site. Surface and subsurface soil sampling and analysis are needed to determine if contaminants have been released to the environment as a result of previous fire-training exercises at the site.

If contaminants are found to extend to the groundwater table in soils, one upgradient and two downgradient monitoring wells are needed to provide water-quality data downgradient of the fire-training area.

5.12.2 Data Quality Objectives

Soil-sample data should be collected to determine if contaminants are present and, if present, to provide initial site-characterization information on the horizontal and vertical extent of

contaminants. Samples should be analyzed for VOCs, semi-VOCs, and TCLP metals. The resulting analytical data will be Level III, which may be used in site characterization and the assessment of risk to human health and the environment.

5.12.3 *Technical Approach*

Four soil borings will be drilled around the perimeter of the old fire-training pit. These borings will be drilled to a nominal depth of 15 feet with samples collected at the surface and at 5, 10, and 15 feet. In addition, one boring will be drilled in the approximate center of the pit. Samples will be analyzed for VOCs, semi-VOCs, and TCLP metals.

If evidence of contamination is present in any of the soil borings, two of the downgradient borings will be deepened to the water table and completed as groundwater-monitoring wells. The groundwater samples from these wells will be analyzed for contaminants of concern on the basis of the soil-boring-sample analyses. An upgradient well will also be installed and sampled for background water quality data.

5.13 Temporary Storage Areas (Buildings 105, 186, 204, 211, and 227)

5.13.1 *Data Needs*

Little data currently exist specific to the waste-storage use of Buildings 105, 186, 204, 211, and 227 (see Figure 23). No known releases have been reported at the sites. Soil samples will be collected from stained areas identified during the field investigation to investigate potential soil contamination. Interior wipe samples may be required to assess potential surficial contamination from stained areas identified inside the buildings.

5.13.2 *Data Quality Objectives*

Soil samples will provide data about possible contamination of stained soil. Wipe samples will provide initial site-characterization data to determine if a contaminant release has occurred and to assess the need for further investigations. EPA Level III quality data will be obtained. Samples will be analyzed for TPH and semi-VOCs, and six samples should be collected for TCLP metals and pesticide analyses.

5.13.3 *Technical Approach*

Three surface-soil samples are recommended from stained areas at Buildings 204 and 211. If no soil staining is found, then samples should be collected from obvious surface-water pathways. No soil sampling is proposed for Buildings 105, 186, and 227 unless evidence of soil staining is observed. Three wipe samples are recommended from any stained areas observed inside Buildings 204 and 211.

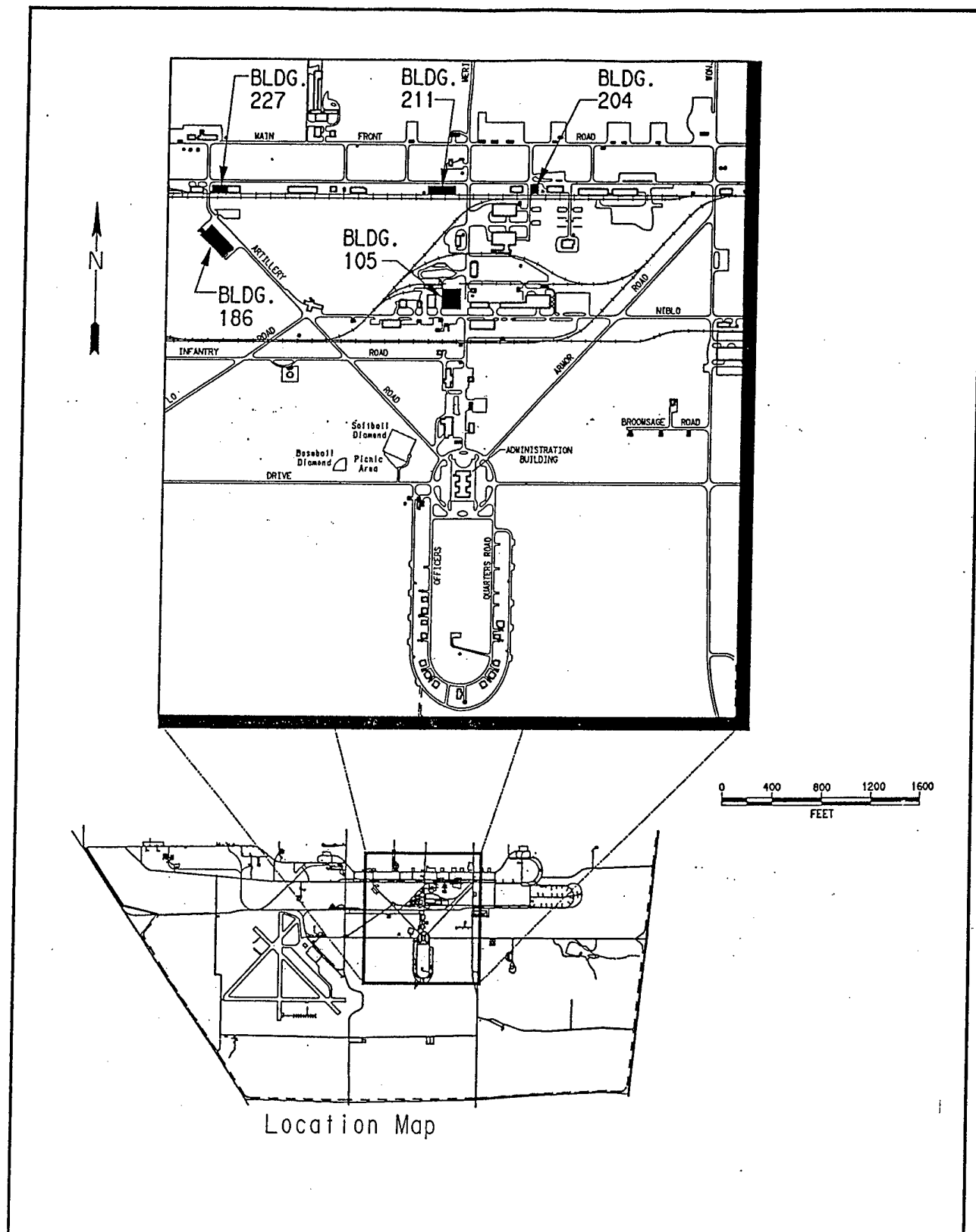


Figure 23. Temporary Storage Areas at JPG

5.14 Temporary Waste Storage Areas (Buildings 279 and 305)

5.14.1 Data Needs

Some data currently exist specific to the hazardous-waste storage use of Buildings 279 and 305 (as shown in Figure 24). These data are given in the RCRA Closure Plans, which have been drafted for both sites. To date, however, these plans have not been approved by the State of Indiana Department of Environmental Management. The draft Closure Plans for Buildings 279 and 305 propose at least three soil borings at each facility. Soil samples will be collected from borings both inside and outside of the buildings in accordance with the RCRA Closure Plans to investigate potential subsurface contamination. Interior wipe samples may be required to assess potential surficial contamination inside the buildings.

5.14.2 Data Quality Objectives

The soil and wipe samples will provide initial site characterization data to determine if a contaminant release has occurred and to assess the need for further investigations. EPA Level III quality data will be obtained. Samples will be analyzed for TCLP (EPA Method 1311), VOCs, semi-VOCs, and PCBs.

5.14.3 Technical Approach

Sampling and analyses details are provided in the RCRA Closure Plans for Buildings 279 and 305 (January 1992 and September 1991, respectively). These plans are subject to modification pending EPA approval. Sample analyses will be in accordance with USATHAMA-approved methodologies. The plans call for two soil borings inside Building 305 along cracks in the floor and four soil borings outside for background-soils data. Samples are to be collected from the 0-to-2-inch depth, 2-to-12-inch depth, and 12-to-24-inch depth.

Approximately eight soil borings are proposed for building 279 in addition to the four proposed for the solvent-pit investigation. These borings will be drilled around the perimeter of the building, and three samples per boring will be submitted for analysis of TCLP metals, VOCs, semi-VOCs, and PCBs. Sixteen wipe samples are also recommended from inside each building.

5.15 Yellow Sulfur Disposal Area

5.15.1 Data Needs

With the exception of a positive identification of sulfur with a pH less than 2, no other environmental sampling has been conducted at the site. Since the site is adjacent to a surface-water pathway, sediment samples from the drainage are needed to determine if contaminants have been released to the surface-water pathway.

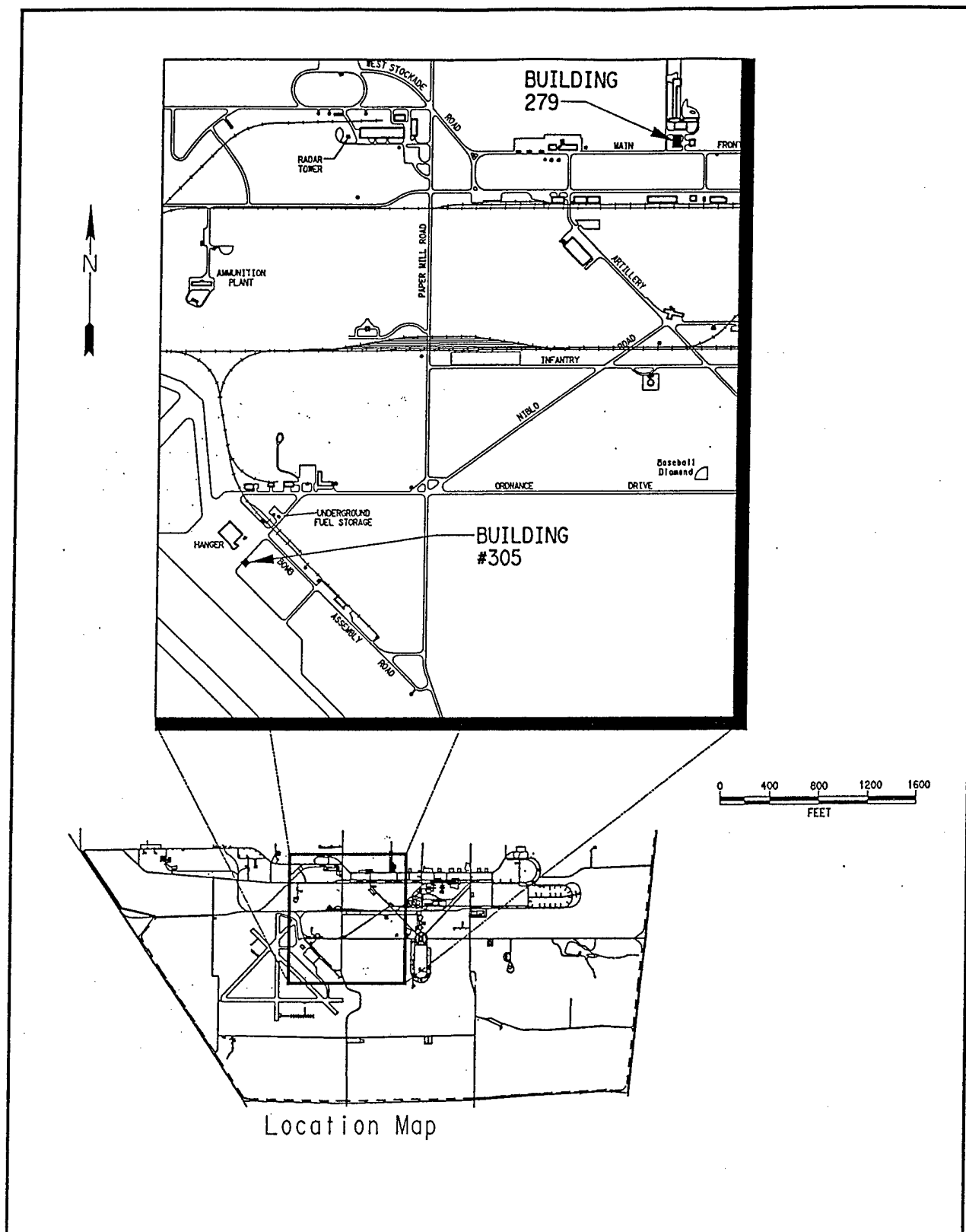


Figure 24. Temporary Waste Storage Areas

Leaching of the sulphur-disposal area during periods of precipitation may have resulted in the downward migration of potentially hazardous contaminants. Surface and subsurface soils in the disposal area are needed to determine the extent of contaminant migration.

If results of the soil sampling and analysis indicate that contamination has spread to the top of the water table, samples of groundwater are needed to provide an indication of water quality in the immediate area of the disposal site.

5.15.2 Data Quality Objectives

Sediment samples will be collected from the drainage area adjacent to the sulfur-disposal area to determine if surface runoff has resulted in the release of contaminants to the surface-water pathway. If surface water is present at the time of sampling, surface water will also be collected at the same locations as the sediments. All samples will be analyzed for sulfur, TCLP metals, and pH. Surface water will also be measured for conductivity and temperature at the time of sampling. The resulting data will be used to provide an initial assessment of the potential risk to human health and the environment. Field-measurement data will be Level II quality data, and laboratory analyses will provide Level III quality data.

The data obtained through sampling and analysis of surface and subsurface soils will be used as initial site-characterization data for confirming the presence or absence of potentially hazardous contaminants and the vertical extent of contaminants. Further follow-on investigations would be required to determine the horizontal extent of contamination. Data obtained through this initial sampling would be Level III quality. Soil samples will be analyzed for sulfur, TCLP metals, and pH. In addition, sample cores will be scanned with a PID, and any material with elevated measurements will be analyzed for VOCs.

Data obtained through groundwater sampling will provide initial information on water quality in the area of the sulfur-disposal site, and data obtained through water-level measurements and aquifer testing, will provide groundwater-flow information. These data will be used for initial site characterization, contaminant-fate and transport modeling, and a preliminary assessment of risk to human health and the environment. Data obtained will be Level III quality. Samples collected will be analyzed for sulfur, TCLP metals, and anions. If soil samples are found to contain VOCs, the groundwater samples will also be analyzed for VOCs.

5.15.3 Technical Approach

Four sediment samples and four surface-water samples (if present) will be collected from points located downgradient of the sulfur-disposal site. These locations will be spaced every 50 feet. For the surface-water samples, water-quality parameters will be measured (pH, conductivity, and temperature). All samples will be analyzed for sulfur and TCLP metals. Surface water samples will also be analyzed for major anions.

Six soil borings will be drilled on a grid established in the sulfur-disposal area. Grid spacing will be every 20 feet or spaced to cover the area. These borings will be drilled to a depth of 10 feet with samples collected at the surface, at 5 feet, and at 10 feet. Samples will be analyzed for sulfur and TCLP metals. On the basis of PID scans, selected samples may be analyzed for VOCs.

Two downgradient monitoring wells and one upgradient monitoring well will be installed if results of the subsurface-soil sampling indicates that downward migration of contaminants to the water table has occurred. These wells will be sampled and analyzed for the contaminants of concern based on the soil-sample data. In addition, water-level measurements and aquifer testing will be performed to support groundwater modeling and contaminant-fate and transport modeling.

5.16 Burn Area South of New Incinerator

5.16.1 Data Needs

No data currently exist for this site. Although most of the burning occurred on a concrete pad, there is also evidence of burning on the ground surface. Surface-soil samples are needed to determine if the burning activities released contaminants to soils surrounding the burn-pad area.

5.16.2 Data Quality Objectives

Soil samples collected at this site will provide initial site-inspection data to be used in determining if potentially hazardous chemicals have been released to the environment. Follow-on investigations would be required to determine the overall extent of contamination.

Data obtained through this sampling will be Level III quality. Samples will be analyzed for explosives, metals, VOCs, and semi-VOCs since the nature of the materials burned at this location are unknown.

5.16.3 Technical Approach

Four surface-soil samples will be collected around the perimeter of the concrete pad to a depth of 0 to 1 foot. The samples will be analyzed for explosives, metals, and TPH. Additionally, one wipe sample will be taken from the concrete pad and analyzed for explosives, metals, and TPH.

5.17 Asbestos Containing Materials

5.17.1 Data Needs

A previous inventory of the location and approximate volumes of asbestos-containing materials was presented in Appendix F of the EPA Environmental Audit of JPG (EPA, 1990). Although numerous sources of asbestos were identified in this appendix, it is suspected that other sites within JPG may contain asbestos materials. A more comprehensive study of all buildings at JPG should be conducted to supplement previous investigations.

5.17.2 Data Quality Objectives

Two types of data will be required to conduct a comprehensive assessment of the asbestos problem at JPG. The first type of data will involve the inventory of all items suspected to contain asbestos at JPG through visual inspection and records searches.

Once all suspected materials have been identified, samples of those materials not previously sampled will be collected for material identification. These data will result in the collection of Level II data for asbestos. Asbestos data will provide initial information to be used in the assessment of risk to human health or the environment.

For those materials found to contain asbestos, further investigation will include evaluation of the materials condition (i.e., if they are weathered and/or friable), estimation of the total volume of material, and assessment of risk. Results of these investigations will be combined to provide a preliminary screening of alternatives or corrective-action measures required for asbestos abatement and to minimize risk to human health and the environment.

5.17.3 Technical Approach

A walk-through of every building at JPG will be made utilizing personnel experienced in the identification of asbestos-containing materials. Each known or suspected material will be noted during the initial walk-through. This survey will be supplemented by a thorough records search of construction records, blueprints, or other records identifying materials used.

For those materials where asbestos is suspected but not confirmed, a representative sample of the material will be collected for laboratory analysis and identification. Materials with positive results for asbestos will be revisited to determine their estimated quantity and location. The number of samples collected at each location will be statistically significant as defined by the Asbestos Hazardous Emergency Response Act (AHERA).

On the basis of the asbestos type, condition, location, and volume, a report will be prepared which provides recommendations for asbestos abatement. A hazardous-ranking-system assessment will be performed in accordance with TM-612.

5.18 Underground Storage Tanks

5.18.1 Data Needs

A records search will be performed to identify the status and locations of all USTs. Tank-removal records will be reviewed to determine if removed tanks have been properly closed. Information on possible retrofitting of tanks will also be sought. Samples from the excavations of USTs have shown that contamination of subsurface soils has occurred. Although samples were collected during excavation, the overall extent of contamination was not determined. For locations where abandoned USTs are known to have released contaminants to subsurface soils, additional subsurface-soil sampling is needed to determine the levels and extent of contamination.

If subsurface-soil-sample information indicates that contamination has migrated to or near the water table, groundwater-quality data are needed to determine whether a potential exists for significant risk to human health or the environment and to provide additional groundwater-flow data.

5.18.2 Data Quality Objectives

The objectives of the follow-on sampling at former UST locations is to provide initial site characterization data to be used in determining the extent of contamination and to provide data to be used in preliminary assessment of risk to human health and the environment. Samples will be analyzed for TPH and for benzene, toluene, ethylbenzene, and xylene (BTEX) with Level III data being generated.

5.18.3 Technical Approach

Following a review of all tank records, the results of all previous UST-leak testing, and the previously collected soil-sample data, the sites where leakage is suspected to have occurred will be sampled. Initially, four soil borings will be drilled around the perimeter of each suspected leaking-tank location. These borings will be drilled to a depth of 10 feet with samples collected from 3-to-4-foot, 5-to-6-foot, 7-to-8-foot, and 9-to-10-foot intervals (i.e., four 1-foot samples per boring). The samples will be analyzed for TPH and BTEX.

5.19 Potential Ammo Dump Site

5.19.1 Data Needs

The exact location and type of materials disposed of at this reported location are unknown. Surveys are needed to first locate the site and then to determine the contents of the disposal area.

5.19.2 *Data Quality Objectives*

The data to be collected for this site are to be initial site-inspection data, which normally would be considered a Level I or Level II quality. Geophysical and UXO surveys will provide field evidence as to the location, size, and approximate depth of the disposal area.

Test pits may be required to determine the nature of the materials buried at this location.

5.19.3 *Technical Approach*

Magnetometry and GPR will be used to survey the area suspected of containing an ammo-disposal area. Initial surveys will be conducted with a 50-foot-grid spacing across the survey area. If anomalies are present, a closer-spaced survey will be conducted to determine the exact location of the disposal site.

If the site can be properly located, two test pits will be carefully dug to determine the contents of the disposal pit. UXO support will direct the test-pit operation with UXO scans conducted every foot as the test pit is deepened. Any items uncovered during the operation will be inspected by UXO-support personnel for identification and evaluation of condition.

5.20 Off-Site Water Supply Wells

5.20.1 *Data Needs*

Soils surrounding the locations of the former USTs should be evaluated for potential fuel contamination. In addition, wipe samples from the area of the former pumps are needed to determine if oil-related contamination is present.

5.20.2 *Data Quality Objectives*

A site inspection is needed to determine if releases of contaminants has occurred and to assess the need for further investigations. Level III quality data will be obtained.

5.20.3 *Technical Approach*

Two soil borings will be drilled immediately adjacent to the former UST locations. Soil borings will be drilled to a depth of 15 feet with samples collected at 5, 10, and 15 feet. The samples will be analyzed for TPH and BTEX.

Two wipe samples will be collected from stained areas at former pump sites. These samples will be analyzed for TPH.

5.21 Groundwater System South of the Firing Line

5.21.1 Data Needs

The general scope of the remedial investigation does not include an overall characterization of on-site groundwater flow. In order to assess potential pathways of contaminant migration, the overall groundwater flow within and around the facility boundaries needs to be assessed. Thus, additional groundwater flow data may be required.

5.21.2 Data Quality Objectives

Several wells are needed in areas remote to RI/FS sites where no groundwater data are available. Also, clustered wells are needed to assess the vertical hydraulic gradients between the alluvial and bedrock aquifers and within the bedrock aquifer.

5.21.3 Technical Approach

It is proposed that an additional 10 wells and 10 soil borings be considered for the purpose of filling in data gaps observed during the field investigation and to address the overall characterization of on-site groundwater flow. Consideration should be given to installing most of the additional wells as three clusters of three wells each for the purpose of determining vertical-flow gradients. Within each well cluster of three, one well would be screened at the base of the alluvium, one well would be screened in the first water-producing zone in the bedrock, and one well would be screened at a deeper bedrock-producing zone not to exceed 100 feet deep. The well clusters should be widely spaced across the southern part of JPG, preferably installed as upgradient wells near groups of sites with one cluster located near the Gate 19 Landfill, another located near the Gator Mine area, and another near the Wastewater Treatment Plant.

6.0 RI WORK TASKS

The following section provides a summary description of the various work tasks required to complete an RI/FS for the area south of the firing line at JPG. These are presented as tasks and subtasks for each RI/FS activity.

6.1 Task 1 - Project Planning

Work to be completed under the Project Planning Task includes the preparation of the following work plans that will be the operating documents used in the completion of other RI/FS activities. This task includes the process of USATHAMA and regulatory agency review and contractor revision from draft to final versions.

6.1.1 Subtask 1 - Technical Plan

The Technical Plan provides an overall plan for conducting an RI/FS for the area south of the firing line at JPG. The plan provides a brief description of location and environmental setting of the installation, provides a summary of site history and previous investigations, identifies the appropriate ARARs for the installation, provides conceptual site models, and summarizes the various work tasks required to complete the RI/FS. Included is a summary of the proposed schedule (by duration) for completing the RI/FS.

6.1.2 Subtask 2 - Sampling Design Plan

On the basis of the work tasks identified in the Technical Plan, the Sampling Design Plan provides the overall plan for conducting field investigations and laboratory analyses needed to satisfy the objectives of the RI/FS. The plan provides a detailed description of both field and laboratory methods and procedures to be used. It also provides maps showing the location of proposed field-investigation activities (i.e., geophysical surveys, borings, monitoring wells, and soil, sediment, and surface-water sampling locations). Included are summaries of the number and types of samples and measurements required, sample-identification numbers, analytical parameters, and QA/QC sample and measurement requirements. Appendices provide detailed procedures to be used.

6.1.3 Subtask 3 - Quality Control Plan

The Quality Control Plan describes the methods and procedures to be used to ensure that quality data are generated during the RI/FS with emphasis on precision, accuracy, and completeness. It also describes the project organization and responsibilities as they relate to Quality Assurance and Quality Control. The plan is formatted in such a way that it meets the requirements of the 14 elements specified in EPA guidance for conducting RI/FS under CERCLA (EPA, 1988) as well as meeting the requirements of the USATHAMA Quality Assurance Program (USATHAMA, 1990). It includes such items as the control of documents, calibration and maintenance of equipment, chain-of-custody requirements, analytical QA/QC requirements, corrective-action procedures, procedures for the assessment of data quality, and requirements for audits and surveillance of RI/FS activities.

6.1.4 Subtask 4 - Health and Safety Plan

The Health and Safety Plan describes the health and safety requirements for contractor and subcontractor personnel while conducting work at JPG as described in the Technical and Sampling Design Plans. The plan incorporates, as necessary, all federal (i.e., Occupational Safety and Health Administration (OSHA) and USATHAMA), state, local, and installation-specific health and safety requirements. The plan meets the requirements of 29 CFR 1910.120. The health and safety plan identifies hazards and methods to control those hazards, assigns personnel responsibilities for health and safety, provides details of the medical program to be used, and the training requirements for the project. The plan also

establishes procedures for personal protective equipment, access control, and decontamination procedures. Material Safety Data Sheets (MSDS) are provided for contaminants known to be present at sites south of the firing line at JPG.

6.2 Task 2 - Field Investigations

Table 9 provides a summary of the field investigation activities proposed for the RI/FS sites in the area south of the firing line at JPG (see Section 5.0, this plan). Detailed descriptions of these activity locations and techniques to be used are presented in the Sampling Design Plan (Volume II). Building 333 The Incinerator, and Building 208 The Photographic Laboratory are not included since no field-investigation activities are proposed for these sites.

6.3 Task 3 - Sample Analysis/Validation

The analytical requirements for the field-investigation activities described in Section 5.0 are also presented in Table 3. Details of the methods of sample analysis and validation activities are provided in the Sampling Design Plan, Volume II. All methods will be USATHAMA-certified methods and will also meet or exceed the equivalent EPA analytical procedures (i.e., SW-846 or CLP). To ensure the accuracy and validity of analytical data, a Quality Control Plan (Volume III) has been prepared. This plan provides a description of quality assurance/quality control (QA/QC) procedures that will be followed for RI/FS activities at JPG. Requirements for the number and type of QA/QC samples to be taken in support of field activities at JPG are also presented in the Sampling Design Plan (Volume II).

6.4 Task 4 - Data Evaluation

After all field and analytical data have been entered into the USATHAMA-IRDMIS-data-management system and have been validated, these data, as well as data from previous investigations, will be evaluated and used to develop a baseline-risk assessment and to develop effective remedial-action plans for those sites requiring remediation. These data will also be used to develop evidence to support a "No Action" alternative decision for those sites found not to be a threat to human health or the environment, and to formulate recommendations for additional data collection where data gaps are found to occur. Examples of the types of data to be collected and evaluated include:

- Lithologic Logs
- Geophysical-Survey Data
- Field Water-Quality Data
- Field Toxic-Gas or Vapor Monitoring
- Soil Organic-Vapor Monitoring
- Daily Field-Observation Logs
- Water-Level Data
- Aquifer-Test Data
- Laboratory Analyses of Groundwater and Surface-Water Samples
- Laboratory Analyses of Soil and Sediments Samples

Table 9. Summary of Proposed RI/FS Field Activities

SITE	Geophysical Survey	UXO Survey	Surface Soil	Subsurface Soil	Stream Sediment	Surface Water	Ground Water	Wipe Samples	ANALYTES
Bldg 185 Incinerator	—	—	2	—	—	—	—	—	TCLP Metals
Bldg 177 Sewage Treatment Plant	—	—	2	—	5	—	—	—	TCLP Metals, Cyanide, TPH
Explosive Burning Area	—	—	16	—	—	—	—	—	Explosives, TCLP Metals
Abandoned Landfill	2	1	—	12	—	—	3	—	VOCs, semi-VOCs, TCLP Metals and Explosives
Wood Storage Pile	—	—	2	—	—	—	—	—	VOCs, Semi-VOCs, PCP, and dioxin
Wood Burning Pile	—	—	2	—	—	—	—	—	VOCs, Semi-VOCs, PCP, and dioxin
Red Lead Disposal Area	—	—	—	20	—	—	3	—	TCLP Metals
Small Arms Firing Range	—	—	4	—	—	—	—	40	TCLP Metals
Burning Ground	2	1	16	36	3	3	1	—	VOCs, semi-VOCs, TCLP Metals and Explosives
Gate 19 Landfill	2	—	10	30	—	—	4	—	BTEX (soil gas), VOCs, semi-VOCs, TCLP Metals
Burning Area for Explosive Residue	—	—	10	12	—	—	3	—	DNT, TNT, TCLP Metals, Herbicides
Bldgs 602, 617, and 279 Solvent Pits	—	—	—	48	—	—	8	—	VOCs
Old Fire Training Pit	—	—	—	20	—	—	3	—	VOCs, semi-VOCs, TCLP Metals
Yellow Sulfur Disposal Area	—	1	—	18	4	4	3	—	Sulfur, TCLP, Metals, pH
Burn Area South of New Incinerator	—	—	4	—	—	—	—	1	explosives, metals, VOCs, semi-VOCs
Potential Ammo Dump Site	2	1	—	—	—	—	—	—	No samples
Underground Storage Tanks	—	—	—	48	—	—	—	—	TPH, BTEX
Off-Site Water Supply Wells	—	—	—	6	—	—	—	2	TPH, BTEX
Waste Storage Bldgs 279 and 305	—	—	—	48	—	—	—	32	VOCs, semi-VOCs, TCLP metals, PCB/pesticides
Storage Bldgs 105, 186, 204, 211, and 227	—	—	15	—	—	—	—	15	semi-VOCs, TPH, TCLP metals, pesticides

The data will be organized into discrete field data files and will be evaluated and processed to provide the following information:

- Lithologic and Geologic Cross Sections
- Groundwater-Level Maps
- Soil Contamination Cross Sections
- Plots of Monitoring Well Tests
- Calculation of Groundwater-Flow Parameters
- Sample-Location Plots showing Contaminant Concentrations

The general scope of the remedial investigation does not include an overall characterization of on-site groundwater flow, however; if necessary, the overall groundwater flow within and around the area south of the firing line will be characterized to assess potential pathways of contaminant migration. Initial data collection on groundwater flow within and around the specific sites south of the firing line will be gathered as part of the RI Field Investigation. It is anticipated that the wells associated with the RI/FS, along with the existing wells at the Gate 19 Landfill and Building 279, will yield sufficient information to characterize the area south of the firing line. If data anomalies are found (e.g., local potentiometric highs and lows) that make overall characterization of groundwater flow questionable or if significant data gaps are revealed, additional wells may be installed to facilitate regional-groundwater-flow characterization in the south area.

6.5 Task 5 - Assessment of Risks

A baseline-risk assessment will be conducted for the area south of the firing line at JPG to evaluate the potential threat to the human or natural environment resulting from the release of contaminants in the absence of any remedial action. This assessment will be used as a basis for determining whether any remedial action is necessary. The components of the baseline-risk assessment as specified in the Superfund Human Health Evaluation Manual (EPA, 1989a) will be:

- selection of indicator chemicals,
- assessment of contaminant concentrations and comparison of projected exposure-point concentrations to applicable or relevant and appropriate requirements (ARARs),
- estimation of human intakes,
- evaluation of toxicity of indicator chemicals, and
- quantitative characterization of risk.

The determination of indicator chemicals will be based on selecting those chemicals or contaminants that pose the greatest potential risk to public health from all contaminants identified as having been released to the environment at JPG. Generally, these chemicals represent the most toxic, mobile, and persistent chemicals at the site or those found in the largest amounts.

The contaminants and their concentrations at the point of potential exposure will be compared with the local, state, and federal ARARs to determine if they exceed the mandatory or recommended maximum concentrations.

Estimates of human uptake of the indicator chemicals will be based on the size of the population and proximity to the potential exposure point for each contaminant pathway as well as predictions of the type of exposure (i.e., ingestion, inhalation, or adsorption). Information on drinking-water supplies and off-site demographics will be gathered during the receptor/pathway identification task as part of the field investigation.

The physicochemical properties of the indicator chemicals will be reviewed as they relate to potential harm to human health. The chemicals are usually classified as toxic, hazardous, or carcinogenic and have established exposure limits. These exposure limits will be compared with the concentrations and anticipated lengths of exposure for human receptors of contaminants present at JPG.

The quantitative characterization will utilize all of the above information which will be entered into a computer data base; both on-site and off-site quantification of risk will be calculated using formulas contained in the EPA's *Risk Assessment Guidance for Superfund: Environmental Evaluation Manual* (EPA, 1989b). Calculations will be made on both the "worst case" and "most probable case" and compared to the EPA's "acceptable risk" threshold.

In addition to the quantitative assessment of public health risks, a qualitative assessment of the risks to the environment, fashioned after U.S. Department of Interior Type B evaluations (43 CFR 11, Subpart E, U.S. DOI, 1986), will be conducted. It will be performed to satisfy the requirements for an Ecological Assessment as described in EPA document EPA/600/13-89/003 (EPA, 1989). This will include an assessment of risk to terrestrial ecosystems and aquatic ecosystems at or near JPG.

If sufficient evidence of a significant risk to the environment exists as a result of the assessment, biological sampling may be required as part of the RI/FS.

The baseline-risk assessment will be based on current conditions at JPG. Since the future use of the installation has yet to be determined, scenarios based on future usage cannot be prepared.

6.6 RI Report

Following completion of the field investigation and laboratory analysis phases of this RI/FS, an RI report will be prepared. All of the previous and present data and information and supporting material needed to make decisions concerning the need for remedial action to ensure that JPG is in compliance with environmental laws and regulations and that risk to human health and the environment is within acceptable limits will be used.

The draft RI report will describe the results of all previous field investigations with emphasis on identification of contaminants, extent of contaminants, contaminant pathways, potential receptors, receptor-exposure points, and rates of contaminant migration. The RI report will generally follow the report format outlined in the *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA, 1988). The report will also include a baseline-risk assessment. Conclusions and recommendations for future work will also be included. Since JPG is scheduled for closure, additional assessment will be made in the RI report of the risk to human health and the environment as a result of closure and transfer of JPG for other uses.

Following USATHAMA, JPG, EPA, and State review of the draft RI report, all comments will be addressed and necessary changes will be incorporated to obtain a draft Final RI report which will be reviewed and revised again to obtain a Final RI report suitable for release to the public.

6.7 Task 6 - Alternative Development and Screening

The current Task Order (0002) does not include the development and screening of remedial action alternatives. However, the following describes the work tasks that will be required following completion of RI field-investigation activities and preparation of the RI report.

6.7.1 *Interim Remedial Action*

Although the characterization of sites outlined in previous sections of this plan should be considered preliminary in nature, any areas found to contain significant quantities of contaminants that are highly hazardous and pose an immediate threat to human health or the environment will be evaluated for possible interim remedial actions designed to minimize the hazard until a permanent remedial action can be taken.

Some interim remedial action has already been conducted at JPG (i.e., removal of leaking USTs and removal and disposal of asbestos-containing materials). These previous actions will be evaluated for effectiveness and recommendations for further interim remedial actions will be made. In some cases, a Record of Decision (ROD) will be prepared and submitted for the appropriate local, state, and EPA concurrence following an interim remedial action (that is, if the action is found to have sufficiently reduced the threat to human health or the environment).

6.7.2 *Developing a Range of Remedial Action Alternatives*

A list of technologies will be developed to meet the remedial-action objectives designed to eliminate or contain contamination to a level that protects human health and the environment. Each technology will be explored to determine if it is appropriate when site-specific conditions are considered. To be studied further, the technologies must achieve standards for effectiveness, implementability, and cost. Technologies that are clearly inappropriate

because they are unreliable, perform poorly on the contaminants of concern, or are not sufficiently developed will be eliminated. Advanced, innovative, or alternative processes will be included whenever possible.

6.7.3 *Alternative Screening*

Remedial-action alternatives will be developed from the list of technologies that have passed the initial screening. One or more technologies will be combined to achieve the general response objectives of source control or management of migration. Source-control actions will prevent or minimize migration of hazardous substances from the source material. Management of migration remedial actions are necessary if hazardous materials have moved from the source and pose a threat to public health or the environment. Those remedial-action alternatives that permanently contain, immobilize, destroy, or recycle contaminants will receive the most consideration.

The alternatives will be screened for environmental considerations, including compliance with chemical and location-specific ARARs. The ability of an alternative to protect workers and the community during remedial actions will be weighed, along with the time required to complete the action. Long-term considerations, such as residuals or untreated wastes and reliability of the alternative, will be accounted for.

A cost screening will be performed on each alternative to exclude those alternatives that are exceedingly more expensive without providing significant additional protection to human health or the environment.

The list of screened remedial-action alternatives, which will be passed on to the next phase of alternative selection, will include the "No Action" alternative for each site. The screening process may be repeated as more site data are collected to reflect improved understanding of site conditions. The initial development and screening will begin during the RI so that additional field data requirements needed for specific remedial-action alternatives can be defined. The initial screening will utilize the objectives established through the use of the conceptual site model, which provides a preliminary assessment of contaminants, pathways, and receptors.

6.7.4 *Detailed Analysis of Alternatives*

A detailed analysis of remaining remedial-action alternatives will be made for each site covered under this plan for JPG as sufficient information and data are obtained. This detailed analysis will provide the basis for informed decision making concerning the best alternative(s) for each site and for JPG as the U.S. Army begins the process of preparing the

installation for release following closure. The alternatives will be assessed using the following criteria established in the *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA, 1988):

- Overall protection of human health and the environment;
- Compliance with ARARs;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume;
- Short-term effectiveness;
- Implementability;
- Cost;
- State Acceptance; and
- Community Acceptance.

Evaluation of alternatives will cover technical, public, health, environmental, institutional, and cost issues.

6.7.5 Proposed Plan

SEC Donohue, Inc., (SECD) will prepare and submit to the Army a draft, final draft, and final version of the Proposed Plan (PP) in accordance with EPA guidance, March 1988. The draft version will be an Army-only review copy, while the final draft and final versions will be released to the regulators by the Army for review and comment. The final PP will also be released to the public for their review. The final version will incorporate Army, regulatory, and public-review comments. The final draft and final version will be due to the Army within 30 and 45 days of receipt of all comments. Along with the final version of the PP, SECD will submit a Response to Comments Package (ELIN A009), which describes how each comment was incorporated. SECD will include the following information in the PP: (1) summary of the environmental conditions at the site as determined during the RI, (2) a description of the remedial alternatives evaluated in the FS, (3) the preferred alternative, (4) summary explanation of any proposed waivers to the ARARs, and (5) a brief analysis that supports the preferred alternative discussed in terms of the nine evaluation criteria. The report shall incorporate an evaluation of the environmental effects of the alternatives in accordance with the NEPA (USCA 1969).

The final PP shall be subject to public review and comments. At the completion of the public comment period, a responsiveness summary based on the public comments received and a Decision Document (DD) reflecting the Government's decision will be prepared. Any supplemental information shall be placed in the appendices of the appropriate document.

6.7.6 Decision Document/Responsiveness Summary

SECD will prepare and submit to the Army a draft, final draft, and final version of the DD. The draft version will be an Army-only review copy, while the final draft and final versions

will be released to the regulators by the Army for review and comment. The final versions will incorporate Army- and regulatory-review comments. SECD will include the following three elements: (1) the declaration, (2) the decision summary, and (3) the responsiveness summary. The DD will also contain a discussion of any significant changes in the PP due to public comment.

SECD will prepare a Responsiveness Summary that summarizes the elements of community involvement in developing the remedial alternative in the PP and responds to each of the significant comments received during the public-comment period. This summary will become part of the DD.

7.0 PROJECT SCHEDULE

Table 10 is the proposed work schedule for conducting RI/FS activities at JPG in terms of work-task duration. This schedule assumes the following:

- An August 31, 1992 project start date.
- A 20-calendar-day Army review, comment, and approval cycle for primary documents.
- A 45-calendar-day regulatory review, comment, and approval cycle for primary documents.
- The work scope proposed in this plan will be combined with that proposed in the Task Order 0005; modification and all tasks will be performed concurrently as one RI/FS.
- Final Work Plan addendums for the Task 0005 mod sites will not be required prior to performance of field work.
- Complete evaluation of soil sample results will not be required prior to the installation of monitoring wells.
- A risk assessment must be completed prior to writing the RI or FS reports.
- Changes in federal, state, or local laws and statutes that affect the type and amount of data collection (i.e., additional contaminants added to the Target Compound List or the lowering of MCLs for specific contaminants) do not occur during the completion of the RI.
- A proposed plan will be prepared, finalized, and submitted for public comment after the RI and FS reports are completed. A 90-calendar-day public comment period will be allowed for the Proposed Plan prior to preparation of the Responsiveness Summary.

Table 10. Proposed Work Schedule

Task	Proposed Schedule
<u>Mobilization</u>	October 26 - 30, 1992
<u>Field Investigations</u>	
UXO Surveys	October 27 - 28, 1992
Geophysical Surveys	October 28 - November 17, 1992
Soil Borings and Sampling	November 2, 1992 - January 5, 1993
Surface Water Sampling	October 28 - 29, 1992
Monitoring Well Installation, Development, Testing and Sampling (as required)	March 3 - May 11, 1993
Asbestos Survey/Sampling	March 24 - June 23 1993
Land Surveying (as required)	November 3, 1992 - January 4, 1993
	May 19 - 24, 1993
Demobilization	June 24 - 30, 1993

8.0 REFERENCES

Ebasco Environmental, 1990a. *Enhanced Preliminary Assessment Report: Jefferson Proving Ground, Madison, Indiana*, prepared for U.S. Army Toxic and Hazardous Materials Agency, Aberdeen Proving Ground, Maryland, March 1990.

Ebasco Environmental, 1990b. *Master Environmental Plan: Jefferson Proving Ground, Madison, Indiana*, prepared for U.S. Army Toxic and Hazardous Materials Agency, Aberdeen Proving Ground, Maryland.

Environmental Science and Engineering, Inc., 1989. *Remedial Investigation at Jefferson Proving Ground, Draft Technical Report A011*, prepared for U.S. Army Toxic and Hazardous Materials Agency, Aberdeen Proving Ground, Maryland.

Hartke, E. J., 1989. *Geology of Jefferson Proving Ground*, Indiana Department of Natural Resources.

U.S. Army Corps of Engineers, 1988. *RCRA Part B Permit Application for Open Burning/Open Detonation*, Nashville, Tennessee.

_____, 1991. *Closure of Jefferson Proving Ground, Indiana and Realignment to Yuma Proving Ground, Arizona: Environmental Impact Statement (Vol. 1 & 2)*; prepared by the Louisville District.

USAEHA, 1988. *Interim Final Report, Ground Water Contamination Survey No. 38-26-0306-89, Evaluation of Solid Waste Management Units, Jefferson Proving Ground, Madison, Indiana*.

U.S. Department of Agriculture and Soil Conservation Service, 1985a. *Soil Survey of Jennings County, Indiana*.

_____, 1985b. *Soil Survey of Ripley County and Part of Jennings County, Indiana*.

_____, 1985c. *Soil Survey of Jefferson County, Indiana*.

U.S. Department of Interior, 1985. *An Archeological Overview and Management Plan for Jefferson Proving Ground, Jefferson, Jennings, and Ripley Counties, Indiana*, National Park Service, Contract No. CX-5000-3-0771.

U.S. Environmental Photographic Interpretation Center (EPIC), 1986. *Installation Assessment Rereview Program Working Document, Jefferson Proving Ground, Madison, Indiana*, Warrenton, Virginia, TS-PIC-85X.

U.S. Environmental Protection Agency (EPA), 1986. *Test Methods for Evaluating Solid Waste, SW-846*, Third Edition.

_____, 1988. *Draft Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*, OSWER Directive 9335.3-01.

_____, 1989a. *Risk Assessment Guidance for Superfund, Vol. I: Human Health Evaluation Manual (Part A)*, EPA 540/1-89/001.

_____, 1989b. *Risk Assessment Guidance for Superfund, Vol. II: Environmental Evaluation Manual*, EPA 540/1-89/002.

_____, 1990. *Environmental Audit: Jefferson Proving Ground, Madison, Indiana*, prepared by the National Enforcement Investigations Center, Denver, Colorado.

SEC Donohue, Inc., 1992. *Letter Report of Site Specific Sampling and Analysis Program Results*, prepared for U.S. Army Toxic and Hazardous Materials Agency, Aberdeen Proving Ground, Maryland.

Greeman, Theodore K., 1981. *Lineaments and Fracture Traces, Jennings County and Jefferson Proving Ground, Indiana*, U.S. Geological Survey, Open File Report 81-1120, Indianapolis, Indiana.

APPENDIX A

INSPECTION FOR ASBESTOS EXPOSURE ASSESSMENT

BULK SAMPLING

POLARIZED LIGHT MICROSCOPY RESULTS

LOCATION	DATE	DATE RECEIVED	LAB/CSL NUMBER	PURCHASE ORDER NUMBER	TYPE OF ASBESTOS FIBERS	PERCENTAGE OF ASBESTOS FIBERS
B100 Upstairs, Beige paperboard	12/16/88	12/19/88	45761-05		none	none
B100 Upstrs., brown'sh fiberglas	12/16/88	12/19/88	45761-03		Chrysotile	<1%
B100 ceiling tile (new conf.rm)	04/11/88	04/11/88	41684-1		none	none
B100, Entrance (1) transite (2)	/ /	09/07/88	44072-2		Chrysotile	5-10%
B100, Entrance wall transite(1)	/ /	09/07/88	44072-1		Chrysotile	5-10%
B100, Roof Shingle	03/10/88	03/10/88	40691-1		Chrysotile	25-30%
B100, Room 11, Insulation	09/07/87	12/02/87	A 271	PC #0038	Chrysotile	20-30%
B100, Upstairs, Brown Board	12/16/88	12/19/88	45761-09		none	none
B100, Upstairs, Green Board	12/16/88	12/19/88	45761-08		none	none
B100, Upstairs, White Gypsum	12/16/88	12/19/88	45761-07		none	none
B100, Upstairs, Black Paperboard	12/16/88	12/19/88	45761-06		none	none
B100, Upstairs, Black'sh Fibrgls	12/16/88	12/19/88	45761-01		none	none
B100, (1)A Attic, piping insul'n.	/ /	12/15/87	A 278	PC #0051	Amosite	45-50%
B100, (1)B Conf. Rm., 4" pip. cor. ins	/ /	12/15/87	A 282	PC #0051	Chrysotile	30-40%
B100, (1)G room 8B, 4" pip. insul'n	/ /	12/15/87	A 296	PC #0051	Chrysotile	30-40%
B100, (2)A Attic, 3" old pip. ins.	/ /	12/15/87	A 279	PC #0051	NA (paper)	none
B100, (2)B Conf. Rm., 4" pip. ins.	/ /	12/15/87	A 283	PC #0051	Amosite	30-40%
B100, (2)G Rm 8B, 4" pipe. insul'n	/ /	12/15/87	A 297	PC #0051	Chrysotile	25-30%
B100, (3)B Attic, Floor insul'n	/ /	12/15/87	A 280	PC #0051	Amosite	3-5%
B100, (4)A Attic, 3" new Pip. ins.	/ /	12/15/87	A 281	PC #0051	Chrysotile	15-20%
B100, Upstairs, White-Gray Gypsum	12/16/88	12/19/88	45761-10		none	none
B100, upstairs conf.rm, insul'n	/ /	12/15/87	A 298	W52H2B7365	Asbestos	none
B103, Insulation, Heating Plant	09/18/87	12/02/87	A 270	PC #0038	Chrysotile	40-50%
B112, Basement, Piping Insul'n	06/03/87	07/21/87	A 210	PC #0299	Asbestos-X	none
B112, Basement, Piping Insul'n	06/03/87	07/21/87	A 211	PC #0299	Asbestos-X (Chrys)	10-15%
B112, Basement, Piping Insul'n	06/03/87	07/21/87	A 209	PC #0299	Asbestos-X (Chrys)	40-50%
B112, Attic, Ins. Mat. for Ceiling	06/03/87	07/21/87	A 206	PC #0299	Asbestos-X	none
B112, Attic, Ins. Mat. for Ceiling	06/03/87	07/21/87	A 207	PC #0299	Asbestos-X	none
B112, Attic, Ins. Mat. for Ceiling	06/03/87	07/21/87	A 204	PC #0299	Asbestos-X	none
B112, Attic, Ins. Mat. for Ceiling	06/03/87	07/21/87	A 208	PC #0299	Asbestos-X	none
B112, Attic, Ins. Mat. for Ceiling	06/03/87	07/21/87	A 205	PC #0299	Asbestos-X	none
B114, Duct Insulation (1)	04/11/88	04/11/88	41684-7		none	none
B115, (2)C Attic, 8" Pipe. Ins.	/ /	12/15/87	A 285	PC #0051	Amosite	20-30%
B115, (3)C Attic, Corr. 4" pip. ins.	/ /	12/15/87	A 286	PC #0051	Chrysotile	15-20%
B115, (4)C Attic, Floor Ins. Shngl	/ /	12/15/87	A 287	PC #0051	Chrysotile	20-30%
B115, (5)C Attic, Floor Insul'n	/ /	12/15/87	A 288	PC #0051	Chrysotile	35-40%
B115, Attic, White Floor Insul'n	/ /	12/15/87	A 284	PC #0051	NA (Mineral Wool)	
B115, grab sopl. steam tunnel gas	07/20/87	08/13/87	A 226	PC #0319	Asbestos-X (Chrys)	30-40%
B125, (1)D Door insul'n Accoust.	/ /	12/15/87	A 289	PC #0051	NA	none
B144 3 1/2" insul'n mechan. rm.	04/11/88	04/11/88	41684-6		Amosite	25-30%
B144 5" insul'n mechanical room	04/11/88	04/11/88	41684-9		Amosite	25-30%
B144 8" insul'n mechanical room	04/11/88	04/11/88	41684-10		Amosite	20-25%
B144 ceiling plaster board	04/11/88	04/11/88	41684-3		none	none
B144 wall tile sprayed-on white	04/11/88	04/11/88	41684-4		none	none
B144, Perforated Wall Tile	04/11/88	04/11/88	41684-2		none	none
B148	/ /	12/05/88	45546-2		Chrysotile	2-3%
B149, Downspout dust (1) DwnSpt.	12/16/88	12/19/88	45761-03		Chrysotile	10-15%
B149, Downspout dust (2) Dwnspt.	12/16/88	12/19/88	45761-04		none	none
B186, Roof Siding	/ /	12/05/88	45546-1		Chrysotile	25-30%
B202, Container Coating	/ /	12/05/88	45546-5		none	none

APPENDIX B



Sample Source

US Army Jefferson Proving Grnd
Commander
Attn: STEJP-EH (K. Joshi)
Madison, IN 47250-5100
Attn: Mr. K. Joshi

Laboratory Report

Date

01/16/89

Page 1 of 2

Lab Control No.

82,485 thru 82,493

P. O. Number

03-89-M-0204

Job No.

007137

FINANCE ACCT. OFFICER

Attn: STEJP-RM-F

Madison, IN 47250-0000

Sample Description	Sample Type	Location
Soil sample	GRAB	Sample identification given below
Date Received	Collected By	Time of Collection
As noted	01/06/89	Client

Parameter	Results	Date Analyzed	Analyst	Method of Analysis
E.C.I. #82,485 #1, Building 602, 11-9-88 Oil and grease, pet.	721. mg/kg	01/09/89	Hoover	Soxhlet extraction Gravimetric
E.C.I. #82,486 Bldg. 303, Airport, 11-9-88 Oil and grease, pet.	1,418. mg/kg	01/09/89	Hoover	Soxhlet extraction Gravimetric
E.C.I. #82,487 #3, Bldg. 310, 11-14-88 (Semi-solid) Oil and grease, pet.	4,378. mg/kg	01/10/89	Hoover	Soxhlet extraction Gravimetric
E.C.I. #82,488 #4, Bldg. 310, 11-14-88 Oil and grease, pet.	2,593. mg/kg	01/10/89	Hoover	Soxhlet extraction Gravimetric
E.C.I. #82,489 #5, Bldg. 617, 11-17-88 Oil and grease, pet.	4,414. mg/kg	01/10/89	Hoover	Soxhlet extraction Gravimetric

ITAL CONSULTANTS, INC.

Avenue • Clarksville, Indiana 47130 • Phone (812) 282-8481



Environmental Consultants

Professional Laboratory Services

Laboratory Report

Date

01/16/89

Page 2 of 2

Lab Control No.

82,485 thru 82,493

P.O. Number

03-89-M-0204

Job No.

007137

US Army Jefferson Proving Grnd

Commander

Attn: STEJP-EH (K. Joshi)

Madison, IN 47250-5100

Attn: Mr. K. Joshi

FINANCE ACCOUNT OFFICER

Attn: STEJP-EH

Madison, IN 47250-0000

Sample Description	Sample Type	Location
Soil sample	GRAB	Sample identification given below
Date Collected	Date Received	Collected By
AS noted	01/06/89	Client
		Time of Collection
		00:00

Parameter

Results

Date Analyzed

Analyst

Method of Analysis

E.C.I. #82,490
#6, Bldg. 617, 11-17-88
Oil and grease, pet.

648. mg/kg

01/10/89

Hoover

Soxhlet extraction
Gravimetric

E.C.I. #82,491
#6, Bldg. 617, 11-17-88
Oil and grease, pet.

2,108. mg/kg

01/10/89

Hoover

Soxhlet extraction
Gravimetric

E.C.I. #82,492
#8, Bldg. 291, 11-21-88
Oil and grease, pet.

2,629. mg/kg

01/10/89

Hoover

Soxhlet extraction
Gravimetric

E.C.I. #82,493
#9, Bldg. 291, 11-21-88
Oil and grease, pet.

137. mg/kg

01/10/89

Hoover

Soxhlet extraction
Gravimetric



Professional Laboratory Services

Laboratory Report

Date

11/07/88

Page 1 of 1

Lab Control No.

80,783

P. O. Number

Job No.

007137

Sample Source

US Army Jefferson Proving Grnd
Commander
Attn: STEJP-EH (K. Joshi)
Madison, IN 47250-5100
Attn: Mr. Kaushik N. Joshi

To:

FINANCE ACCT. OFFICER

Attn: STEJP-RM-F

Madison, IN 47250-0000

Sample Description

Sample Type

Location

Water sample

GRAB

Building #291

Sample Collected

Date Received

Collected By

Time of Collection

Unknown

10/28/88

Client

00:00

meter

Results

Date Analyzed

Analyst

Method of Analysis

Oil and grease, pet.

8.3 mg/l

11/03/88

Hoover

Partition
Gravimetric