HARDFILL 49A ENVIRONMENTAL CLEANUP PLAN
PROJECT NO. JREZ-2000-7005

GRIFFISS AIR FORCE BASE, NEW YORK

CONTRACT: F41624-01-D-8544
TASK ORDER: 0002
CDRL #A005, A009, A010

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APRIL 2002

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APRIL 2002

DEPARTMENT OF THE AIR FORCE
AIR FORCE BASE CONVERSION AGENCY

April 3, 2002

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Hardfill 49A Environmental Cleanup Plan - Final

The attached subject document is provided for your use and has been revised in accordance with comments received from your office on the previously submitted draft plan. Any questions that you may have pertaining to the final project plan may be directed to Mark Rabe of my environmental staff at the above address or at 315-330-2275.

MICHAEL F. MCDERMOTT
BRAC Environmental Coordinator

Attachment
Hardfill 49A Environmental
Cleanup Plan - Final

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LIST OF ACRONYMS

AFCEE	Air Force Center for Environmental Excellence
AMSL	Above Mean Sea Level
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CQP	Construction Quality Plan
C&D	Construction and Demolition debris
EPA	United States Environmental Protection Agency
FPM	FPM Group, LTD.
GAFB	Griffiss Air Force Base
HASP	Health and Safety Plan
IRP	Installation Restoration Program
mg/kg	milligrams per kilogram
MSDS	Material Safety Data Sheet
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
ppm	Parts per million
QA/PMP	Quality Assurance/Program Management Plan
QAPP	Quality Assurance Procedures Plan
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RL	Reporting Limits
SAP	Sampling and Analysis Plan
SAR	Small Arms Range
XRF	x-ray fluorescence
TAGM	Technical and Administrative Guidance Memorandum
TCLP	Toxicity Characteristic Leaching Procedure

TPH	Total Petroleum Hydrocarbons
TSDF	Treatment, Storage or Disposal Facility
VOC	Volatile Organic Chemical

SECTION 1

INTRODUCTION

This work plan was prepared to detail the scope of environmental remediation as identified in the statement of work for Hardfill 49A Remedial Action Project No. JREZ 2000-7005. The objective of this proposed action is to remediate the Hardfill 49A area to a soil clean up goal of 400 mg/kg for total lead and 5 mg/L for leachable lead by toxicity characteristic leaching procedure (TCLP) and obtain site closure. These goals are consistent with New York State Department of Environmental Conservation TAGM 4046.

Hardfill 49A, located within Griffiss Air Force Base (GAFB), was used informally for the placement of hardfill material and other nonhazardous materials over an undetermined period of time. The hardfill area received an assortment of construction and demolition debris (C&D). This hardfill area was not a permitted disposal area.

1.1 PROJECT BACKGROUND

The former GAFB is located in Oneida County, New York, approximately two miles northeast of the city of Rome in central New York State. The base property covers approximately 3,540 acres and is situated in the relatively broad valley of the Mohawk River, at an average elevation of 504 feet above mean sea level (AMSL).

GAFB was established in 1942 as a Strategic Air Command bomber support installation. The 416th Bombardment Wing was the host unit at GAFB. The 416th Bombardment Wing's mission was maintenance and implementation of effective air refueling operations, while providing long-range bombardment capability on a global scale. GAFB was realigned as part of a nationwide base realignment and closure in October 1995, and much of its mission has since been transferred to other locations.

On 22 July 1987, the base was listed on the US Environmental Protection Agency (EPA) National Priority List, which brought the installation under the federal facilities provisions of CERCLA Section 120. In August 1990, the Air Force, the EPA, and the New York State Department of Environmental Conservation (NYSDEC) entered into a Federal Facility Agreement.

As part of the various national defense missions carried out at GAFB between 1942 and 1995, hazardous substances and wastes were used and disposed of at numerous locations on the base. In 1981, GAFB initiated a process for identifying and cleaning up sites under the Installation Restoration Program (IRP). Several sites were identified as IRP sites, including Hardfill 49A. The general location of Hardfill 49A is identified on Figure 1.1.

1.2 PROJECT OBJECTIVES

The objective of the proposed action is a removal of soil until a soil cleanup goal of 400 mg/kg for total lead and 5 mg/L for leachable lead by TCLP is achieved. Specifically, the following Scope of Work will be performed:

- Preparation of remedial plans to follow during the remedial actions to accomplish the cleanup and restoration objectives;
- Excavation and mechanical separation of the contaminated from the non-contaminated materials and soils to the extent feasible. Stockpile non-contaminated material for reuse;
- Off-site transportation, stabilization, and disposal of contaminated material;
- Sampling and analysis of contaminated material in accordance with NYSDEC landfill regulations prior to disposal;
- Reuse of non-contaminated, separated materials from Hardfill 49A as partial backfill. Import additional backfill as necessary;
- Disposal of contaminated material characterized as hazardous waste to a permitted landfill;
- Regrading and restoration of the site for proper slope and drainage after removal of contaminated material from Hardfill 49A;
- Placement of a soil cover consisting of six inches of clean soil and four inches of topsoil and seeding for a vegetative cover. An erosion control fabric shall be placed over areas with slopes greater than five percent;
- Sampling and analysis as required by the NYSDEC to validate site closure;
- Implementation of deed restrictions, as appropriate; and
- Preparation of appropriate reports and decision documents on the results of the sampling, and remedial actions.

1.3 INNOVATIVE TECHNOLOGY PLAN

There are several ways to treat or dispose of lead-contaminated hazardous waste. Several options are presented below.

1.3.1 Technology Alternatives

Mechanical Separation: In accordance with RCRA land disposal restrictions, soil that is a characteristic hazardous waste due to lead contamination must be treated, typically via solidification/stabilization methods prior to placement in a hazardous waste landfill. Therefore, minimizing the volume of material that must be disposed of off-site at a hazardous waste landfill may reduce the overall project cost. Mechanical separation methods, such as screening, may be used to minimize the volume of material requiring disposal as a hazardous waste.

Onsite Stabilization and Solidification: Stabilization/solidification is a proven remediation technology for inorganic compounds. Solidification is the process in which soil is mixed with a solidification agent to physically bind or enclose contaminants within a solidified/stabilized mass. Stabilization is the process where chemical reactions are induced between the stabilizing agent and contaminants to reduce their mobility. The technology has been successfully applied to treatment of lead-contaminated soils. Several techniques for stabilizing and solidifying contaminated soils exist. One of the most common methods is cement stabilization. Another is granular phosphorous which chemically bonds to lead. Once stabilized, the mixture is analyzed to verify it is not a hazardous waste. If it is not a hazardous waste, it can be reused as backfill, provided the total lead concentration does not exceed the clean up goal or placed in a solid waste landfill. Because solidification/stabilization would not reduce the total lead concentration to below the cleanup criteria, the material could not be disposed of on-site and therefore not considered further.

Soil Washing/Leaching: Soil washing is a water-based process for separating contaminants from soil. Contaminants are removed by dissolving/suspending them in the wash solution, or by concentrating them into a smaller volume of soil through particle size separation (organic and inorganic contaminants tend to bind, either chemically or physically, to clay, silt, and organic particles). The smaller volume of soil can then be further treated or disposed. Soil washing also produces a concentrated aqueous stream that must be treated. The chemical leaching process consists of leaching the contaminated materials with a solution and collecting the leachate. Leaching solutions consist of acids, such as nitric acid or other proprietary extraction solutions. The leachate is then treated to remove and recover the contaminants. Soil washing/leaching would not remove the bullets and bullet fragments from the soil and was not considered further.

1.3.2 Selected Technology

For this project, the selected technology consists of mechanical separation of non-contaminated debris from lead-contaminated soils. Non-contaminated debris will be recycled, reused or disposed of off-site as solid waste, as per criteria discussed in the work procedures in Section 4. Hazardous soils and debris will shipped off-site to a TSDF for stabilization and landfill disposal.

This technology will offer the best value by eliminating the source contamination (lead bullets and other lead wastes), recycling or reuse of buried materials to the extent practical by mechanical means, and disposal to multiple appropriate landfills based on material type and contamination level.

1.4 PHYSICAL CHARACTERISTICS OF THE SITE

1.4.1 Introduction

Hardfill 49A is located northeast of the base runways. It is bordered on the northeast by a wooded area, on the north by Landfill 1, and on the southwest by a gravel road and the Small Arms Range (SAR). Hardfill 49A is an approximately 1-acre area that was an extension of the original SAR and later informally used for the placement of hardfill material and C&D after the SAR was reconfigured to its present orientation.

1.4.2 Regional Geology

GAFB is located in the Mohawk Section of the Appalachian Plateaus Physiographic Province, in the Mohawk River Basin. GAFB and the surrounding Mohawk River Basin are underlain by the Ordovician-age Utica Shale bedrock (Fisher, et al., 1970). The Utica shale bedrock is black, finely laminated, marine in origin, and contains occasional concentrations of pyrite. The Utica Shale is overlain by up to 150 feet of glacial deposits consisting of (progressing from deep to shallow) till, lacustrine delta, lacustrine sand deposits, glacial outwash sand and gravel deposits, and recent fluvial deposits (Cadwell and Dineen, 1987; and Casey and Reynolds, 1989). Hardfill 49A is underlain by outwash sands and gravels. (Casey and Reynolds, 1989).

1.4.3 Regional Hydrogeology

GAFB is within the Mohawk River drainage basin (USGS, 1955). The Mohawk River, Three Mile Creek, and Six Mile Creek receive surface water and groundwater discharge from GAFB (Law, 1994). The Mohawk River flows south between the City of Rome and GAFB. It joins the Erie Barge Canal south of the City of Rome and flows east (USDOC NOAA, 1985).

Six Mile Creek originates north of the base and flows southeast. A tributary to Six Mile Creek originates in two wetland areas and flows westward near the southern ends of Hardfill 49A before joining Six Mile Creek (NYSDEC, 1986). Six Mile Creek flows into the Erie Barge Canal southeast of GAFB (USDOC NOAA, 1985). Hardfill 49A is within the Six Mile Creek drainage basin. A portion of the water from the Mohawk River, Three Mile Creek, and Six Mile Creek is used to maintain the water level in the Erie Barge Canal. Excess water discharges from the Erie Barge Canal back into the Mohawk River via a dam and spillways southeast of GAFB (USDOC NOAA, 1985).

The glacial outwash sands and gravels at Hardfill 49A is one of the primary shallow water-bearing zones at GAFB (Casey and Reynolds, 1989). Glacial outwash deposits range in thickness from 10 to 140 feet. Glacial lacustrine deposits range in thickness up to 150 feet. The glacial outwash deposits are the most productive aquifers in the area followed by the glacial lacustrine deposits. Regional groundwater flow at GAFB is radially to the southwest, south, and southeast, generally following surface topography.

Groundwater usage in the area of GAFB is limited to domestic and trailer park supply wells outside the City of Rome water supply service area (NYSDOH, 1982).

Potable water is supplied to GAFB and surrounding areas by the City of Rome Department of Public Works. The source of potable water is the Fish Creek water system, with diversion dams impounding water in Lake Tegasoke. The water from Fish Creek is transported to the Stokes Filtration Treatment Plant, located five miles north of Rome on State Highway 26 next to Rome Reservoir in the Town of Lee (EIS, 1995).

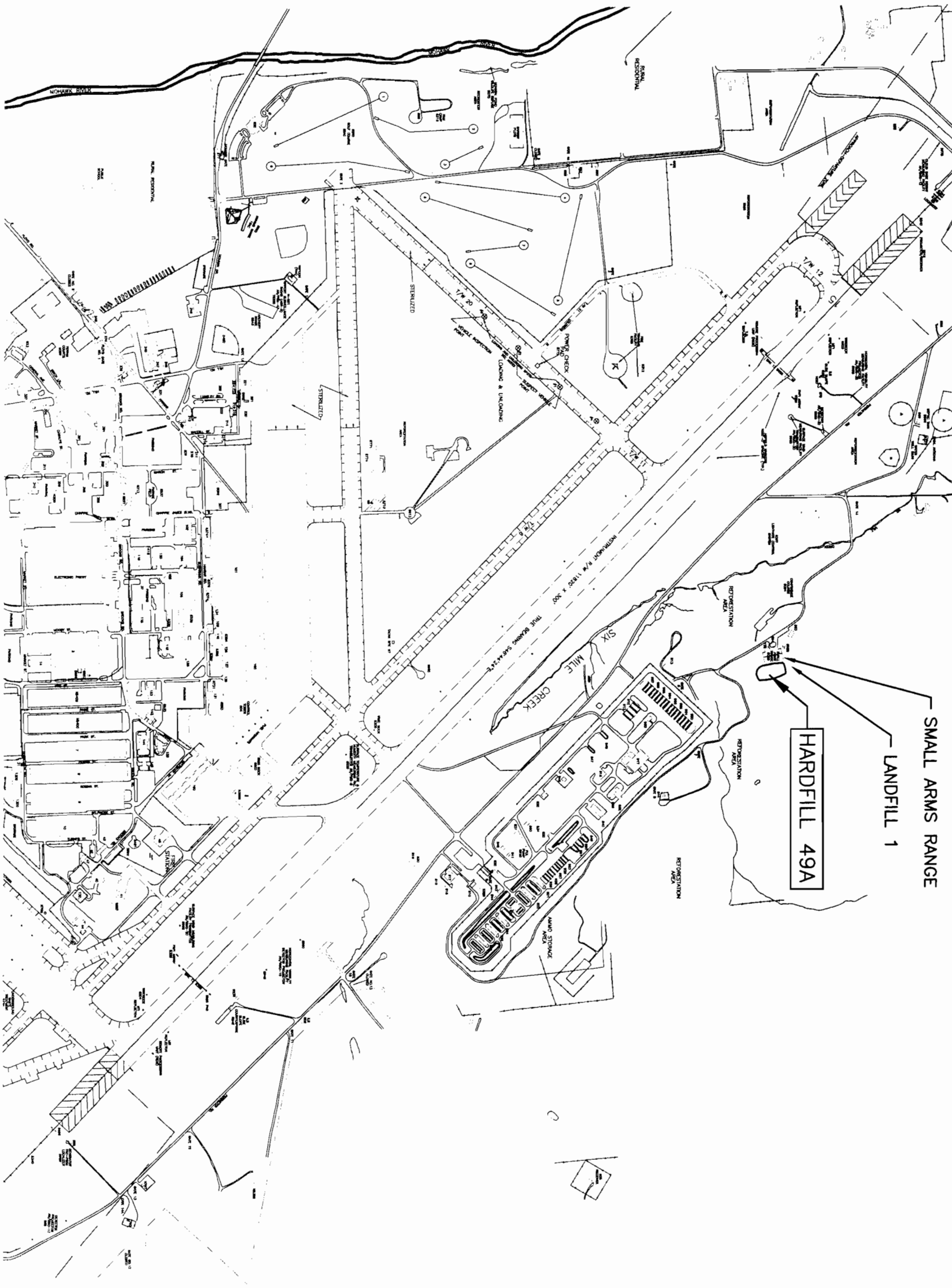
1.4.4 Geology of Hardfill 49A

The hardfill delineation is based on test pit information and the as-built drawing from the remedial action conducted in the fall of 1998.

The geology in the northern part of the Hardfill 49A study area consists of up to seven feet of hardfill and disturbed soils. Figure 1.2 shows the location of the test pits used to make cross sections A-A and B-B. Geologic cross sections A-A' and B-B', derived from test pit data, are presented on Figure 1.3 and Figure 1.4. The fill material consists of fine to medium sand, silt, gravel, concrete, wood debris, railroad ties, and metallic debris based on data obtained from test pitting activities. Native soils have been excavated to form berms around the hardfill. Hardfill materials have been incorporated into the upper two to three feet of the berm in places. Below the fill is up to eight feet of native fine to medium brown sands overlying glacial till. Borings were terminated in the upper one to five feet of till.

1.4.5 Hydrogeology of Hardfill 49A

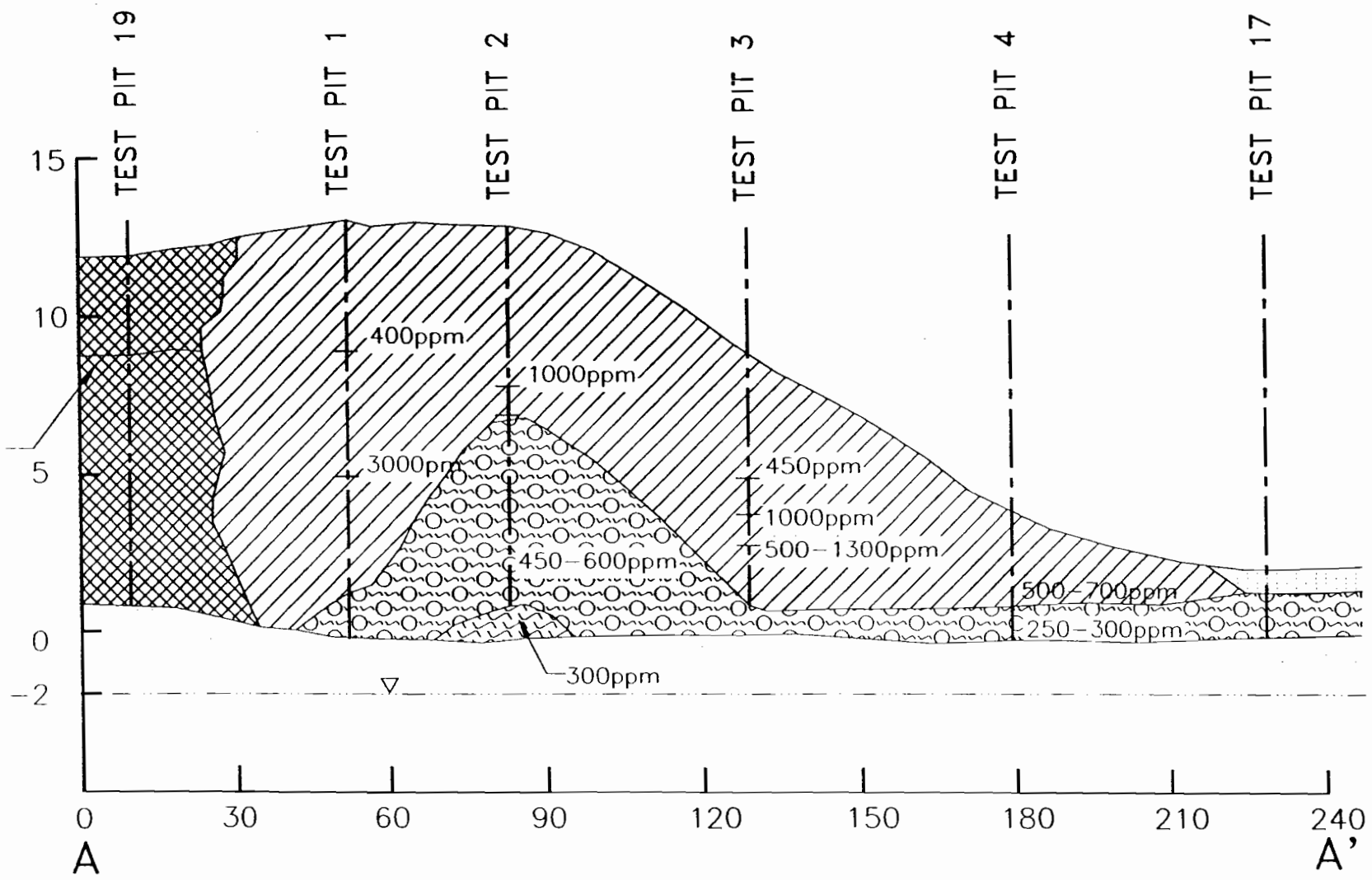
Groundwater flow in the area of Hardfill 49A is to the southwest toward the Six Mile Creek tributary. The Six Mile Creek tributary is located 150 to 200 feet south and southwest of the Hardfill 49A area. Groundwater elevations are highest to the northeast in MW49A01 (522.50 feet AMSL) and lowest in MW49A03 (510.12 feet AMSL), located along the southwestern edge of the Hardfill 49A area. Landfill 1 is located upgradient (north) of Hardfill 49A and may represent a significant upgradient source of groundwater contaminants. Depths to groundwater ranged from 8.04 feet below ground surface in MWSAR02, located along the western edge of Hardfill 49A and the SAR berm, to 18.86 feet below ground surface in MWSAR03, located between the northwest corner of Hardfill 49A and the SAR berm. The average depth to the water table is 13.6 feet below ground surface in wells installed around Hardfill 49A. Gradients are 0.03 ft/ft across the site. (Parsons 1997).



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1-6

FIGURE 1.1	HARDFILLS REMEDIAL DESIGN FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK	GRIFFISS AFB ROME, NEW YORK	PARSONS ENGINEERING SCIENCE, INC. LIVERPOOL, N.Y. (315) 451-9560	Issue Certification	Job No. 740881 Designed XXX Drawn MAB Checked XXX Reviewed XXX Approved Reg. No. Date			
REV. A	SITE LOCATION MAP					A		ISSUED FOR REVIEW
						Rev	Date	Description By



LEGEND

- FILL
- SILT
- HARDFILL
- BROWN FINE TO MEDIUM SAND AND GRAVEL
- GRAVELLY SILT
- FILL (SAND)
- 300ppm ESTIMATED LEAD CONCENTRATION (XRF)
- ESTIMATED GROUNDWATER TABLE

BULLETS OBSERVED IN HARDFILL MATERIALS (SCATTERED) AND IN GRAVELLY SILT (DENSELY DISTRIBUTED)

HARDFILL– CONSIST OF TIMBERS, WOOD FRAGMENTS, PIPES, METAL FRAGMENTS, GLASS, FLOOR TILE, PAINTED WOOD, WIRE AND CABLE.

0 15 30
SCALE: 1" = 30' (Hor.)
0 2.5 5
SCALE: 1" = 5' (Vert.)

AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE
GRIFFISS AIR FORCE BASE - NEW YORK

CROSS SECTION A-A'

PARSONS ENGINEERING SCIENCE, INC.

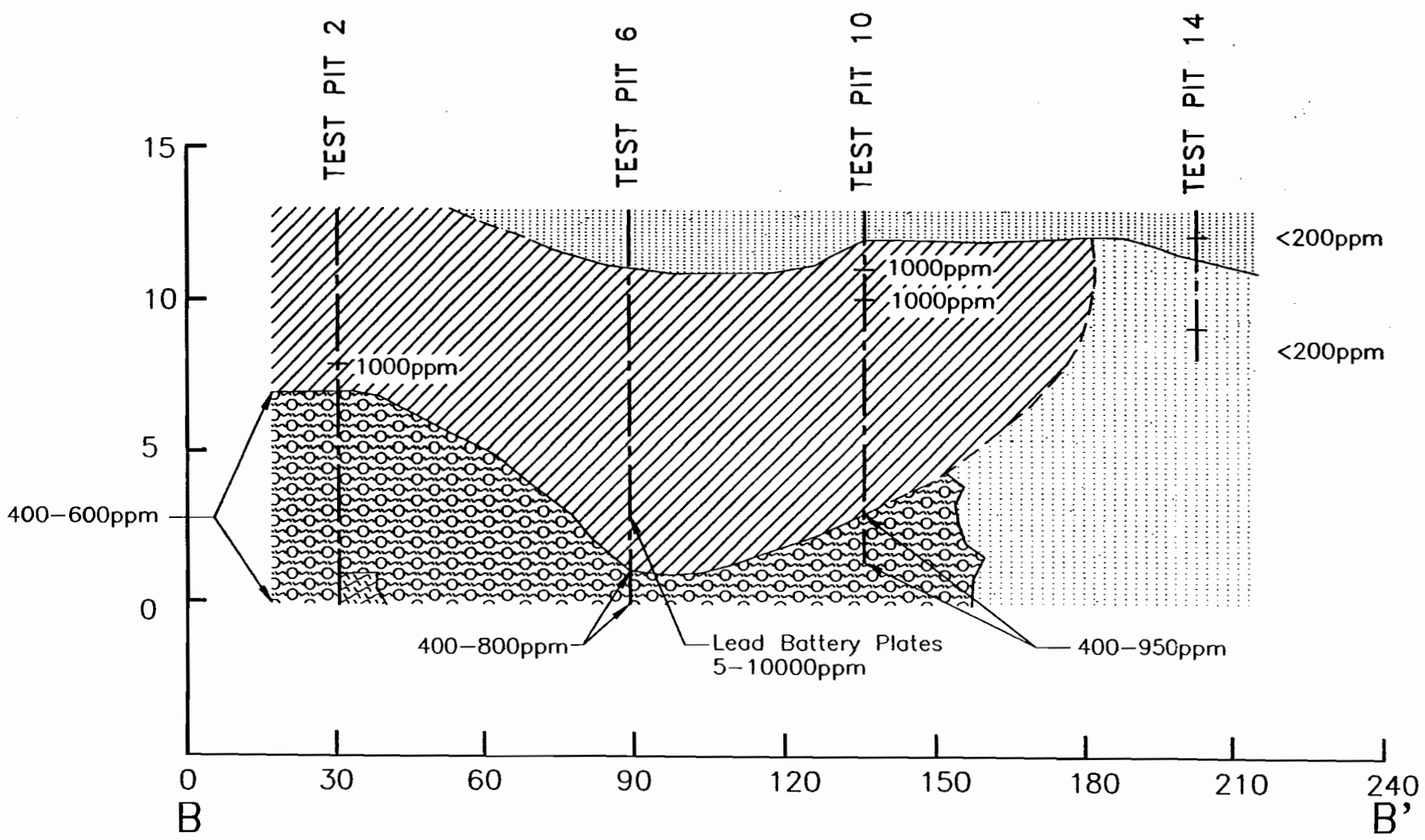
Reference (Peer, 1999)

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DESIGNED BY:	MB
DRAWN BY:	HFP
CHECKED BY:	MB
DATE	6/99

NO.	REVISION	BY	DATE

FILENAME: 1566O1F1C

FIGURE 1.3



BULLETS OBSERVED IN HARDFILL MATERIALS (SCATTERED) IN GRAVELLY SILT (DENSELY DISTRIBUTED)

HARDFILL– CONSIST OF TIMBERS, WOOD FRAGMENTS, PIPES, METAL FRAGMENTS, GLASS, FLOOR TILE, PAINTED WOOD, WIRE AND CABLE.

LEGEND

- SILT
- HARDFILL
- BROWN FINE TO MEDIUM SAND AND GRAVEL
- GRAVELLY SAND AND SILT
- FILL (SAND)
- 400ppm ESTIMATED LEAD CONCENTRATION

0 15 30
SCALE: 1" = 30' (Hor.)
0 2.5 5
SCALE: 1" = 5' (Vert.)

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FIGURE 1.4

SECTION 2

SUMMARY OF PREVIOUS REMEDIAL WORK/INVESTIGATIONS

The most recent work done at this site was a consolidation of hardfill materials into the northern portion of the area and placement of cover material over the hardfill in the fall of 1998. In 1999, lead contamination in the fill area was observed and a total of 21 test pits were dug to determine the extent of lead contamination.

2.1 FALL 1998 REMEDIAL ACTION

2.1.1 Site Clearing and Hardfill Material Consolidation

CSI began clearing and grubbing activities on July 20, 1998. The site was cleared of brush, shrubs and small trees of less than 6 inches in diameter in order to allow room for consolidation and compaction of hardfill materials and placement of the soil cover over the materials. Vegetation of greater size was generally located at the limits of the site and did not have to be cleared. Plant waste resulting from the clearing and grubbing activities was chipped and buried at the site.

Consolidation of C&D debris and other hardfill materials began on July 20, 1998 and was performed in conjunction with grubbing and clearing of the site. The consolidation and compaction of C&D materials was initiated to reduce the size of the areas requiring a geotextile fabric and soil cover. The material from within the hardfill area was excavated and consolidated, along with the existing exposed C&D material, in the northwest corner of the northern basin area of the site. Any depressions left after removal of C&D material were filled, compacted and graded with unclassified clean soil. Large concrete slabs were demolished for ease in handling and compacting. The areas receiving C&D debris/material were excavated and C&D debris/material was consolidated and compacted into the excavations. Depressions in the consolidation areas were filled with unclassified clean soil, which was then compacted and graded. The compacted and graded consolidation areas were then covered with filter fabric. General grading of the site was performed as needed to minimize the presence of large surface depressions and extrusions and to provide for controlled drainage of surface runoff. Consolidation activities were substantially complete by July 21, 1998. Application and grading of the subgrade was completed by July 30, 1998.

2.1.2 Geotextile Installation

A geotextile (filter fabric) liner was installed over the area where C&D material was consolidated, compacted and graded, starting on July 31, 1998 and finishing on August 5, 1998. The filter fabric was installed in order to stabilize the compacted hardfill material, minimize soil settling into potential voids within the consolidated debris, and provide a stable base for application of the soil cover.

2.1.3 Soil Cover Installation

A soil cover was installed at Hardfill 49A to mitigate or eliminate exposure risks associated with surface soil contamination at the site, to provide an area consistent with future base reuse strategies, and to provide a base for a vegetative cover. The material used for the soil cover was primarily borrow material determined to be unclassified clean fill (silt, sand, and silty sand, with varying amounts of gravel), and topsoil. The unclassified borrow material was obtained from the northeast corner of the northern basin area. The soil cover was placed over the entire extent of the northern basin hardfill area. In all areas where C&D was consolidated, the soil cover consisted of a 6-inch unclassified clean soil base that was overlain by four inches of top soil. Other areas of the site where the hardfill was simply graded and compacted, had varying thickness' of unclassified clean fill applied, which was overlain by four inches of topsoil, consistent with attaining the desired final configuration of the site. The unclassified soil base was applied from August 6, 1998 through August 20, 1998.

Application and grading of topsoil began on August 20, 1998 and continued until September 30, 1998. An additional two inches of topsoil was placed atop the area where geotextile fabric had been installed and hand smoothing of furrows in the access road to Hardfill 49A. Fine grading and raking of the topsoil was substantially completed by October 5, 1998.

2.1.4 Revegetation and Restoration

The soil cover at the site was seeded and fertilized to establish a competent vegetative cover and restore the site. The vegetative cover was intended to control soil erosion near the site, and to provide a natural aesthetically pleasing landscape. After installation and grading of topsoil was substantially complete and approved, the site was hydroseeded and mulched on October 5, 1998. Seed certification was submitted to and approved by the COR and the site was seeded with a mix of 80% Serra Hard Fescue and 20% Capitol Chewings Fescue. Minor raking and smoothing substantially completed site remediation by October 6, 1998. A final site survey was completed on October 20, 1998. Figure 2.1 (CSI, October 30, 1998), shows the as-built configuration of Hardfill 49A upon completion.

2.2 1999 POST CLOSURE ACTIVITIES

2.2.1 Test Pit Investigation

During remedial activities conducted by PEER Consultants at the GAFB SAR in the fall of 1998, a determination was made that lead contaminated soil was present beneath Hardfill 49A. Lead contaminated soil was found to extend from the SAR site into Hardfill 49A. The contamination from the SAR may have been spread when the backstop berms were previously moved. Consequently, in May and June 1999, a series of 21 test pits were excavated throughout the northern basin area of Hardfill 49A east of the SAR. Excavated materials were screened both visually and using direct reading x-ray fluorescence (XRF) equipment to assess the distribution of lead in the subsurface. A total of 47 soil samples and two duplicates were collected and submitted for analysis of total metals. A copy of the preliminary draft report (PEER, June 1999) is provided in Appendix A. Appendix B contains the test pit logs (PEER, June 1999).

Based on the information developed from this test pit investigation, the following conclusions were made:

- Lead contamination appears to be widespread throughout the hardfill materials and is derived from several sources including bullets, lead paint and other lead containing materials (i.e. lead acid battery plates);
- Range-related lead contaminated soil (gravelly silt) underlies a significant portion of the hardfill;
- An area of sanitary refuse is located in the north-central portion of the site. This refuse also contains lead materials which are of a different origin than those in the hardfill/range-related deposits;
- Based on XRF screening, lead contamination of soil does not appear to continue into the underlying native sand and gravel;
- Lead contaminated materials extend into the groundwater at certain locations. At other locations, the groundwater is within 3-4 feet of the contaminated material and;
- Native materials at the site consist of sand and gravel without fines or organic matter. This material is anticipated to possess a high hydraulic conductivity and is unlikely to attenuate metals in leachate from the contaminated materials. This native material provides a pathway for dissolved lead to reach the groundwater.

2.2.2 Groundwater Investigation

FPM Group, Ltd. (FPM), under contract with AFCEE, conducted two groundwater sampling events at the Hardflll sites 49A, 49B, 49C, 49D, and the SAR. The sampling events were performed to confirm the conclusions in the Pre-design Investigation Report for Remedial Design at Hardfills 49A, 49B, 49C and 49D, GAFB (Parsons, February 1997) and the Final Investigation Report for the SAR, GAFB (Parsons, September 1997).

Analytical results for the 1999 and 2000 sampling events at Hardfill 49A show the following:

- 1999 results of VOCs were consistent with those measured in 1996; no VOCs were detected;
- 1999 results indicated wells MW49AO3 and MW49AO4 with phthalate compound detection at levels below reporting limits (RL) and well below NYS Groundwater Standards;
- 1999 TPH-diesel range results were similarly low compared to those detected in 1996;
- Unlike the previous sampling events, the most recent round of sampling revealed no detections of lead in the groundwater as reported in the "total" and "dissolved" samples and;
- 2000 metals results indicate upgradient well MW49AO1 had sodium at levels exceeding the NYS Groundwater Standard in both the "total" and "dissolved" samples. Well MW49AO2 indicated exceedances for iron and manganese (in both "total" and

"dissolved" samples), and MW49AO4 for iron only (in the "total" sample only). The "total" and "dissolved" iron and manganese results for 2000 were less than the previous sampling events, except for "total" iron in MW49AO2, which was slightly higher than the 1996 results, but approximately one order of magnitude less than the June 1999 results.

A draft copy of the summary report (FPM, August 2000) is provided in Appendix C.

2.3 PREVIOUS CONCLUSION AND RECOMMENDATIONS

A soil cover was installed at Hardfill 49A to mitigate or eliminate exposure risks associated with surface soil contamination at the site, and to provide an area consistent with future base reuse strategies.

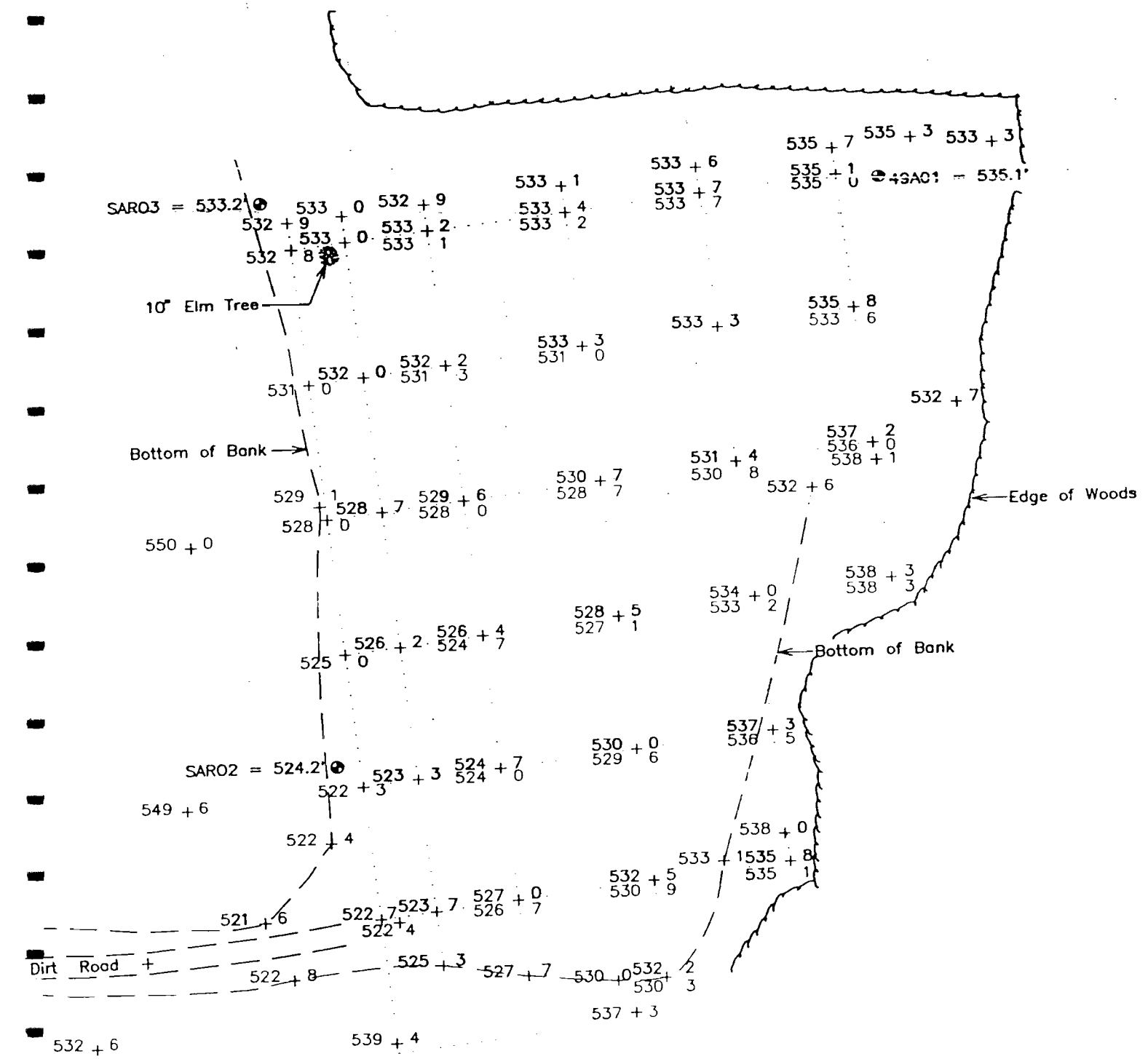
Subsequently, post closure activities including test pit investigation and further groundwater investigation, were conducted at the site. The results of the investigations indicated that lead contamination appears throughout the hardfill materials, and the lead is derived from several sources including bullets, lead paint and other lead containing materials. Additionally, lead contaminated materials extend into the groundwater at certain locations. Based on the findings of the post closure investigations, the following was recommended:

- Remediation of the lead contaminated soils via excavation, off-site stabilization, and off-site disposal at a regulated disposal facility. It was estimated that approximately 12,000 cubic yards of contaminated soil would require remediation.
- Quarterly monitoring of the wells adjacent to Hardfill Area 49A for a period of one year following remediation of contaminated soil.

The first recommendation becomes the basis for this remedial action. Quarterly monitoring of the wells will not be done at this time.

AS-BUILT CONFIGURATION HARDFILL 49A

Source (CSI, 1998)



SECTION 3

REMEDIATION MANAGEMENT PLAN

3.1 PROJECT MANAGEMENT ORGANIZATION

A team of appropriately trained and qualified professionals from Parsons will conduct this project. Each member of the team has been assigned various duties related to the project. The key project team members are briefly described below in terms of their project responsibilities.

Technical Director (TD) – Dr. Ross Miller will provide the technical direction for the project. He will provide technical advice and technical review for all aspects of the project and will ensure that all technical requirements are met.

Program Manager – Mr. Jake Dustin will function as the Parsons Program Manager. Mr. Dustin will ensure that all AFCEE requirements are being met.

Project Manager (PM) – Mr. John Lanier will perform the duties of Project Manager. The PM will be responsible for all project activities. Mr. Lanier will also function as the primary client contact, and ensure that all project and client requirements are met.

Site Construction Manager – Mr. Richard Stapleton will perform the duties of field team leader. In the absence of the PM at the site, Mr. Stapleton will be responsible for the supervision of Parsons' personnel and subcontractors.

Health and Safety Officer (HSO) – Mr. Andy Soos will be the site HSO. Mr. Soos will advise the Project Manager on all aspects of health and safety on site. He has authority to stop work if any operation threatens worker or public health or safety.

Quality Assurance Officer (QAO) – Mr. Matt Millias will be the project QAO and will be responsible for ensuring that Parsons' corporate quality assurance requirements are being implemented on the project. Mr. Millias will accomplish this through the audit, surveillance and/or project review process.

Client Sponsor – Mr. Chris Raddell will serve as the client sponsor for the project. He will be responsible for ensuring that client's requirements are communicated to and understood by the PM. Mr. Raddell will ensure that the PM has access to all resources of the Parsons corporation in order to complete the work. He will also obtain feedback from the client on project performance.

3.2 POINTS OF CONTACT

The following are the points of contact for the project.

Roy Willis, Team Chief
Dept. of the Air Force
Headquarters 311th Human Systems Wing/PKVCB
3207 North Road
Brooks Air Force Base, Texas 78235-5363
(P) 210-536-6451

Daniel E. House, Contracting Officer
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AFBCA/DA Environmental Section
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NYSDEC
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(F) 212-637-4360

Richard Petkovsek, Field Engineer
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HQ AFCEE/ERB, OL-Griffiss
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Rome, NY 13441-4105
(P) 315-330-2273
(F) 315-330-4062

3.3 PROJECT PLANS AND PROCEDURES

3.3.1 Project Plans

Parsons project plans and procedures will be developed and issued for all work activities. Upon completion, these plans and procedures will be used to guide and manage the project. Copies of the plans will be kept in the project files. Project procedures that will be used to control project deliverables, services, and activities include the following documents.

- Parsons Quality Assurance/Project Management Plan (QA/PMP);
- Environmental Cleanup Plan (Work Plan);
- Quality Program Plan (QPP) including a Environmental Sampling and Analysis Plan (SAP);
- Environmental Construction Quality Plan (CQP);
- Health and Safety Plan (HASP); and,
- PRISM Cost Reporting System

3.3.2 Form Of Contract

This project has been contracted to Parsons I&T as a Cost plus Fixed Fee Delivery Order from the HSW/PKVCB under the terms and conditions of Contract F41624-01-D-8544, Delivery Order No. 0002 and proposal dated August 29, 2001. Invoices will be prepared by Parsons in accordance with Attachment C (Proposed Invoicing Schedule) of the above-mentioned proposal.

If Parsons determines that a change order is necessary, Parsons will provide to the HSW/PKVCB verbally, with written follow-up, the required modifications. Parsons will demonstrate that the change is clearly outside of the scope and/or pricing assumptions outlined in the proposal. No work outside the agreed-upon scope of work will be conducted without written authorization from the HSW/PKVCB.

3.4 QUALITY MANAGEMENT

Parsons' quality assurance policy requires that every project have and implement a Quality Assurance/Project Management Plan (QA/PMP). Project activities will be performed in accordance with quality assurance/quality control (QA/QC) procedures that support this plan and ensure that the project will conform to the client's requirements. The goal of this plan is to ensure that the requirements of the project are clearly understood by the project team and met the first time, thereby preventing costly rework. The QA/PMP will be updated, as necessary, throughout the project.

3.4.1 Review

Technical and/or peer review of client deliverables will be performed prior to submittal of the documents. Client deliverables that will be reviewed include all technical reports, studies, assessments, work plans, sampling and analysis plans, health and safety plans, drawings, specifications, calculations, and procurement/subcontract technical documents.

The TD and other technical management reviewers will verify the correct technical approach is utilized and that work products are responsive to the project statement of work and regulatory requirements. Technical design reviewers shall verify the adequacy of reference material used, technical procedures and approaches applied, drawing accuracy, constructability, operability, technical documents prepared, and calculations made by authors. Authors and designers will meet with technical/peer reviewers at an early stage in the project to ensure that they have an adequate understanding of the project prior to conducting the review.

For small documents (e.g. letters and small bound reports), at least one technically qualified person will review the document for technical and non-technical aspects. For larger documents (e.g. large bound reports), several technically qualified people will review the technical aspects of the document. In addition, a separate, non-technical reviewer, will check the document. The project manager shall ensure that the appropriate level of document review is conducted.

3.4.2 Document Control and Records

Upon completion of technical/peer and non-technical reviews, reviewer comments shall be incorporated into the document as necessary. A Document Review Form will be signed by all reviewers and placed into the project files to document that the review was conducted. If reviewers provide comments directly on draft versions of the document, the draft versions shall be maintained in the project file until the final version has been approved. When the final version of the document has been approved, the draft versions shall be discarded.

Records and documents shall be legible, identifiable, and retrievable. They shall also be protected against damage, deterioration, or loss.

3.4.3 Audits

Audits will be performed, as required, by the QAO and/or his representative, to ensure that project activities and client deliverables are being performed and reviewed in accordance with project procedures and this QA/PMP. Audit reports will also document any deviation(s) from the plan and corrective actions performed. Results of audits will be filed in the project files.

3.5 SUBCONTRACTOR MANAGEMENT

The project manager will control and manage subcontractors in accordance with office procurement procedures. Office procedures include full integration of subcontractors into Parsons delivery order teams, clear and concise statements of work to be performed, designation of subcontractor personnel accountable for the work and clear identification of work products, delivery schedules and periodic reports. Subcontractors will be used for the following activities to support this project:

Activity	Subcontractor	Task Leader
Data Validation	FPM Group	John Lanier
Analytical	Severn Trent	John Lanier
Transportation & Disposal	Earthwatch Waste Systems	John Lanier

SECTION 4

REMEDIATION PROCEDURES

Prior to beginning remediation, a site specific Quality Program Plan (QPP) including a Environmental Sampling and Analysis Plan (SAP), a Health and Safety Plan (HASP), and a Environmental Construction Quality Plan (CQP) will be submitted to AFCEE and AFBCA for review and approval. After approval of these plans, the remediation will be done as detailed herein.

4.1 GENERAL SEQUENCE OF ACTIVITIES

1. The top one foot (+/–) of cover material will be removed and stockpiled. A dozer will be used to push this material off the top of the fill and into a stockpile. The depth of cut will continue until hardfill debris is visually observed. This material was placed as cover in the fall of 1998 as part of the 1998 CSI remedial action. It is anticipated that this material is clean and is below the site clean up standards of 400 mg/kg total lead and 5 mg/L leachable lead by TCLP. There is approximately 1,000 cy of this cover material. The stockpile will be composite sampled and analyzed, as per the SAP. If all samples reveal lead concentrations below the cleanup levels, the soil will be reused onsite as backfill. If any portion of the material is greater than 400 mg/kg for total lead, it will be disposed of off-site. Depending on the level of leachable lead, the material will either be disposed of off-site as solid waste or hazardous waste. If any portion of the material is determined to be a hazardous waste, that portion of material will be shipped to a TSDF.

2. The remaining materials in the defined limits of the excavation area, see Figure 4.4, will be excavated and segregated in stockpiles.

3. Large non-hardfill items such as large wood pieces, wood timbers, utility poles, railroad ties, large metal pipe and metal containers will be mechanically removed with a grapple bucket on an excavator. This material will be stockpiled as C&D debris. Very large debris (> 4' length) such as utility poles and railroad ties will be inspected for loose contamination. Manual brushing may be required to ensure loose soil removal. Smaller debris (<4' length) may be manually brushed to remove loose soil deposits or size reduced, by mechanical shearing, and power screened. The small debris will be run through a rotary or vibratory screen to remove loose soil deposits from the debris. The C&D stockpile will not be sampled. It is assumed that the lead contamination is either in the soil or lead wastes (i.e. bullets) commingled with the debris. Screening and/or brushing will separate the contaminants from the debris. The debris will be inspected visually to assure that the loose soil is removed. This material will be shipped to a sanitary landfill as solid waste.

4. Other large items such as hardfill items (concrete & brick) and large lead wastes (battery cases) will be sorted manually after the power screening (see Figure 4.1).

5. The rest of the excavated materials will be mechanically separated to the extent that is practically feasible, via power screening and manual sorting, and segregated into four separate stockpiles, 1) Lead Waste; battery cases and other lead wastes, 2) Hardfill; bricks, concrete and large stones, 3) C&D; wood, plastic, floor tiles, roofing, etc. and 4) Soil, silt, sand and gravel that passes a 2-inch or finer screen (see Figure 4.1).

6. Power screening will be accomplished through the use of a commercially available screening plant (see Appendix D). This equipment can be fitted with a variety of screen sizes. Screen sizes may be modified in the field as the work progresses. It is anticipated that an initial screen size of 2 inches will be used. Materials that do not pass the 2-inch screen will be rotary or vibratory screened to remove loose soils. Materials that pass the 2-inch screen are anticipated to be soils contaminated with lead and will be fine screened or stockpiled.

7. Materials passing the 2" screen will be fine screened to remove the lead bullets and lead fragments. Materials that do not pass the fine screen will be considered hazardous for lead and will be disposed of at a TSDF. Materials that pass the fine screen will be sampled and analyzed to determine if they are above the cleanup goals. Materials less than the cleanup goal will be reused on-site as backfill. Materials above the cleanup goals will either be disposed off-site as solid waste or hazardous waste dependent on the level of leachable lead.

8. Should the fine screening prove to be ineffective, the fine screening will be stopped and the material passing a 2-inch screen will be disposed of off-site as a hazardous waste (see Figure 4.1).

9. The stockpiled material disposition is anticipated as follows:

   Lead Waste – To the extent practical, lead will separated from the soil and debris. This material can be recycled. The lead will be loaded into roll off boxes and shipped off-site to a local recycler.

   Hardfill – This material is anticipated to be below cleanup standards. This debris will be run through a rotary or vibratory screen to remove loose soil deposits from the debris. If the material is below cleanup levels, the material will be crushed on-site. This material will be used for backfilling the excavation.

   Construction & Demolition Debris - This material is anticipated to be below clean up standards. This debris will be run through a rotary or vibratory screen to remove loose soil deposits from the debris. This material is below clean up levels, by definition, and the material will be shipped to a sanitary landfill as a solid waste.

   Soil, silt sand and gravel – This material is anticipated to be above the site cleanup goals. It may also contain the majority of the lead wastes that do not get screened out (i.e. those that pass the 2-inch screen). This material will be shipped off-site to a TSDF. If all samples of the fine screened material reveal lead concentrations below the site clean up levels, the soil will be reused on-site as backfill. If the soil is not fine screened, it will not be used as backfill because of the lead fragments contained in the soil. If any portion

of the material is determined to be a hazardous waste, the material will be shipped to a TSDF.

4.1.1 Schedule

The project schedule is divided into two phases. Phase 1 is the Work Plan development, design, review and approval. Phase 2 is the field construction. Figure 4.2 identifies the anticipated Phase 1 and Phase 2 schedule. This schedule will be updated regularly as the work progresses.

4.2 SITE SECURITY PLAN

Hardfill 49A is located in the northeast portion of the former GAFB. Hardfill 49A is bounded on the southwest by an unnamed gravel road, on the west by a former SAR, to the north by Landfill 1, and to the east by a forested area. The site is located north of the former runway areas and is generally not accessible by the general public. An entrance gate will be set up along the entrance road alongside of the SAR berm. A security control point at the office trailer will be established with a logbook where all personnel will sign in and out of the site pending appropriate authorization. The entrance gate will be locked when site activities are not ongoing.

In addition, temporary fencing, as necessary, will be used to demarcate the work zones in the excavation area.

It will be the responsibility of all field workers to report any security breaches to the Site Construction Manager. The Site Construction Manager will initiate an appropriate response that may consist of escorting the violator out of the work area or calling the police, if necessary.

At the end of each workday, the site will be inspected to insure all gates are locked and the site is left in a safe/secure condition during periods of inactivity.

4.3 SITE PREPARATION PLAN

4.3.1 Temporary Facilities

The following temporary facilities will be utilized during the project:

- Office facilities including telephone will be set up and maintained at a convenient area near the work site, see Figure 4.3, and shall have a complete set of plans and specifications along with all approved schedules and shop drawings.
- Portable toilets will be provided and maintained in sufficient quantity based on crew size.
- Decontamination facilities (Figure 4.5) will be constructed and include a collection sump, equipment decontamination pad, personnel wash pad, potable water storage and decontamination water storage. The equipment staged at this location shall include:
  - pressure washer
  - boot wash

- disrobing area and containers
- stationary tubs and
- emergency shower

Necessary utility connections shall be installed and all preparations made for installation of a decontamination trailer, should site work be upgraded to EPA LEVEL C or higher.

4.3.2 Utilities

- Arrangements will be made with the local utility for electrical connections.
- Arrangements will be made for local telephone service.
- Potable water will be stored on site in portable tanks.
- Construction water shall be obtained from on-site (weapons storage area) hydrants.

4.3.3 Establish Work Zones

Exclusion zones, decontamination reduction and clean work zones will be established with visible barriers to maintain site safety requirements and prevent waste migration. Barriers will be orange construction-style fencing staked into the ground. The work zones shall be relocated, as needed, based on existing site conditions and pending agreement of the site superintendent and site safety officer.

4.3.4 Establish Staging Areas

Staging areas will be designated within the footprint of the area to be excavated. The staging areas will be divided, as necessary, to keep like materials together. Materials will be staged and processed on previously contaminated areas. The staging areas will be sized, placed and moved, as required, to enable all materials to be excavated and processed. Six inches of soil under the staging areas will be removed and disposed off-site following the termination of the staging area usage.

4.3.5 Pre-Construction Survey

A subcontractor will be used to perform pre-construction surveying. Surveying will produce a topographical drawing of existing site conditions. The excavation area will also be laid out and staked at the time of the survey.

4.3.6 Site Clearing

Vegetation will be removed from the work area. A dozer will be used to scrape the ground surface and pile the material into a convenient location. Branches and brush will be chipped and staged for disposition under the final cover material.

4.3.7 Temporary Road

Stone will be placed on the existing access road alongside the SAR berm as an entrance into the work area. This will provide a stable base for getting equipment into and out of the work

area. This access road will also be used as a loading area (see Figure 4.4) and will be sized, as needed, during the excavation, to accommodate the loading out of waste materials.

4.4 EROSION CONTROL PLAN

4.4.1 Future Site Use

It is not known at this time what the future use of this site will be. No new construction activities are planned at this time.

4.4.2 Erosion Potential

This site is relatively flat. The area is bounded on the north side by a wooded area of higher elevation and on the south side by the SAR berm of higher elevation. The excavation will remove higher areas within Hardfill 49A, so the potential for erosion and surface water runoff is low.

4.4.3 Control Technologies

Erosion control will be achieved by controlling the direction and speed of surface runoff water. There are two primary sources of runoff water.

- Surface runoff from areas outside the exclusion zone, and
- Surface runoff from disturbed areas within the exclusion zone.

The water runoff from outside the exclusion zone will be directed away from the exclusion zone. Surface water inside the exclusion zone in the disturbed areas will be directed to collection points.

The following methods will be employed to control runoff.

Silt fence: Silt fencing (Figure 4.5) will be used to slow surface water runoff on broad areas, encouraging deposition of silt and reducing the formation of gullies.

Straw bales: Straw bale dikes will be used to slow surface water in existing gullies or ravines. The dikes will be used at specific points where erosion is likely to occur. Usually two or three straw bales are staked down in a line perpendicular to slow surface water flow.

Diversion Dikes with Sediment Traps:

These traps will be used to redirect existing flow patterns away from exclusion zone or away from disturbed areas. They will also be used to encourage deposition of sediment.

Blind Sumps: Blind sumps will be used in areas of potential surface ponding where flow cannot be redirected down slope. Temporary blind sumps consist of large diameter clean stone and geotextile fabric to separate water from

sediment. An eight-inch diameter perforated section of HDPE sewer pipe is placed in the sump. Inside this pipe is a submersible electric pump which is operated on an as-needed basis. Power to the pump; will be supplied by either portable generator or temporary electric lines.

Actual placement of these control devices will depend upon existing terrain and weather conditions as work proceeds.

4.5 EXCAVATION PLAN

4.5.1 Excavation Planning

Prior to excavating, the location of utilities will be identified and marked. This will be done by coordinating with Mark Rabe at 315-330-2275 at least two weeks prior to excavating and reviewing any site plans with the Owner's Representative. No active utilities are expected in the excavation area.

4.5.2 Excavation Procedures

Excavation will be done with mechanical equipment consisting of hydraulic excavators, dozers and loaders. The excavation will start in the northeast portion of the site and proceed to the southwest. Excavation will continue in the horizontal and vertical directions until clean native soils are visually exposed. Clean native soils shall mean the lack of bullets and/or lead debris by visual inspection.

Horizontal limits of excavation – The horizontal limits of excavation will be to that area where native soils are exposed and no visual contaminants (i.e. lead wastes and bullets) can be seen. In general, the excavation will be as shown on Figure 4.4, Excavation Plan.

Vertical limits of excavation - The vertical limits of excavation will be to that area where native soils are exposed and no visual contaminants can be seen. In general, the excavation will be from 2 feet to 12 feet below ground surface.

4.5.3 Hauling Methods

If necessary, soils and debris will be loaded into off-road dump trucks, with an excavator or loader, for transport to a separation/stockpile area. A dozer may also be used to push soils and debris to the separation/stockpile areas.

4.5.4 Water Management

Most of the excavation will not extend into groundwater. If groundwater is encountered, it will be pumped into on-site storage tanks, as needed, and tested for lead content. Upon receipt of the analytical data, the groundwater will either be disposed of off-site or used for dust control. Water run-on to the site from rain will be controlled by construction of diversion dikes as specified in Section 4.4.

4.5.5 Backfilling Procedures

Backfilling will be done with a dozer and roller. Clean off-site borrow material will be brought in, as needed, to fill excavated areas and to grade the area for proper drainage. Final grades will be determined after removal of the contaminated materials. The material will be sufficiently compacted with a smooth roller to avoid future settling.

4.5.6 Survey Procedures

A subcontractor will be used to complete pre-excavation surveying. Surveying will produce a topographical drawing of existing site conditions, prior to removal of the contaminated materials.

Following the contaminated soil removal, a second survey will be conducted. This survey will produce a topographical drawing of conditions prior to final backfill.

After the backfilling is complete, a third survey will be conducted to document the as-built condition of the area.

4.6 CONTAMINATED SOIL STOCKPILE PLAN

A stockpile area will be designated within the excavation area. Having the stockpiles within the excavation area will eliminate the need for a runoff collection system and will eliminate the potential for disturbing other non-contaminated areas. This area will consist of a bermed area within the footprint of the area to be excavated (see Figure 4.4). The stockpile area will be divided into four separate areas with Jersey type concrete barriers.

As soil, hardfill and debris is excavated, it will be moved to the stockpile/screening area via off-road dump trucks or pushed with a dozer. The material will be dumped to a feed area where it will be mechanically and manual separated, power screened and sorted according to its waste type.

The sorted material will then be moved to its proper stockpile area until determination of final disposition is made. Upon waste type determination and/or receipt of analytical results, the material will be loaded with a rubber tire loader or excavator into dump trucks for shipment to off-site disposal or moved to a clean stockpile area.

If any water is collected from the screening or stockpiling operations, the water will be transferred to an on-site holding tank where it will be tested for lead. Upon receipt of the analytical data, the groundwater will either be disposed of off-site or used for dust control. If the water cannot be used for dust control, it is anticipated that this water will meet the requirements without pre-treatment and will be discharged to a sanitary sewer manhole. If the water does not meet pre-treatment standards, it will be treated and retested prior to discharge or shipped off-site to a TSDF.

4.7 TRANSPORTATION PLAN

Transport for off-site disposal will be subcontracted to fully licensed, permitted and insured transportation vendors. Transporter permitting requirements shall be in accordance with 6NYCRR 372.3. The disposal materials will be loaded into dump trailers or roll-off containers for shipment to the appropriate disposal facility. Anticipated transportation vendors include the following:

Buffalo Fuel Corp. – Buffalo, NY

WTS – Niagara Falls, NY

Earthwatch Waste Systems – Buffalo, NY

All vehicles leaving the exclusion zone will be decontaminated by pressure washing to remove any soil build up to the greatest extent possible. Decon waters will be collected into a sump within the decon pad area and transferred to a storage tank. Decon solids will be mixed with the contaminated soils and disposed of off-site. All loads will be covered with poly and tarped to protect against the spread of contamination.

Manifests will be pre-printed with Generator/Owner and disposal vendor information. Site-specific trucker information will be added when the trucks are loaded. After loading, the manifest will be completed and signed by both the trucker and the Generator/Owner.

Labeling of the waste transport vehicles will be accomplished as per DOT guidelines. Placards will be visibly displayed as required.

There are no packaging requirements for the anticipated waste materials. All wastes will be bulk-shipped in dump trailers, roll-off boxes or tanker trailers (for liquids).

Prior to leaving the site, the trucks shall be inspected to insure that the loads are covered, the load is not leaking and that the proper paperwork is in place.

A permanent record will be maintained by the Site Construction Manager. This record will be a log that identifies the load number, date, manifest number, weigh ticket number, transporter name and disposal location.

4.8 INTEGRATED SOLID WASTE MANAGEMENT PLAN

Technical activities and analysis will be done as detailed below in support of the integrated solid waste management program.

4.8.1 Permitting and Approval Authorities

The Project Manager will submit to the Generator/Owner the names and addresses of the prospective disposal facilities to be used including TSDF requirements as per 6NYCRR 372.2(b). The Generator/Owner will review and approve the facilities prior to shipment.

4.8.2 Disposal Procedures

Solid waste excavated from the defined boundary areas will be mechanically separated into various recoverable/reusable and non-recoverable materials. Recoverable/ reusable materials include lead bullets, lead battery plates, non-contaminated hardfill and non-contaminated cover material. Non-recoverable materials include soils that exceed cleanup levels and hardfill materials, which are classified as C&D waste and any hardfill materials that exceed the clean up levels specified.

Solid waste, material greater than 2" in size, will be assumed to be non lead-contaminated. The solid waste will be sent off-site to a sanitary landfill as solid waste.

The landfills anticipated to be used for solid waste are:

Seneca Meadows Landfill – Waterloo, NY

High Acres Landfill – Rochester, NY

If the solid waste is determined to be hazardous, the waste will be shipped off-site to a permitted TSDF such as:

Chemical Waste Management – Model City, NY

Lead wastes, which can be recycled, will be shipped off-site to a local recycler such as:

Reding Recycling – Rome, NY

4.9 SPILL AND DISCHARGE CONTROL PLAN

4.9.1 Types of Hazardous Waste/Material

Lead is the primary contaminant of concern. The health and safety aspects for the project are discussed in the HASP. Other hazardous materials, which may be brought to the site, will be identified by the Hazard Communication Program and details of their properties can be found in MSDS catalog that will be maintained at the job trailer.

4.9.2 Categorization of Levels of Spills and Discharges

The Site Construction Manager will assess all spills and discharges. Spills will be categorized by the source from which they came.

4.9.3 Control Procedures and Protective Measures

The spill prevention plan includes the diking/berming of all storage of contaminated liquids and/or fuel, the following of operating procedures to include spill prevention design, and the training of employees in spill prevention and control techniques.

In the even of accidental spillage, the following flexible spill response will be implemented:

A. First aid will be administered to injured/contaminated persons. Any employee observing a spill will act immediately to remove and/or protect injured/

contaminated persons from any life-threatening situation. First aid and/or decontamination procedures will be implemented as appropriate.

B. Warn unsuspecting person/vehicle of the hazard. Personnel will act to prevent any unsuspecting persons from coming in contact with spilled material by alerting other nearby persons and by obtaining assistance of other personnel who are familiar with spill control cleanup techniques.

C. Stop the spill at the source, if possible. Without taking unnecessary risks, personnel will attempt to stop the spill at the source. This may involve activities such as uprighting a drum, closing a valve, or temporarily sealing a hole with a plug. Personnel will not expend more than a brief effort prior to notifying the project supervisor.

D. Notify the Project Supervisor. Utilizing available personal radio communications or other rapid communication procedures, the project supervisor will be notified of the spill, including information on material spilled, quantity, personal injuries and immediate life-threatening hazards.

E. Spill assessment and primary containment. The project supervisor will make a rapid assessment of the spill and direct primary containment measures. Depending upon the nature of the spill, primary containment measures may include, but are not limited to:

- Construction of a temporary containment berm utilizing on-site clay absorbent earth.
- Digging a sump, installing a polyethylene liner and diverting the spilled material to the sump.
- Placing drums under the leak to collect the spilling material before it flows over the ground.
- Transferring the material from its original container to another container.

F. Notify the Owner's Project Manager. The project supervisor will notify the Owner's project manager of the spill and steps taken to institute primary containment.

G. Spill Cleanup Procedures. The project supervisor will develop a spill cleanup procedure taking into consideration associated hazards, quantity of spilled material, disposal methods and costs. The spill cleanup plan will be reviewed for acceptance by the Owner's project manager.

H. Spill Cleanup. Personnel will clean up all spills following the spill cleanup plan developed by the project supervisor. The project supervisor will supervise the spill cleanup. Most equipment, material, and supplies necessary to clean up a spill will already be immediately available on-site. Such items may include, but are not limited to: front-end loader, shovels, rakes, clay absorbent earth, polyethylene, personal safety equipment, steel drums, pumps, and miscellaneous hand tools.

I. Spill cleanup inspection. The Owner's project manager and the project supervisor jointly will inspect the spill site to determine that the spill has been adequately cleaned up.

4.9.4 Regulatory and Base Spill Response Plans

To the extent that they are different than the above plan, regulatory and base spill response plans will be adhered to. At the pre-construction meeting, base plans for spill response will be discussed.

4.10 AIR MODELING AND MONITORING PLAN

4.10.1 Air Contaminants of Concern

The air contaminant of concern is lead in dust particulate.

4.10.2 Meteorological History and Conditions

The prevailing winds are from the west north-west as shown on the Table below. The average rainfall is 43.28 inches and the average snowfall for the area is 110 inches. The average mean temperatures are shown on the Table below:

Data Area	For Griffiss AFB/Rome*			for Rome, NY**			
Month	Prevailing Wind Direction	Mean Wind Speeds (mph)	Peak Gusts (mph)	Avg Precipitation (in)	Avg High Temp (F)	Avg Low Temp (F)	Mean Temp (F)
Jan	WNW	7	68	3.5	27	12	20
Feb	WNW	7	67	3	29	14	22
Mar	WNW	7	76	3.5	40	24	32
Apr	WNW	7	64	3.6	53	35	45
May	WNW	6	69	3.7	66	45	56
Jun	WNW	5	84	4.1	75	54	65
Jul	WNW	5	59	3.8	80	60	70
Aug	ESE	3	64	3.8	77	58	68
Sep	ESE	5	69	4.3	69	50	60
Oct	ESE	6	76	3.4	57	40	49
Nov	WNW	7	60	4.3	45	32	39
Dec	ESE	7	56	4.2	32	19	26

* Source – National Climatic Data Center
** Source – Weather.com

4.10.3 Real Time Monitoring

The potential for inhalation of dust containing lead is calculated with the following formula. The formula was used to calculate the airborne dust necessary to approach the OSHA action levels for the lead detected in site soils as follows:

$$EL_{mix} = \frac{(10^6\ mg/kg)(EL\ mg/m^3)}{(conc\ mg/kg)(Safety\ Factor)}$$

EL_{mix}: Air concentration of total dust at which the contaminants of concern would be at their established exposure limit.

EL: Exposure limit of the contaminant of concern (e.g., its PEL or TLV, whichever is lower, in mg/m^3)

10^6: Conversion factor

conc: Soil concentration of the contaminant of concern in mg/kg

Safety Factor: A number between 1 and 10 used to account for the degree of confidence in the concentration information.

Based upon the anticipated average concentration of lead found in soil at the hardfill area, 4,000 milligrams per kilogram (mg/kg), the airborne dust concentration necessary to approach the OSHA lead action level is calculated as follows:

$$EL_{mix} = \frac{(0.05\ mg/m^3) \times (10^6\ mg/kg)}{(4{,}000\ mg/kg) \times (2)} = 6.25\ mg/m^3$$

where:

EL_c = PEL for lead = 0.05 milligrams per cubic meter (mg/m^3)

dust conc. = 4,000 mg/kg

S.F. = 2

The dust exposure limit for lead exceeds visible dust concentrations, which is approximately 5 mg/m^3. Therefore, the nuisance dust exposure limit of 5 mg/m^3 will be the action limit for all soil disturbance activities. At these concentrations, dust would be visible and thus, precautions would be taken to suppress the dust. As such, monitoring with a real-time aerosol device (Mini-RAM™ Model PDM-3 or equivalent) will not be required to monitor for airborne dust to control exposure to metals. If work is being conducted in a non-vegetated area on a windy day, workers shall wet down the work area with water. If the site health and safety officer or any member of the field team does not feel that these measures are sufficient, then workers may don a full-face air-purifying respirator equipped with HEPA cartridges.

4.10.4 Community Air Monitoring Plan

Because the work site is secluded and away from any community contact, a community air monitoring plan is not required. However, real-time air monitoring, for particulate levels at the perimeter of the work area will be done as a historical record. Dust will be periodically monitored, per Section 5.4, downwind of the work area at temporary particulate monitoring locations. If the downwind particulate level is 5 mg/m3 greater than the upwind particulate level, then dust suppression techniques must be employed. Generally, if dust levels are visible,

dust suppression methods must be employed. All readings will be recorded and be available for State (NYSDEC and NYSDOH) personnel to review.

4.11 DEMOBILIZATION AND CLOSURE PLAN

4.11.1 Method for Certifying Attainment of Project Goals

Excavation to native soils will be verified by visual control. Cleanup goals in the soil will be controlled by confirmation sampling and re-excavation until the confirmation samples meet the cleanup goals.

4.11.2 Decontamination Methods

A decontamination area will be set up as part of the site preparation activities. This area will be used for decontaminating equipment prior to demobilizing. Equipment that has been contaminated by the operations, (i.e. heavy equipment, hand tools, etc.) will be water washed in this area to remove accumulated debris. Wash waters will be collected in a sump and properly disposed of off-site. Debris removed while cleaning will be assumed to be hazardous and will be shipped off-site to the TSDF. Contaminated consumable materials, such as PPE and small tools will be considered hazardous and disposed of with the soil off-site at the TSDF.

4.11.3 Procedure for Dismantling Project Facilities and Equipment

The Construction Manager will coordinate the orderly removal of all temporary facilities and construction equipment.

Project facilities will be removed when no longer needed. Telephones and power will be removed by the companies that installed them. Rental equipment will be returned to the renting agency.

Large construction equipment will be decontaminated, by removing accumulated debris, and loaded onto transport vehicles for return to the renting agency.

4.11.4 Inventory of Hazardous Materials to Remain at the Site

No hazardous materials will be left at the site. Following construction and when no longer needed, hazardous materials will be removed from the site.

4.11.5 Permanent Site Maintenance

No further site maintenance will be required after the site is seeded and grass is established.

4.11.6 Method for Initiating Site Closure

Closure of the site shall include final submittal of all technical reports, analytical data reports, waste disposal manifests and other waste documentation (weight tickets, bills of lading, etc.) and preparation of a final remedial action report.

Certification that the site closure has been completed will be the Final Remedial Action Report.

4.11.7 Permanent Deed Restrictions

The Project Manager will work with the Owner to establish property deed restrictions, if required.

4.12 ENVIRONMENTAL COMMUNITY RELATIONS

Community relations will consist of being good neighbors with the users of the SAR. SAR users will generally use the firing range after normal working hours, which includes nights and weekends. If the SAR use schedule includes use during normal scheduled working hours, the SAR Owner will notify the Project Manager through the AFCEE Project Manager of their intent to use the range. Work may either be scheduled around this time or temporarily suspended.

4.13 STANDARD OPERATING PROCEDURES FOR HAZARDOUS WASTE

Standard operating procedures for handling hazardous waste are included in Parsons Hazardous Waste Field Service Manual, which is attached as Appendix H to the HASP.

MATERIAL PROCESSING

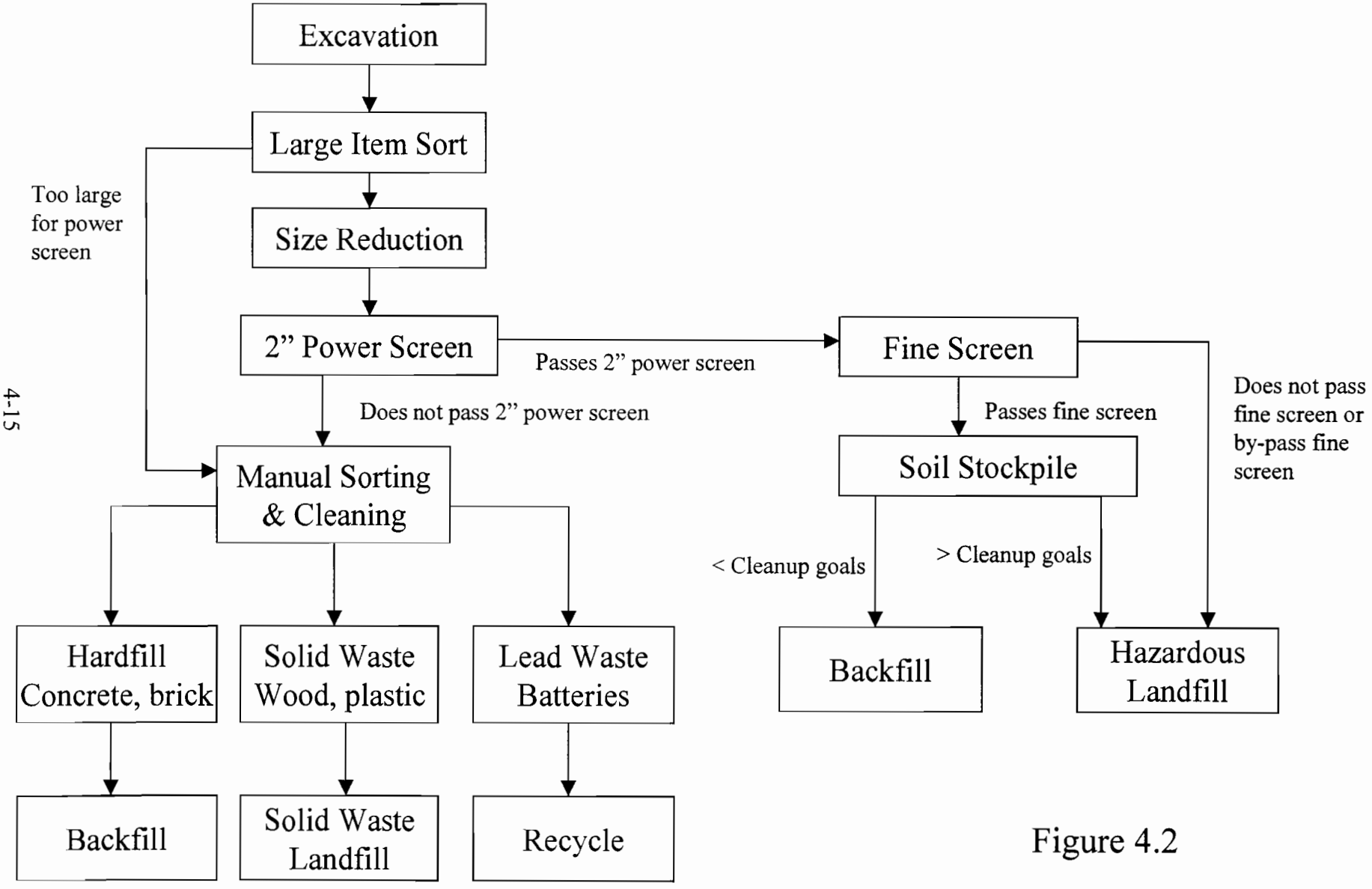


Figure 4.2

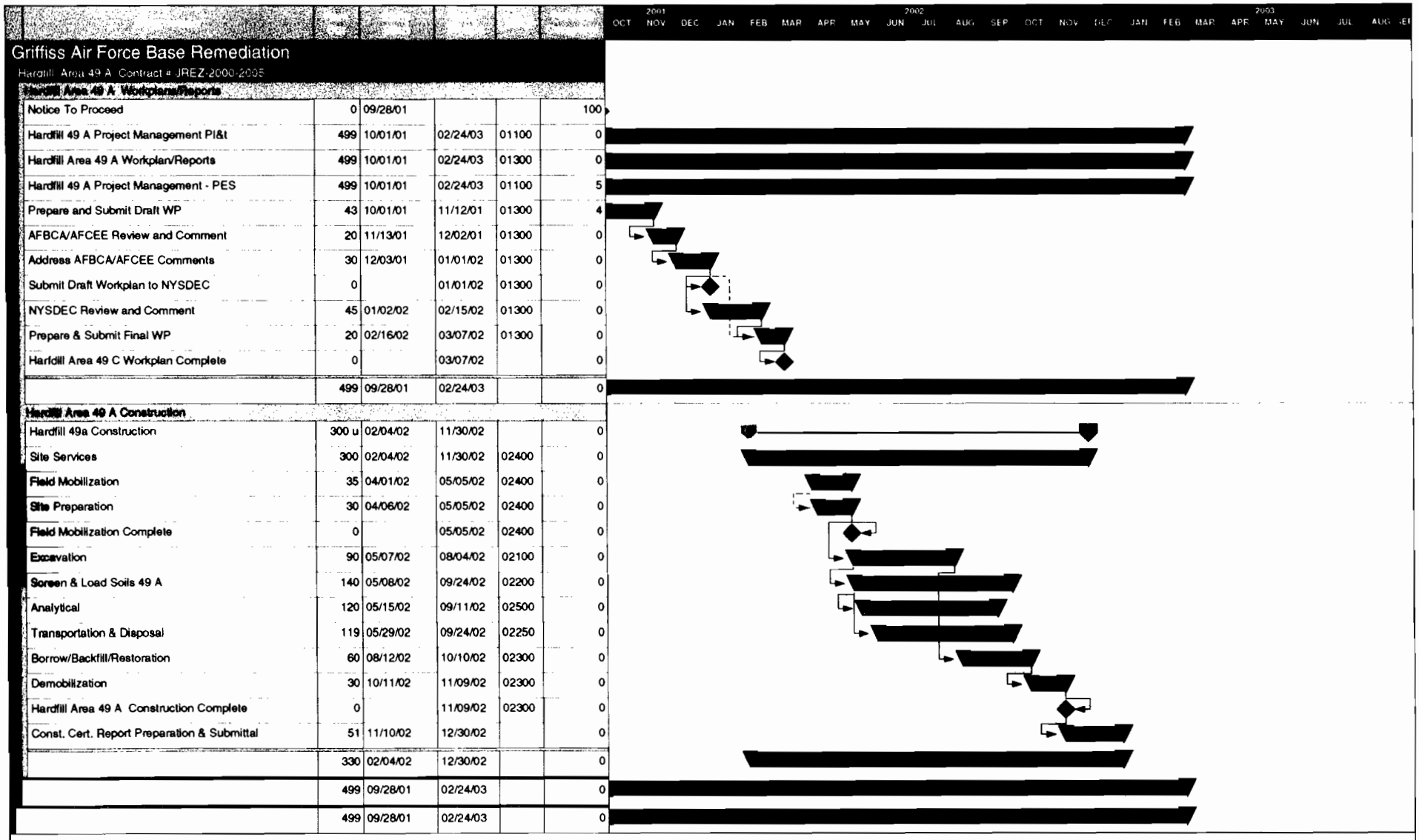
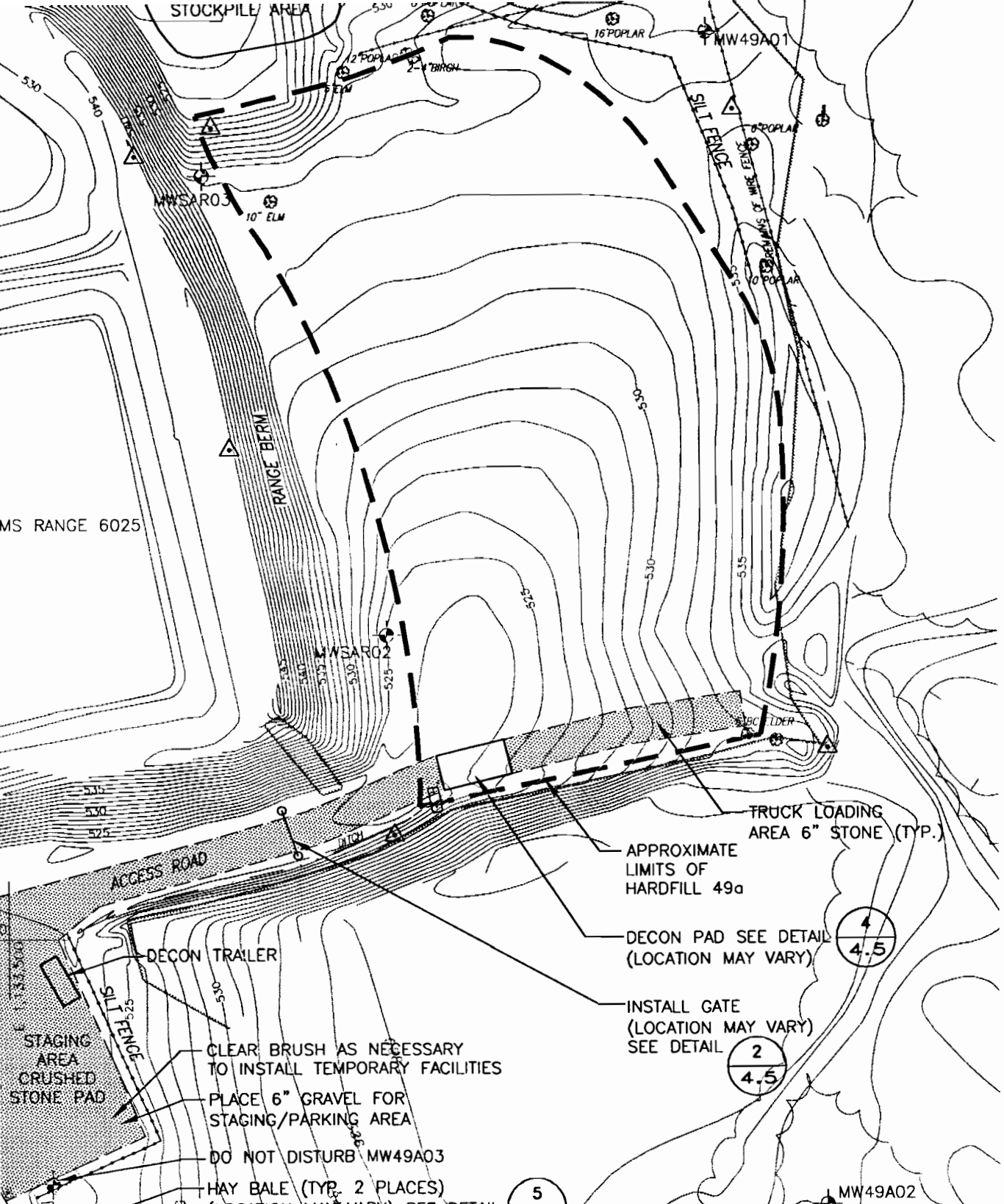

Griffiss Air Force Base Remediation
Hardfill Area 49 A Contract # JREZ-2000-2005
2001
2002
2003
OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG
Hardfill Area 49 A Workplans/Reports
Notice To Proceed 0 09/28/01 100
Hardfill 49 A Project Management PI&t 499 10/01/01 02/24/03 01100 0
Hardfill Area 49 A Workplan/Reports 499 10/01/01 02/24/03 01300 0
Hardfill 49 A Project Management - PES 499 10/01/01 02/24/03 01100 5
Prepare and Submit Draft WP 43 10/01/01 11/12/01 01300 4
AFBCA/AFCEE Review and Comment 20 11/13/01 12/02/01 01300 0
Address AFBCA/AFCEE Comments 30 12/03/01 01/01/02 01300 0
Submit Draft Workplan to NYSDEC 0 01/01/02 01300 0
NYSDEC Review and Comment 45 01/02/02 02/15/02 01300 0
Prepare & Submit Final WP 20 02/16/02 03/07/02 01300 0
Hardfill Area 49 C Workplan Complete 0 03/07/02 0
499 09/28/01 02/24/03 0
Hardfill Area 49 A Construction
Hardfill 49a Construction 300 u 02/04/02 11/30/02 0
Site Services 300 02/04/02 11/30/02 02400 0
Field Mobilization 35 04/01/02 05/05/02 02400 0
Site Preparation 30 04/06/02 05/05/02 02400 0
Field Mobilization Complete 0 05/05/02 02400 0
Excavation 90 05/07/02 08/04/02 02100 0
Screen & Load Soils 49 A 140 05/08/02 09/24/02 02200 0
Analytical 120 05/15/02 09/11/02 02500 0
Transportation & Disposal 119 05/29/02 09/24/02 02250 0
Borrow/Backfill/Restoration 60 08/12/02 10/10/02 02300 0
Demobilization 30 10/11/02 11/09/02 02300 0
Hardfill Area 49 A Construction Complete 0 11/09/02 02300 0
Const. Cert. Report Preparation & Submittal 51 11/10/02 12/30/02 0
330 02/04/02 12/30/02 0
499 09/28/01 02/24/03 0
499 09/28/01 02/24/03 0
Start date 09/27/00 4:00AM
Finish date 12/31/03 4:59PM
Data date 10/01/01 4:00AM
Run date 11/01/01 12:00PM
Page number 1A
© Primavera Systems, Inc.
Parsons Engineering Science
Griffiss Air Force Base Remediation
Project JREZ 2000-7005
Hardfill Area 49 A
Early start point
Early finish point
Early bar
Progress bar
Critical bar
Summary bar
Progress point
Critical point
Summary point
Start milestone point
Finish milestone point

FIGURE 4.2



AN ACTIVE FACILITY. ALL WORK SHALL BE COORDINATED WITH THE OWNER A MINIMUM OF TWO DAYS PRIOR TO CONDUCTING ANY ACTIVITIES. ALL CHANGES IN SCHEDULE MUST ALSO BE COORDINATED WITH THE OWNER.

2. ENTRANCE ROAD AND PARKING/STAGING AREAS SHALL BE CONSTRUCTED/MAINTAINED AS NECESSARY TO SUPPORT ALL OPERATIONS. GRAVEL AND/OR 2" CRUSHER STONE SHALL BE PLACED AND COMPACTED 6" THICK. GEOTEXTILE SHALL BE PLACED ON SOFT AREAS, AS NEEDED, PRIOR TO STONE PLACEMENT.

3. TRAILERS SHALL BE LOCATED, AS REQUIRED, TO MAKE USE OF EXISTING POWER AND/OR TELEPHONE POLES.

LEGEND

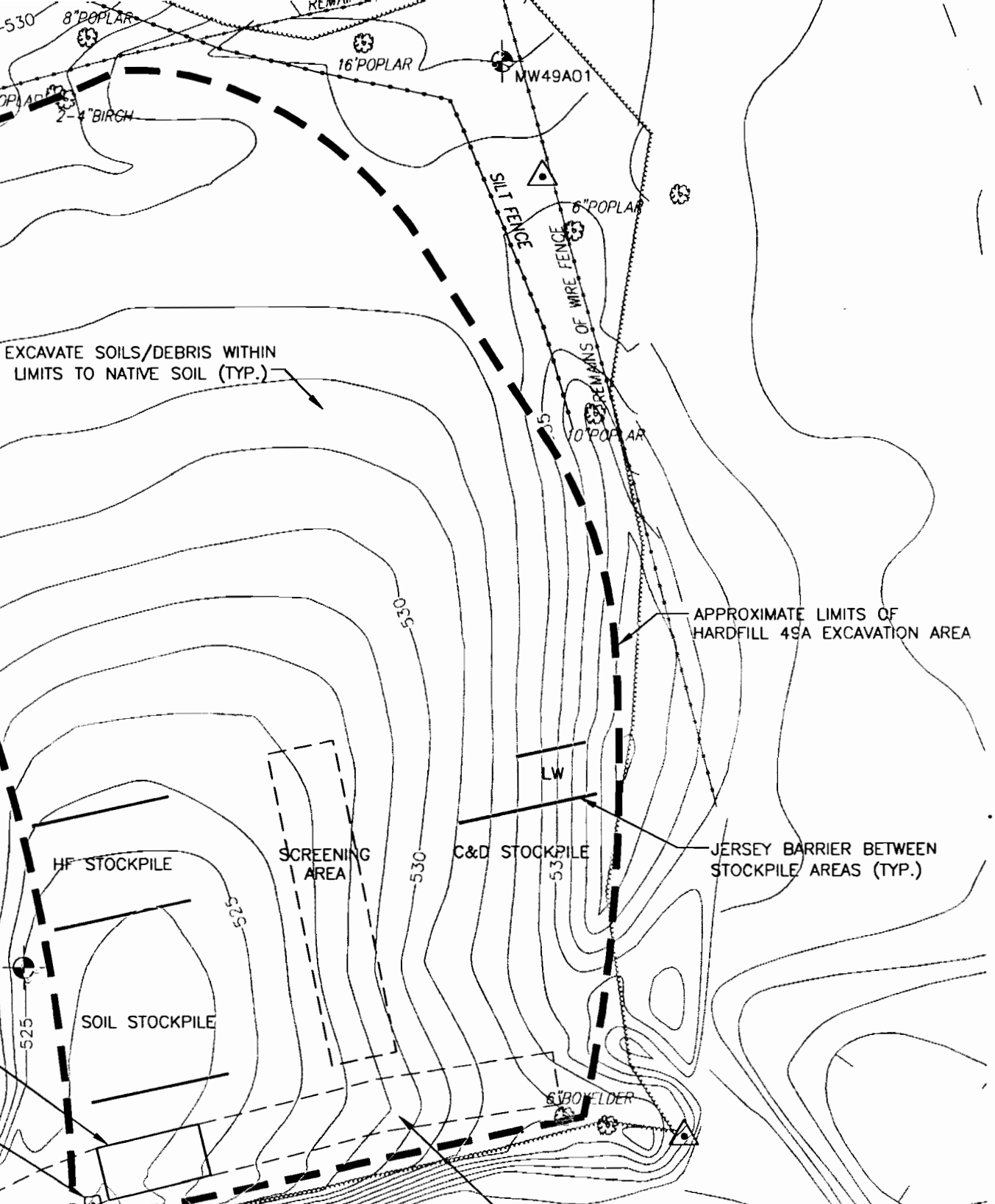
- SURVEY BENCHMARK
- LF1MW-9 — EXISTING MONITORING WELL (LOCATION APPROXIMATE)
- MW49C01 — EXISTING MONITORING WELL (LOCATION SURVEYED)
- NEW SURVEY MONUMENT (APPROXIMATE LOCATIONS)
- 490 — EXISTING TOPOGRAPHIC CONTOURS
- CENTERLINE OF DITCH OR SWALE
- LIMIT OF TREES AND BRUSH
- PROPOSED SILT FENCE

60 30 0 60 120

SCALE: 1"=60'

FIGURE 4.3

HARDFILL 49A ENVIRONMENTAL CLEANUP
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK



3. MOVE EXCAVATED SOILS TO SCREENING AREA FOR PROCESSING.
4. SCREEN, SEPARATE AND STOCKPILE AS PER WORK PLAN.
5. SCREENING AND STOCKPILE AREA TO BE MOVED/SIZED AS REQUIRED TO EXCAVATE ALL AREAS.
6. AREAS UNDER SCREENING/STOCKPILE AREAS TO BE SCRAPED 6" FOLLOWING ALL OPERATIONS. THIS MATERIAL SHALL BE DISPOSED OF AS SOIL EXCEEDING CLEAN UP STANDARDS.
7. WHEN NOT NEEDED, THE ACCESS ROAD STONE WITHIN THE EXCAVATION TO BE SCRAPED UP, AND DISPOSED OF OFF-SITE AS CONTAMINATED.
8. REMOVE AND DISPOSE OF OFF-SITE, THE DECON PAD AFTER FINAL USE.
9. UNCONTAMINATED ENTRANCE ROAD STONE OUTSIDE OF THE EXCAVATION LIMITS. MAY REMAIN.

LEGEND

- SURVEY BENCHMARK
- LF1MW-9 — EXISTING MONITORING WELL (LOCATION APPROXIMATE)
- MW49C01 — EXISTING MONITORING WELL (LOCATION SURVEYED)
- NEW SURVEY MONUMENT (APPROXIMATE LOCATIONS)
- 490 — EXISTING TOPOGRAPHIC CONTOURS
- CENTERLINE OF DITCH OR SWALE
- LIMIT OF TREES AND BRUSH
- PROPOSED SILT FENCE
- LIMITS OF EXCAVATION

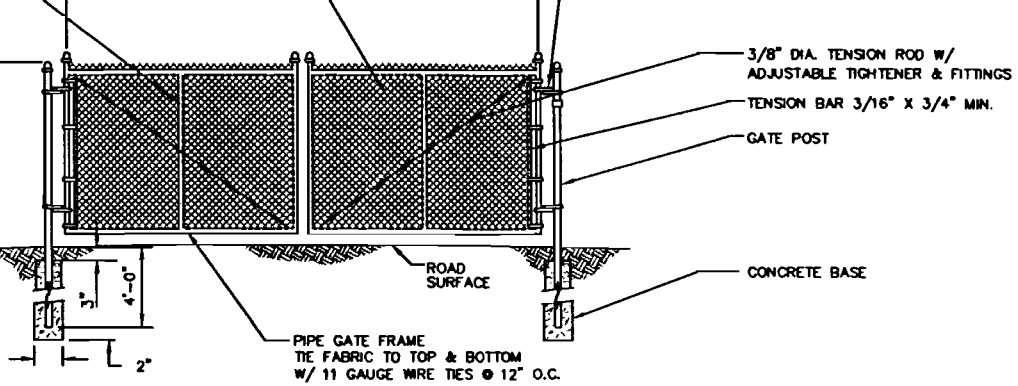
LW	LEAD WASTES
C&D	CONSTRUCTION & DEMOLITION DEBRIS
HF	HARDFILL
SOIL	MATERIAL PASSING 2" SCREEN

40 20 0 40 80

SCALE: 1"=40'

FIGURE 4.4

HARDFILL 49A ENVIRONMENTAL CLEANUP
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

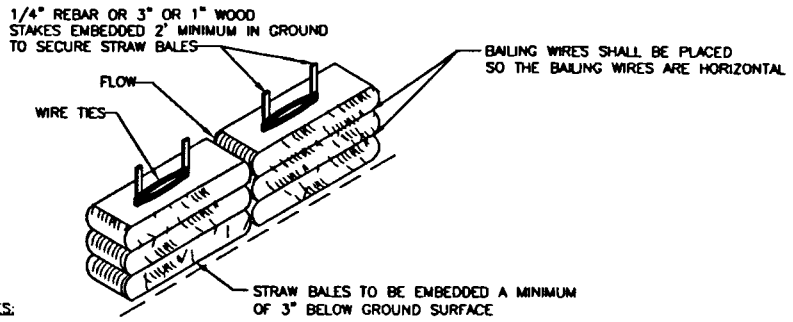


EAFS TO SWING 180° SO THAT GATE
E OPENED EITHER IN OR OUT

2 ENTRANCE GATE DETAIL
NOT TO SCALE



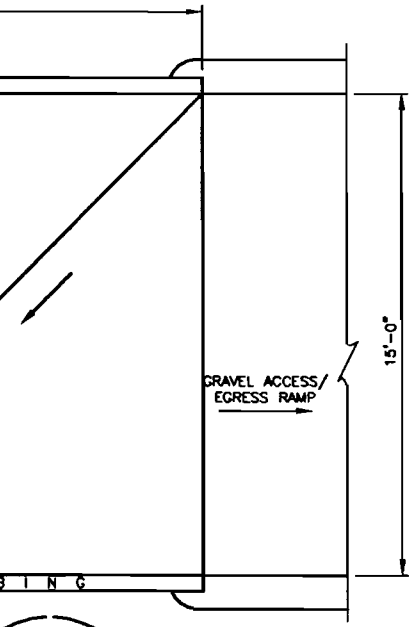
3 TYPICAL GRAVEL ROAD DETAIL
NOT TO SCALE



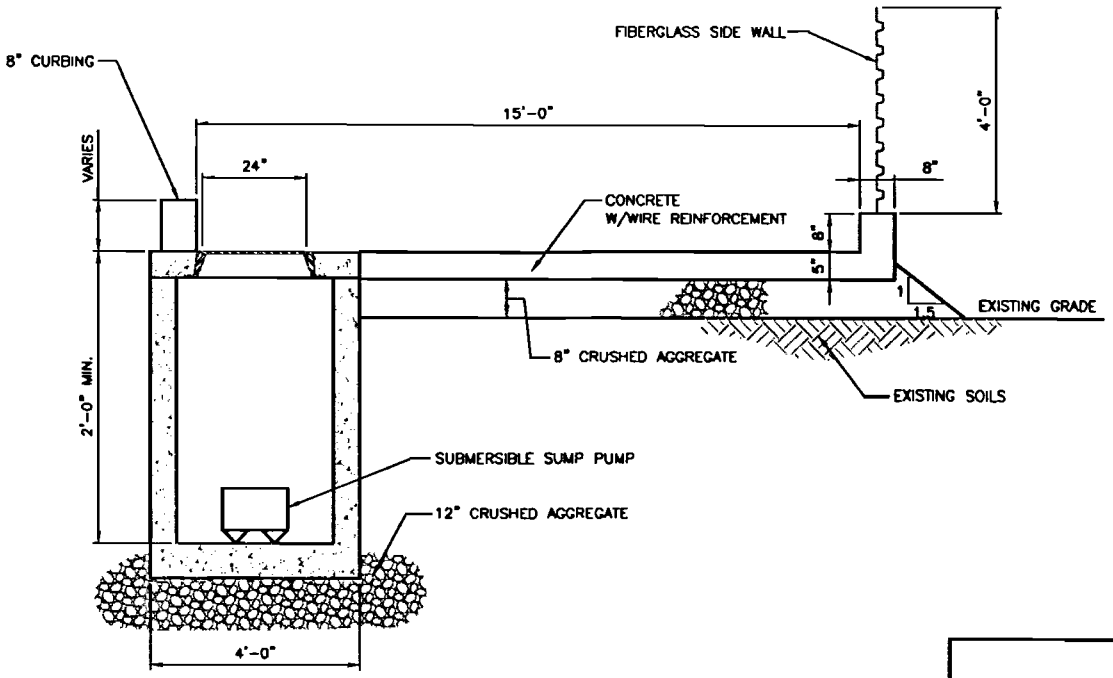
NOTES:

1. BALES SHALL TIGHTLY ABUT ADJACENT BALES.
2. BALES SHALL BE REPAIRED OR REPLACED AS NEEDED SO AS NOT TO IMPEDE STORM FLOW OR DRAINAGE.
3. HAY BALES SHALL BE REMOVED AT THE END OF THE PROJECT.

5 TYPICAL STRAW BALE DETAIL
NOT TO SCALE



000 GAL.
OLYETHYLENE
ANK
WASTEWATER)



NOTES:

1. CONCRETE SURFACE SHALL BE A MINIMUM OF 5" THICK, 3,000 PSI MINIMUM WITH WELDED WIRE REINFORCEMENT.
2. SLOPE CONCRETE 1/4" PER FOOT MINIMUM TO DRAIN TOWARD MANHOLE
3. CURBING TO BE 8" WIDE BY 8" HIGH MINIMUM AT ALL LOCATIONS
4. TANKS TO BEAR ON 12 INCHES OF COMPACTED NYSDOT TYPE 2 MATERIAL.
5. PROVIDE FIBERGLASS SIDE WALL PANELS MOUNTED ON CURBING, 4 FEET HIGH MINIMUM, ON TWO SIDES TO PREVENT OVERSPRAY.

FIGURE 4.5

HARDFILL 49A ENVIRONMENTAL CLEANUP
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

SECTION 5

FIELD SAMPLING PLAN

The Field Sampling Plan describes the guidelines that will be followed by personnel involved in the waste characterization process and the confirmatory sampling following excavation. The field procedures to be followed are described in the SAP.

5.1 SAMPLING OBJECTIVES

The sampling objectives for the project are as follows:

- Confirm the removal of all material with lead concentrations exceeding the New York State standards in the Hardfill 49A area;
- Characterize the soils screened from the hardfill for disposal;
- Provide data for lead dust levels at the work site perimeter and:
- Provide employee exposure monitoring.

5.2 CONFIRMATION SAMPLING

After the excavated materials are removed to native soils by visual control, (no observance of debris or bullets; see Section 4.5.2) soil samples will be collected from the bottom and sidewalls of the excavated areas. Bottom and sidewall areas will be determined after native soils have been exposed. Composite soil samples will be collected on a 50' x 50' grid pattern. Samples from five random locations within the grid area will be composited into one sample for analysis. Up to 100 composite samples will be collected within the surface to 6-inch depth interval.

Manual sampling methods will be employed to collect samples. A stainless steel scoop will be used to collect individual aliquots within the grid area. These aliquots will be placed into a stainless steel bowl for homogenizing by manual mixing.

A representative sample will be taken from the mixture and placed into an appropriate container.

The soil samples will be packaged and sent off-site. The samples will be analyzed for total lead (analytical methods are specified on Table 1.2 of the SAP).

If the results of the total lead are less than 400 ppm, the composite sample will be analyzed for leachable lead by TCLP methods. If the sample results for lead are greater than 400 ppm, the area will be re-excavated and re-sampled.

If the results of the leachable lead are less than 5 mg/L by TCLP methods, the excavation will be considered complete. If the results are greater than 5 mg/L, the area will be re-excavated and re-sampled.

Laboratory turn-around-time will be field determined on an as-needed basis. The field supervisor will determine how critical is the time needed for results based on current and planned field operations. In general, one week turn-around-time is expected, but this can be expedited as necessary.

5.3 WASTE CHARACTERIZATION

The excavated materials are going to be mechanically separated into four separate categories of materials. The four categories are C&D debris, hard fill, lead wastes and soils. It is assumed that debris (i.e. material over 2 inches) will not be contaminated. Therefore, material over 2 inches will be mechanically separated via heavy equipment and/or via use of a power screen and stockpiled. Large materials will be inspected for loose soils and brushed, if necessary. Other material over 2 inches will then be sent through a rotary or vibratory screen to remove any loose potentially contaminated soil. After being power-screened and/or brushed, the material greater than 2 inches will be further segregated into the lead waste, hard fill or C&D debris category. No samples will be taken from the greater than 2-inch material.

Material smaller than 2 inches will pass through the power screen. This material is expected to contain contaminated soil and lead wastes (i.e. bullets, bullet fragments) and is anticipated to be potentially above the cleanup standard. If this material is not fine screened, it will all be disposed of off-site as hazardous. No sampling will be required.

If the material smaller than 2 inches is fine screened, the material that does not pass the fine screen will be considered hazardous (this is anticipated to be the lead bullets) and disposed of off-site. No sampling of this material is required.

If the material is fine screened, the material that passes the fine screen will be stockpiled for sampling. Sampling will consist of five grab samples randomly collected from each 500 cubic yard stockpile and composited into one sample.

This composite sample will be analyzed for total lead and leachable lead.

If the total lead is less than 400 ppm and the leachable lead is less than 5 mg/L, the soil will be re-used on site as backfill. If the total lead is greater than 400 ppm, and the leachable lead less than 5 mg/L, the soil will be considered non-hazardous and disposed of off-site as solid waste.

If the total lead is greater than 400 ppm and the leachable lead is greater than 5 mg/L, the soil will be considered hazardous and disposed of off-site as a hazardous waste.

5.4 AIR SAMPLING

Air sampling will be conducted during the construction activities. One sample per day will be collected at a downwind location, at the Exclusion Zone perimeter. Filter media samples will be sent off-site for laboratory analysis at the rate of one sample per week. The sample will be analyzed for total lead. Filter samples not sent off-site for laboratory analysis will be held until the results of the sample for that week has been received. An air sampling pump (SKC-Aircheck

52 model vacuum pump rated for 1-2 l/min of airflow through self enclosed canisters containing filter media or equivalent) will be used.

Personal air monitoring to assess employee exposure will be performed using personal sampling pumps placed on job personnel simulating the greatest risk exposures. An exposure assessment will be conducted. PPE levels will be based on this exposure assessment. If a negative exposure assessment is obtained, personal monitoring will be stopped.

5.5 SAMPLE DESIGNATION

Samples will be designated as per the procedures included in the SAP (Section 5.1 and Table 5.1).

5.6 SAMPLING EQUIPMENT AND PROCEDURES

Sampling equipment and procedures are specified in the SAP (Section 3).

5.7 SAMPLE HANDLING AND PROCEDURES

Samples intended for chemical analysis will be handled as described in the SAP (Section 5).

5.8 FIELD MEASUREMENTS

Field measurements are described in the SAP (Section 3).

APPENDIX A

TEST PIT INVESTIGATION

PRELIMINARY REPORT
TEST PIT INVESTIGATION AT
HARDFILL 49A AT
THE FORMER GRIFFISS AFB, NEW YORK

PRELIMINARY DRAFT
JUNE, 1999

Preliminary Results of the Test Pit Investigation at Hardfill 49A

Introduction

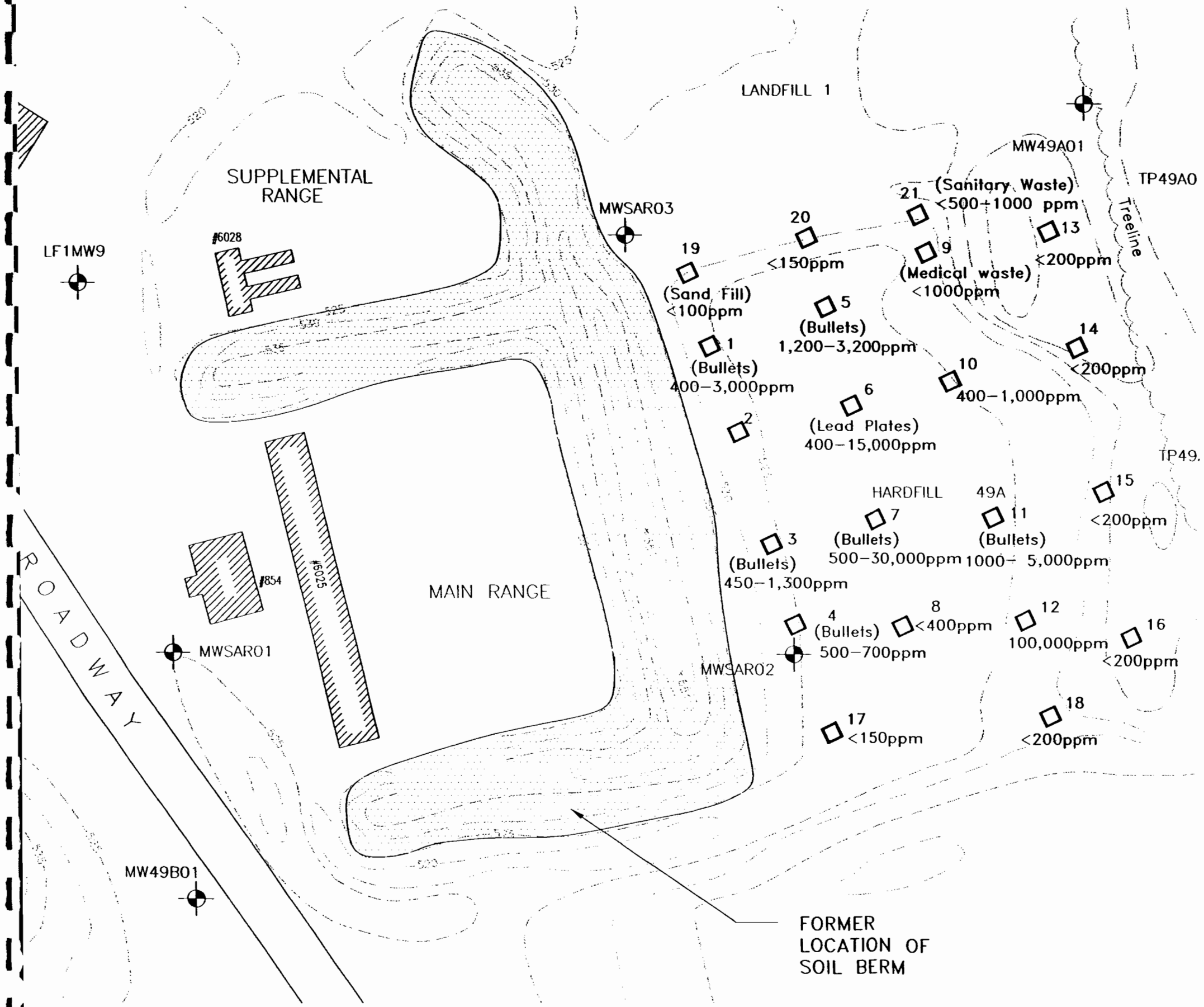
Remedial activities were undertaken at the Small Arms Range (SAR) in late summer and fall of 1998. As a result of these activities, a determination was made that additional range-related lead contaminated soil may be present beneath the area known as Hardfill 49A. Consequently, a series of 16 test pits were proposed to investigate this possibility. The original intent was to excavate through the hardfill materials to the underlying native soils to determine whether range-related materials were present beneath the hardfill and, if so, to define the extent of such material.

Additional remedial activities at the SAR, currently in progress, required the removal of hardfill materials which were known to overlie a portion of the SAR berms. During these removal activities, visual indications of lead contamination of the hardfill materials were observed. Elevated lead levels were found in the hardfill material using direct reading x-ray fluorescence (XRF) equipment. As a result, the test pit activities were modified to also include screening of the hardfill materials.

Field Activities and Observations

Test-pit excavation was undertaken during the period from May 26, 1999 to June 7, 1999. Sixteen test pits, numbered as such, were installed at the locations shown on Figure 1. Screening of the excavated materials both visually and with handheld XRF equipment was performed throughout each excavation. XRF screening data is contained in the logs for each test pit. 400 ppm of lead has been the remedial goal for the SAR.

A maximum of three samples were obtained from each test pit for laboratory analysis using EPA SW-846 Methods 6010/7471 for total metals. Analytical results for the samples are pending. The logs for each test pit are provided in Attachment A.



NOTES:

1. ALL LOCATIONS ARE APPROXIMATE.
2. TOPOGRAPHY DOES NOT REPRESENT CURRENT CONDITIONS.
3. ALL INFORMATION IS PRELIMINARY AND SUBJECT TO CHANGE.

* LEAD CONCENTRATIONS ARE BASED ON X-RAY FLUORESCENCE METER.

LEGEND

MWSAR02 — EXISTING MONITORING WELL

16 — TEST PIT LOCATION

<200ppm — ESTIMATED LEAD CONCENTRATION *

FORMER BERMED AREA

0 25 50
SCALE: 1" = 50'

FIGURE 1
TEST PIT LOCATIONS

AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE
GRIFFISS AIR FORCE BASE - NEW YORK

PEER CONSULTANTS, P.C.
12300 TWINBROOK PARKWAY
SUITE 410
ROCKVILLE, MARYLAND 20852
(301) 816-0700

PROJECT NUMBER: 1566-045-001-03 | SCALE: 1" = 50' | DESIGNED BY: MB 6/99 | DRAWN BY: HFP 6/99 | CHECKED BY: MB 6/99

NO.	REVISION	BY	DATE

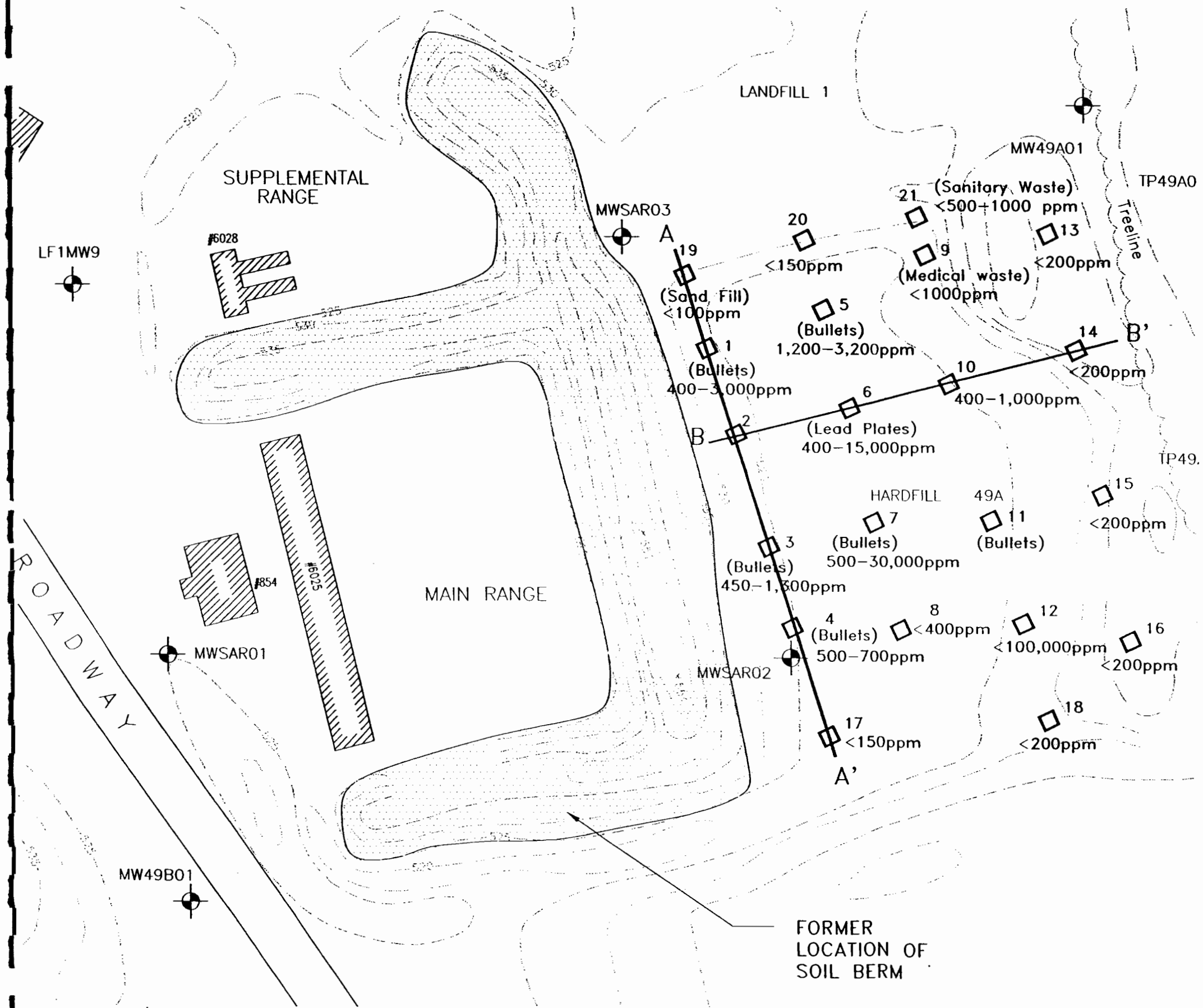
FILENAME: 15601F1A

To assist in interpreting the information obtained from the test pit activities, two cross-sections were prepared. The location of these cross-sections is shown on Figure 2. Figure 3 presents cross-section A-A' trending from north to south. Figure 4 presents cross-section B-B' trending from west to east. At this point no vertical or horizontal control has been established for the test pits. Certain assumptions were made in the construction of the cross-sections. For cross-section A-A', the elevation of the native materials in Test Pits 1-4 and 17 were assumed to be the same based on information developed during removal of the SAR berm. For cross-section B-B', the ground surface was assumed to be the same for each location. Given the lack of vertical and horizontal control, use of these cross-sections to estimate volumes should be avoided.

Hardfill materials were encountered in Test Pits 1 through 8 and 10 through 12 (See Figures 3 and 4). Hardfill materials consisted of treated timbers, wood fragments (painted and unpainted), various pieces of metal, crushed metal containers, pieces of pipe, concrete rubble, asphalt rubble, bricks, glass, and plastic. These materials were mixed with gray silt and gravel that commonly contained bullets and fragments. Of the locations where hardfill was encountered, only Test Pits 8 and 12 did not contain bullets and bullet fragments in the hardfill materials. In Test Pits 1 through 4, 6, 7, 10, and 11, gray gravelly silt with some sand was observed beneath the hardfill materials that contained bullets, bullet fragments, and lead patinas on the soil aggregate surfaces. Lead patinas (probably resulting from precipitation of dissolved lead) were visible as silvery coatings on both wood and soil in most of the test pits where lead containing materials were encountered.

Test Pit 9 was observed to contain fill materials that do not correlate with those found in the other pits. The material found in this pit was comprised of sanitary refuse containing primarily paper and general household refuse. Also found in the sanitary refuse was a small plastic bag containing approximately 50 hypodermic syringes and several empty blood vials. This medical waste was not labeled or identified in any fashion. Lead containing material (based on XRF readings) consisting of a confetti-like substance was observed in the sanitary refuse.

During the test pit excavation, it became apparent that additional lead bearing materials were present in the hardfill and sanitary refuse materials. Many of the wood fragments with paint



NOTES:

1. ALL LOCATIONS ARE APPROXIMATE.
2. TOPOGRAPHY DOES NOT REPRESENT CURRENT CONDITIONS.
3. ALL INFORMATION IS PRELIMINARY AND SUBJECT TO CHANGE.

* LEAD CONCENTRATIONS ARE BASED ON X-RAY FLUORESCENCE METER.

LEGEND

MWSAR02	EXISTING MONITORING WELL
16	TEST PIT LOCATION
<200ppm	ESTIMATED LEAD CONCENTRATION *
	FORMER BERMED AREA

AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE
GRIFFISS AIR FORCE BASE - NEW YORK

FIGURE 2
CROSS SECTION LOCATIONS

PEI CONSULTANTS, P.C.
12300 TWINBROOK PARKWAY
SUITE 410
ROCKVILLE, MARYLAND 20852
(301) 816-0700

NO.	REVISION	BY	DATE

PROJECT NUMBER: 1566-045-001-03
SCALE: 1" = 50'
DESIGNED BY: MB 6/99
DRAWN BY: HFP 6/99
CHECKED BY: MB 6/99

FILENAME: 156601F1B

were determined to contain lead. Lead acid battery plates were observed in the excavation for Test Pit 6. The confetti-like material found in Test Pit 9 was also determined to contain lead.

All four test pits on the eastern edge of the site (Test Pits 13 through 16) were found to contain neither hardfill nor range-related materials.

A second round of test pits (numbered 17 through 21) were installed to define the limits of lead contaminated material. The only test pit which was observed to contain lead associated with either the range or the hardfill materials was Test Pit 21 which was found to contain a small, discrete (approximately 1 cubic foot) clump of soil containing bullets. No continuity between this small deposit and those materials observed in the original 16 pits was observed. At this location large quantities of the confetti-like material observed in Test Pit 9 were also observed at this location.

Beneath the fill materials, the native soil consists of sand and gravel with few to no fines or organic matter. This deposit was consistently found across the site. Groundwater was typically encountered 2-4 feet below the elevation of the native materials at Test Pits 1 through 4. At Test Pit 7, groundwater was observed to be in contact with the lead contaminated materials.

Summary and Conclusions

A total of 21 test pits were installed throughout the area known as Hardfill 49A. Excavated materials were screened both visually and using direct reading XRF equipment to assess the distribution of lead in the subsurface. A total of 47 samples plus two duplicates were collected and submitted to Severn Trent Laboratories in Amherst, New York for analysis for total metals.

Based on the information developed from this test pit investigation the following preliminary conclusions are made:

- Lead contamination appears to be widespread throughout the hardfill materials and is derived from several sources including bullets, lead paint and other lead containing materials (i.e. lead acid battery plates).

- Range-related lead contaminated soil (gravelly silt) underlies a significant portion of the hardfill.

- An area of sanitary refuse is located on the north central portion of the site. This refuse also contains lead materials which are of a different origin than those in the hardfill/range-related deposits.

- Lead contamination of soil does not appear to continue into the underlying native sand and gravel based on XRF screening.

- Lead contaminated materials extend into the groundwater at certain locations. At other locations, the groundwater is within 3-4 feet of the contaminated material.

- Native materials at the site consist of a sand and gravel without fines or organic matter. This material is anticipated to possess a high hydraulic conductivity, and is unlikely to attenuate metals in leachate from the contaminated materials. This native material provides a pathway for dissolved lead to reach the groundwater.

Hard Fill 49A Test Pit Soil Sampling
Summary of Analytical Results for Total Lead (ppm)

	LEAD, SW6010/7471			
	LOCATION IN PIT			
TEST PIT #	A	B	C	D
1	434	242	760	
2	482	112	208	
3	797	1400	1520	
4	189	119	3.2	
5	173	5.2		
6	214	1220		
7	146	489	4	
8	55.9	24.5	3.6	3.1
9	101	9.6		
10	106	8170	2180	
11	435	166	2230	
12	61.0	3.9		
13	7.8			
14	6			
15	7.0	6.4		
16	16.2			
17	23.8	2.2		
18	136	7.8		
19	80.3	4.4		
20	7.6	3		
21	423	33.3	3.6	

Hard Fill 49A Test Pit, Soil Sampling
Analytical Results (ppm), May 26, 1999
Metals, Page 1 of 2

Metals, SW6010/7471	Guidance Values (1)	Practical Quantitation Limit for Soil (2)	Background Screening Level (a)	GSGHF49ATP14A		GSGHF49ATP10A		GSGHF49ATP10B		GSGHF49ATP10C		GSGHF49ATP6A		GSGHF49ATP6B	
Aluminum	18,306	50	18,306	9380	J	8160	J	14200	J	13600	J	7060	J	6010	J
Antimony	820[b]	40	N/D	N/D	M	1.1	M	46.8	M	12.2	M	5.7	M	36.6	M
Arsenic	3.3[c]	60	4.9	5.8	F	8.1	F	6.6	F	7.5	F	4.1	F	4.8	F
Barium	71	2	71	33.4		129		60.7		67.1		27.8		23.1	
Beryllium	0.16[c]	0.3	0.73	0.47		0.40		0.76		0.71		0.32		0.32	
Cadmium	1[c]	4	N/D	N/D		0.36	F	0.20	F	0.21	F	N/D		N/D	
Calcium	23,821	10	23,821	754	J	29300	J	4380	J	3870	J	1960	J	2800	J
Chromium	10[c]	7	22.6	10.5	M	10.4	M	17.2	M	16.3	M	7.7	M	6.9	M
Cobalt	19	7	19	7.5		6.0	F	10.4		10.3		4.5	F	3.9	F
Copper	25[c]	6	43	38.2		50.3		68.2		94.6		16.8		16.6	
Iron	2,000[c]	7	47,350	22200		16300		24000		28100		13400		12300	
Lead	36	50	36	6.0	F	106		8170		2180		214		1220	
Magnesium	7,175	30	7,175	3760		3110		4530		4420		2320		2100	
Manganese	2,106	2	2,106	745	M	658	M	721	M	773	M	398	M	387	M
Mercury (3)	0.1[c]	0.1	N/D	N/D		0.092	F	0.12		0.067	F	N/D		N/D	
Molybdenum	10,000[b]	8	N/D	N/D		17.9		2.5	F	0.90	F	N/D		N/D	
Nickel	13[c]	15	46	16.1		12.9	F	25.3		23.9		10	F	9.3	F
Potassium	1,993	500	1,993	920		838		2620		2560		1380		1240	
Selenium	2[c]	0.5	N/D	N/D	M	N/D	M	N/D	M	N/D	M	N/D	M	N/D	
Silver	10,000[b]	7	N/D	N/D		N/D		0.38	F	N/D		N/D		N/D	
Sodium	259	30	259	333		438		532		553		320		349	
Thallium	N/D	40	N/D	4.1	M	6.0	M	4.4	M	4.5	M	2.5	M	2.2	M
Vanadium	36	8	36	14.9		15.3		26.5		25.0		13.3		12.1	
Zinc	20[c]	2	120	59.0	R	116	R	84.4	R	83.8	R	36.6	R	40.1	R

(1) Guidance Value selected is the most stringent of Federal, NY State and Griffiss AFB background soil screening levels. The superscripts are defined as follows:
- (a) GriffissAFB background soil screening levels as determined during the base wide remedial investigation.
- (b) Federal Requirements: EPA Risk based concentrations for industrial soil, Region 3.
- (c) State Requirements: Recommended state soil cleanup objectives from base wide remedial investigation.

(2) AFCEE Model QAPP, Version 1.1 method specific Practical Quantitation Limit (PQL). When the Guidance Value is below the PQL, achieving the Quantitation Limit is considered acceptable for meeting the Guidance Value.

(3) Analyzed using Method SW7471.

N/D = Not detected or below PQL, - = No value reported.

Hard Fill 49A Test Pit, Soil Sampling
Analytical Results (ppm), May 26, 1999
Metals, Page 2 of 2

Metals, SW6010/7471	Guidance Values (1)	Practical Quantitation Limit for Soil (2)	Background Screening Level (a)	GSGHF49ATP13A						
Aluminum	18,306	50	18,306	9480	J					
Antimony	820[b]	40	N/D	N/D	M					
Arsenic	3.3[c]	60	4.9	3.7	F					
Barium	71	2	71	21.2						
Beryllium	0.16[c]	0.3	0.73	0.51						
Cadmium	1[c]	4	N/D	N/D						
Calcium	23,821	10	23,821	625	J					
Chromium	10[c]	7	22.6	9.6	M					
Cobalt	19	7	19	5.8	F					
Copper	25[c]	6	43	29.4						
Iron	2,000[c]	7	47,350	17400						
Lead	36	50	36	7.8	F					
Magnesium	7,175	30	7,175	3350						
Manganese	2,106	2	2,106	507	M					
Mercury (3)	0.1[c]	0.1	N/D	0.048	F					
Molybdenum	10,000[b]	8	N/D	N/D						
Nickel	13[c]	15	46	12.9	F					
Potassium	1,993	500	1,993	1320						
Selenium	2[c]	0.5	N/D	N/D	M					
Silver	10,000[b]	7	N/D	N/D						
Sodium	259	30	259	272						
Thallium	N/D	40	N/D	2.9	M					
Vanadium	36	8	36	14.4						
Zinc	20 [c]	2	120	42.7	R					

(4) Guidance Value selected is the most stringent of Federal, NY State and Griffiss AFB background soil screening levels. The superscripts are defined as follows:
- (d) GriffissAFB background soil screening levels as determined during the base wide remedial investigation.
- (e) Federal Requirements: EPA Risk based concentrations for industrial soil, Region 3.
- (f) State Requirements: Recommended state soil cleanup objectives from base wide remedial investigation.

(5) AFCEE Model QAPP, Version 1.1 method specific Practical Quantitation Limit (PQL). When the Guidance Value is below the PQL, achieving the Quantitation Limit is considered acceptable for meeting the Guidance Value.

(6) Analyzed using Method SW7471.

N/D = Not detected or below PQL, - = No value reported.

Hard Fill 49A Test Pit, Soil Sampling
Analytical Results (ppm), June 2, 1999
Metals, Page 1 of 2

Metals, SW6010/7471	Guidance Values (1)	Practical Quantitation Limit for Soil (2)	Background Screening Level (a)	GSGHF49ATP15A	GSGHF49ATP15AD	GSGHF49ATP16A	GSGHF49ATP12A	GSGHF49ATP12B	GSGHF49ATP11A
Aluminum	18,306	50	18,306	14100	12700	13300	9170	5730	4920
Antimony	820[b]	40	N/D	0.97 M	N/D M	N/D M	3.0 M	0.92 M	3.0 M
Arsenic	3.3[c]	60	4.9	3.1 F	3.3 F	4.0 F	3.6 F	2.4 F	2.7 F
Barium	71	2	71	33.5	34.8	40.1	81.7	15.9	31.8
Beryllium	0.16[c]	0.3	0.73	0.48	0.41	0.47	0.32	0.35	0.22 F
Cadmium	1[c]	4	N/D	0.24 F	0.23 F	0.30 F	0.32 F	0.14 F	0.21 F
Calcium	23,821	10	23,821	320 J	339 J	1720 J	15900 J	1260 J	45300 J
Chromium	10[c]	7	22.6	12.9	10.8	12.4	11.1	6.2 F	6.6 F
Cobalt	19	7	19	6.1 F	5.2 F	6.9 F	5.8 F	4.0 F	3.4 F
Copper	25[c]	6	43	13.9	8.2	24.3	28.4	13.9	36.6
Iron	2,000[c]	7	47,350	18200	16200	18800	15300	11300	9640
Lead	36	50	36	7.0	6.4 F	16.2 F	61.0	3.9 F	435
Magnesium	7,175	30	7,175	2670	1550	3520	3690	2070	2810
Manganese	2,106	2	2,106	550	676	875	447	387	303
Mercury (3)	0.1[c]	0.1	N/D	N/D	N/D	N/D	0.25	N/D	N/D
Molybdenum	10,000[b]	8	N/D	1.5 F	9.0 J	1.5 F	0.86 F	N/D	N/D
Nickel	13[c]	15	46	12.3 F	6.2 F	15.1	12.8 F	8.9 F	7.6 F
Potassium	1,993	500	1,993	1540 J	1060 J	1480	1480	1240	1120
Selenium	2[c]	0.5	N/D	1.1 F	2.8 F	2.0 F	N/D	1.1 F	N/D
Silver	10,000[b]	7	N/D	N/D	N/D	N/D	N/D	N/D	N/D
Sodium	259	30	259	456	378	441	423	361	404
Thallium	N/D	40	N/D	5.4 F	9.3 F	5.0 F	3.0 F	2.2 F	1.8 F
Vanadium	36	8	36	23.1 R	23.1 J	20.2	17.6	10.8	10.1
Zinc	20[c]	2	120 J	47.4 J	41.2 J	55.4 J	153 J	31.0 J	51.9 J

(1) Guidance Value selected is the most stringent of Federal, NY State and Griffiss AFB background soil screening levels. The superscripts are defined as follows:
- (a) GriffissAFB background soil screening levels as determined during the base wide remedial investigation.
- (b) Federal Requirements: EPA Risk based concentrations for industrial soil, Region 3.
- (c) State Requirements: Recommended state soil cleanup objectives from base wide remedial investigation.

(2) AFCEE Model QAPP, Version 1.1 method specific Practical Quantitation Limit (PQL). When the Guidance Value is below the PQL, achieving the Quantitation Limit is considered acceptable for meeting the Guidance Value.

(3) Analyzed using Method SW7471.

N/D = Not detected or below PQL, - = No value reported.

Hard Fill 49A Test Pit, Soil Sampling
Analytical Results (ppm), June 2, 1999
Metals, Page 2 of 2

Metals, SW6010/7471	Guidance Values (1)	Practical Quantitation Limit for Soil (2)	Background Screening Level (a)	GSGHF49ATP11B		GSGHF49ATP11C					
Aluminum	18,306	50	18,306	10300		5620					
Antimony	820[b]	40	N/D	1.6	M	12.8	M				
Arsenic	3.3[c]	60	4.9	4.2	F	2.1	F				
Barium	71	2	71	63.6		22.3					
Beryllium	0.16[c]	0.3	0.73	0.44		0.21	F				
Cadmium	1[c]	4	N/D	0.48	F	0.16	F				
Calcium	23,821	10	23,821	20100	J	1960	J				
Chromium	10[c]	7	22.6	16.8		18.6					
Cobalt	19	7	19	6.4	F	4.1	F				
Copper	25[c]	6	43	127		740					
Iron	2,000[c]	7	47,350	15900		12300					
Lead	36	50	36	166		2230					
Magnesium	7,175	30	7,175	4090		2050					
Manganese	2,106	2	2,106	605		358					
Mercury (3)	0.1[c]	0.1	N/D	0.36		N/D					
Molybdenum	10,000[b]	8	N/D	N/D		N/D					
Nickel	13[c]	15	46	15.6		37.2					
Potassium	1,993	500	1,993	1760		788					
Selenium	2[c]	0.5	N/D	1.7	F	0.78	F				
Silver	10,000[b]	7	N/D	N/D		N/D					
Sodium	259	30	259	511		380					
Thallium	N/D	40	N/D	2.8	F	1.9	F				
Vanadium	36	8	36	21.0		10.1					
Zinc	20 [c]	2	120	150	J	193	J				

(4) Guidance Value selected is the most stringent of Federal, NY State and Griffiss AFB background soil screening levels. The superscripts are defined as follows:
- (d) GriffissAFB background soil screening levels as determined during the base wide remedial investigation.
- (e) Federal Requirements: EPA Risk based concentrations for industrial soil, Region 3.
- (f) State Requirements: Recommended state soil cleanup objectives from base wide remedial investigation.

(5) AFCEE Model QAPP, Version 1.1 method specific Practical Quantitation Limit (PQL). When the Guidance Value is below the PQL, achieving the Quantitation Limit is considered acceptable for meeting the Guidance Value.

(6) Analyzed using Method SW7471.

N/D = Not detected or below PQL, - = No value reported.

OWS 133 Soil Sampling
Analytical Results (ppm), June 2, 1999
Metals, Page 1 of 1

Metals, SW6010/7471	Guidance Values (1)	Practical Quantitation Limit for Soil (2)	Background Screening Level (a)						
Aluminum	18,306	50	18,306						
Antimony	820[b]	40	N/D						
Arsenic	3.3[c]	60	4.9						
Barium	71	2	71						
Beryllium	0.16[c]	0.3	0.73						
Cadmium	1[c]	4	N/D						
Calcium	23,821	10	23,821						
Chromium	10[c]	7	22.6						
Cobalt	19	7	19						
Copper	25[c]	6	43						
Iron	2,000[c]	7	47,350						
Lead	36	50	36						
Magnesium	7,175	30	7,175						
Manganese	2,106	2	2,106						
Mercury (3)	0.1[c]	0.1	N/D						
Molybdenum	10,000[b]	8	N/D						
Nickel	13[c]	15	46						
Potassium	1,993	500	1,993						
Selenium	2[c]	0.5	N/D						
Silver	10,000[b]	7	N/D						
Sodium	259	30	259						
Thallium	N/D	40	N/D						
Vanadium	36	8	36						
Zinc	20 [c]	2	120						

(7) Guidance Value selected is the most stringent of Federal, NY State and Griffiss AFB background soil screening levels. The superscripts are defined as follows:
- (g) GriffissAFB background soil screening levels as determined during the base wide remedial investigation.
- (h) Federal Requirements: EPA Risk based concentrations for industrial soil, Region 3.
- (i) State Requirements: Recommended state soil cleanup objectives from base wide remedial investigation.

(8) AFCEE Model QAPP, Version 1.1 method specific Practical Quantitation Limit (PQL). When the Guidance Value is below the PQL, achieving the Quantitation Limit is considered acceptable for meeting the Guidance Value.

(9) Analyzed using Method SW7471.

N/D = Not detected or below PQL, - = No value reported.

Hard Fill 49A Test Pit, Soil Sampling
Analytical Results (ppm), June 7, 1999
Metals, Page 1 of 2

Metals, SW6010/7471	Guidance Values (1)	Practical Quantitation Limit for Soil (2)	Background Screening Level (a)	GSGHF49ATP17A		GSGHF49ATP17B		GSGHF49ATP18A		GSGHF49ATP18B		GSGHF49ATP19A		GSGHF49ATP19B	
Aluminum	18,306	50	18,306	5660	M	3110	M	6070	M	8930	M	10500	M	4740	M
Antimony	820[b]	40	N/D	N/D	M	N/D	M	N/D	M	N/D	M	N/D	M	N/D	M
Arsenic	3.3[c]	60	4.9	3.6	F	2.3	F	3.5	F	3.7	F	5.0	F	3.1	F
Barium	71	2	71	27.4	J	24.0	J	31.4	J	30.3	J	51.4	J	19.8	J
Beryllium	0.16[c]	0.3	0.73	0.35		0.26	F	0.37		0.35		0.55		0.30	
Cadmium	1[c]	4	N/D	0.19	F	N/D		0.42	F	N/D		N/D		N/D	
Calcium	23,821	10	23,821	29700	M	826	M	13500	M	1290	M	1190	M	13700	M
Chromium	10[c]	7	22.6	8.0		3.4	F	6.8	F	7.2		11.4		5.5	F
Cobalt	19	7	19	4.8	F	2.8	F	5.0	F	5.2	F	7.2		4.1	F
Copper	25[c]	6	43	22.1		136		217		17.5		34.9		17.1	
Iron	2,000[c]	7	47,350	12700	M	8040	M	10900	M	16900	M	21200	M	11400	M
Lead	36	50	36	23.8	M	2.2	M	136	M	7.8	M	80.3	M	4.4	M
Magnesium	7,175	30	7,175	2930	M	1360	M	3490	M	2260	M	3190	M	2140	M
Manganese	2,106	2	2,106	437		635		354		787		984		436	
Mercury (3)	0.1[c]	0.1	N/D	N/D		N/D		N/D		N/D		N/D		N/D	
Molybdenum	10,000[b]	8	N/D	N/D		N/D		N/D		N/D		N/D		N/D	
Nickel	13[c]	15	46	10.9	F	7.7	F	10.4	F	10.2	F	15.9		8.9	F
Potassium	1,993	500	1,993	775	R	564	R	856	R	458	R	709	R	651	R
Selenium	2[c]	0.5	N/D	N/D	M	N/D	M	N/D	M	N/D	M	N/D	M	N/D	M
Silver	10,000[b]	7	N/D	N/D		N/D		N/D		N/D		N/D		N/D	
Sodium	259	30	259	N/D	J	N/D	J	N/D	J	N/D	J	N/D	J	N/D	J
Thallium	N/D	40	N/D	2.4	F	2.2	F	2.2	F	3.3	F	4.3	F	2.1	F
Vanadium	36	8	36	13.5		5.7	F	11.1		13.1		16.5		8.7	
Zinc	20[c]	2	120	43.1		27.1		459		42.6		55.0		30.5	

(1) Guidance Value selected is the most stringent of Federal, NY State and Griffiss AFB background soil screening levels. The superscripts are defined as follows:
- (a) GriffissAFB background soil screening levels as determined during the base wide remedial investigation.
- (b) Federal Requirements: EPA Risk based concentrations for industrial soil, Region 3.
- (c) State Requirements: Recommended state soil cleanup objectives from base wide remedial investigation.

(2) AFCEE Model QAPP, Version 1.1 method specific Practical Quantitation Limit (PQL). When the Guidance Value is below the PQL, achieving the Quantitation Limit is considered acceptable for meeting the Guidance Value.

(3) Analyzed using Method SW7471.

N/D = Not detected or below PQL, - = No value reported.

Hard Fill 49A Test Pit, Soil Sampling
Analytical Results (ppm), June 7, 1999
Metals, Page 2 of 2

Metals, SW6010/7471	Guidance Values (1)	Practical Quantitation Limit for Soil (2)	Background Screening Level (a)	GSGHF49ATP20A		GSGHF49ATP20B		GSGHF49ATP21A		GSGHF49ATP21B		GSGHF49ATP21C		
Aluminum	18,306	50	18,306	4310	M	3500	M	5740	M	4560	M	4180	M	
Antimony	820[b]	40	N/D	N/D	M	N/D	M	2.0	M	N/D	M	N/D	M	
Arsenic	3.3[c]	60	4.9	28.7	F	2.8	F	15.0	F	20.0	F	1.7	F	
Barium	71	2	71	88.5	J	23.6	F	82.0		78.3		25.7		
Beryllium	0.16[c]	0.3	0.73	1.6		0.23	F	1.2		1.6		0.29	F	
Cadmium	1[c]	4	N/D	N/D		N/D		N/D		0.13	F	N/D		
Calcium	23,821	10	23,821	2600	M	16000	M	2170	M	1860	M	1520	M	
Chromium	10[c]	7	22.6	11.2		4.2	F	9.9		13.9		4.7	F	
Cobalt	19	7	19	3.7	F	3.2	F	4.4	F	5.4	F	4.0	F	
Copper	25[c]	6	43	32.2		13.1	F	123		36.9		15.9		
Iron	2,000[c]	7	47,350	14500	M	8780	M	12500	M	29900	M	11800	M	
Lead	36	50	36	7.6	M	3.0	M	423	M	33.3	M	3.6	M	
Magnesium	7,175	30	7,175	300	M	1860	M	1140	M	352	M	1930	M	
Manganese	2,106	2	2,106	19.1		167		246		54.8		657		
Mercury (3)	0.1[c]	0.1	N/D	N/D		N/D		0.12		0.76		N/D		
Molybdenum	10,000[b]	8	N/D	2.4	F	0.94	F	1.6	F	8.6		N/D		
Nickel	13[c]	15	46	13.1	F	7.5	F	12.1	F	17.6		9.0	F	
Potassium	1,993	500	1,993	510	R	595	R	716	R	512	R	592	R	
Selenium	2[c]	0.5	N/D	N/D	M	N/D	M	N/D	M	N/D	M	N/D	M	
Silver	10,000[b]	7	N/D	N/D		N/D		N/D		0.71	F	N/D		
Sodium	259	30	259	N/D	J	N/D	J	N/D	J	N/D	J	N/D	J	
Thallium	N/D	40	N/D	2.4	F	1.2	F	2.4	F	4.2	F	2.3	F	
Vanadium	36	8	36	47.9		6.8	F	33.8		45.4		7.4	F	
Zinc	20[c]	2	120	35.1		28.6		51.8		71.2		65.0		

(4) Guidance Value selected is the most stringent of Federal, NY State and Griffiss AFB background soil screening levels. The superscripts are defined as follows:
- (d) GriffissAFB background soil screening levels as determined during the base wide remedial investigation.
- (e) Federal Requirements: EPA Risk based concentrations for industrial soil, Region 3.
- (f) State Requirements: Recommended state soil cleanup objectives from base wide remedial investigation.

(5) AFCEE Model QAPP, Version 1.1 method specific Practical Quantitation Limit (PQL). When the Guidance Value is below the PQL, achieving the Quantitation Limit is considered acceptable for meeting the Guidance Value.

(6) Analyzed using Method SW7471.

N/D = Not detected or below PQL, - = No value reported.

Hard Fill 49A Test Pit, Soil Sampling
Analytical Results (ppm), June 3, 1999
Metals, Page 1 of 3

Metals, SW6010/7471	Guidance Values (1)	Practical Quantitation Limit for Soil (2)	Background Screening Level (a)	GSGHF49ATP2A		GSGHF49ATP2B		GSGHF49ATP2C		GSGHF49ATP3A		GSGHF49ATP3B		GSGHF49ATP3C	
Aluminum	18,306	50	18,306	10800	J	9950	J	11800	J	16300	J	9260	J	11000	J
Antimony	820[b]	40	N/D	3.6	F	1.9	F	2.4	F	5.2	F	9.5	F	9.6	F
Arsenic	3.3[c]	60	4.9	4.5	M	3.8	M	4.0	F	6.5	M	3.8	F	4.0	F
Barium	71	2	71	41.3		40.0		53.6		58.7		37.4		45.3	
Beryllium	0.16[c]	0.3	0.73	0.44		0.35		0.61		0.66		0.37		0.50	
Cadmium	1[c]	4	N/D	0.28	F	0.28	F	0.37	F	0.41	F	0.28	F	0.36	F
Calcium	23,821	10	23,821	1890	J	924	J	7060	J	3460	J	7000	J	3200	J
Chromium	10[c]	7	22.6	10.7		9.3		14.1		18.5		10.5		12.5	
Cobalt	19	7	19	6.6	F	5.9	F	9.4		9.8		5.8		8.2	
Copper	25[c]	6	43	72.3	M	26.1	M	45.3	M	350	M	177	M	47.9	M
Iron	2,000[c]	7	47,350	18900	J	16200	J	21900	J	28900	J	15800	J	18500	J
Lead	36	50	36	482	M	112	M	208	M	797	M	1400	M	1520	M
Magnesium	7,175	30	7,175	3260		2430		3900		5220		2760		3340	
Manganese	2,106	2	2,106	778	M	906	M	646	M	1300	M	591	M	890	M
Mercury (3)	0.1[c]	0.1	N/D	N/D		N/D		N/D		N/D		N/D		N/D	
Molybdenum	10,000[b]	8	N/D	1.3	F	9.6		2.0	F	0.83	F	0.60	F	0.49	F
Nickel	13[c]	15	46	14.5	F	11.9	F	20.5		22.3		14.4	F	18.3	
Potassium	1,993	500	1,993	919		840		1500		1460		1020		1220	
Selenium	2[c]	0.5	N/D	2.0	F	2.2	F	2.4	F	2.3	F	1.6	F	1.9	F
Silver	10,000[b]	7	N/D	N/D		N/D		N/D		N/D		N/D		N/D	
Sodium	259	30	259	454		415		547		724		402		477	
Thallium	N/D	40	N/D	3.6	F	9.8	F	5.2	F	5.9	F	3.1	F	3.8	F
Vanadium	36	8	36	16.4		15.9		20.0		24.2		15.2		17.9	
Zinc	20 [c]	2	120	70.6	M	52.4	M	75.8	M	166	M	90.3	M	74.7	M

(1) Guidance Value selected is the most stringent of Federal, NY State and Griffiss AFB background soil screening levels. The superscripts are defined as follows:
- (a) GriffissAFB background soil screening levels as determined during the base wide remedial investigation.
- (b) Federal Requirements: EPA Risk based concentrations for industrial soil, Region 3.
- (c) State Requirements: Recommended state soil cleanup objectives from base wide remedial investigation.

(2) AFCEE Model QAPP, Version 1.1 method specific Practical Quantitation Limit (PQL). When the Guidance Value is below the PQL, achieving the Quantitation Limit is considered acceptable for meeting the Guidance Value.

(3) Analyzed using Method SW7471.

N/D = Not detected or below PQL, - = No value reported.

Hard Fill 49A Test Pit, Soil Sampling
Analytical Results (ppm), June 3, 1999
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Metals, SW6010/7471	Guidance Values (1)	Practical Quantitation Limit for Soil (2)	Background Screening Level (a)	GSGHF49ATP4A	GSGHF49ATP4B	GSGHF49ATP4C	GSGHF49ATP7A	GSGHF49ATPB	GSGHF49ATP7C
Aluminum	18,306	50	18,306	8220 J	9350 J	3480 J	8200 J	11100 J	37 40 J
Antimony	820[b]	40	N/D	1.6 F	1.6 F	0.90 J	1.9 F	1.2 F	N/D J
Arsenic	3.3[c]	60	4.9	3.3 M	3.9 M	1.7 M	4.2 M	6.0 M	2.0 M
Barium	71	2	71	33.2	38.4	11.1	71.1	60.4	22.1
Beryllium	0.16[c]	0.3	0.73	0.31	0.38	0.160 F	0.30	0.67	0.14 F
Cadmium	1[c]	4	N/D	0.29 F	0.38 F	N/D	0.16 F	0.38 F	0.14 F
Calcium	23,821	10	23,821	4180	13100 J	1080 J	16100 J	3030 J	819 J
Chromium	10[c]	7	22.6	10.8	10.9	4.2F	17.6	15.2	4.2 F
Cobalt	19	7	19	6.1	6.4 F	3.1F	6.2 F	11.4	3.0 F
Copper	25[c]	6	43	29.2 M	35.8 M	9.7 M	45.0 M	52.8 M	13.2 M
Iron	2,000[c]	7	47,350	15100 J	17300 J	8290 J	16400 J	25700 J	8390 J
Lead	36	50	36	189 M	119 M	3.2 M	146 M	489 M	4.0 M
Magnesium	7,175	30	7,175	2600	2950	1470	3780	4470	1600
Manganese	2,106	2	2,106	737 M	1020 M	292 M	500 M	551 M	746 M
Mercury (3)	0.1[c]	0.1	N/D	N/D	N/D	N/D	0.34	N/D	N/D
Molybdenum	10,000[b]	8	N/D	0.47 F	N/D	N/D	0.50	1.0 F	N/D
Nickel	13[c]	15	46	12.5 F	14.1 F	6.6 F	14.7	25.9	6.7 F
Potassium	1,993	500	1,993	751	926	667	979	1040	638
Selenium	2[c]	0.5	N/D	1.6 F	1.2 F	N/D	1.9 F	2.0 F	N/D
Silver	10,000[b]	7	N/D	N/D	0.35 F	N/D	N/D	N/D	N/D
Sodium	259	30	259	437	480	373	779	546	397
Thallium	N/D	40	N/D	2.8 F	3.7 F	1.2 F	2.5 F	3.7 F	1.7 F
Vanadium	36	8	36	14.5	17.5	6.9 F	17.0	19.2	6.6 F
Zinc	20 [c]	2	120	48.1 M	62.8 M	28.1 M	277 M	71.1 M	26.8 M

(4) Guidance Value selected is the most stringent of Federal, NY State and Griffiss AFB background soil screening levels. The superscripts are defined as follows:
- (d) GriffissAFB background soil screening levels as determined during the base wide remedial investigation.
- (e) Federal Requirements: EPA Risk based concentrations for industrial soil, Region 3.
- (f) State Requirements: Recommended state soil cleanup objectives from base wide remedial investigation.

(5) AFCEE Model QAPP, Version 1.1 method specific Practical Quantitation Limit (PQL). When the Guidance Value is below the PQL, achieving the Quantitation Limit is considered acceptable for meeting the Guidance Value.

(6) Analyzed using Method SW7471.

N/D = Not detected or below PQL, - = No value reported.

Hard Fill 49A Test Pit, Soil Sampling
Analytical Results (ppm), June 3, 1999
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Metals, SW6010/7471	Guidance Values (1)	Practical Quantitation Limit for Soil (2)	Background Screening Level (a)	GSGHF49ATP8A		GSGHF49ATP8B		GSGHF49ATP8C		GSGHF49ATP8CD			
Aluminum	18,306	50	18,306	5650	J	8820	J	3140	J	3430	J		
Antimony	820[b]	40	N/D	1.2	F	0.99	F	N/D	J	1.4	F		
Arsenic	3.3[c]	60	4.9	3.1	M	3.3	M	2.3	M	3.2	M		
Barium	71	2	71	30.5		36.9		11.7		12.0			
Beryllium	0.16[c]	0.3	0.73	0.23	F	0.49		N/D		0.15	F		
Cadmium	1[c]	4	N/D	0.34	F	0.31	F	0.14	F	0.12	F		
Calcium	23,821	10	23,821	22500	J	2400	J	997	J	814	J		
Chromium	10[c]	7	22.6	8.0		11.5		3.8	F	4.3	F		
Cobalt	19	7	19	4.7	F	8.4		3.3	F	4.9	F		
Copper	25[c]	6	43	29.2	M	25.0	M	11.0	M	12.0	M		
Iron	2,000[c]	7	47,350	11100	J	18800	J	7750	J	8930	J		
Lead	36	50	36	55.9	M	24.5	M	3.6	M	3.1	M		
Magnesium	7,175	30	7,175	2660		3470		1400		1470			
Manganese	2,106	2	2,106	396	M	472	M	310	M	236	M		
Mercury (3)	0.1[c]	0.1	N/D	N/D		N/D		N/D		N/D			
Molybdenum	10,000[b]	8	N/D	0.56		0.64	F	0.48	F	N/D			
Nickel	13[c]	15	46	10.5	F	18.3		6.8	F	7.6	F		
Potassium	1,993	500	1,993	799		820		425	F	484	F		
Selenium	2[c]	0.5	N/D	0.85	F	1.5	F	N/D		0.96	F		
Silver	10,000[b]	7	N/D	N/D		N/D		N/D		N/D			
Sodium	259	30	259	499		529		407		351			
Thallium	N/D	40	N/D	1.7	F	2.6	F	1.2	F	1.1	F		
Vanadium	36	8	36	12.9		15.0		5.8	F	6.7	F		
Zinc	20[c]	2	120	60.5	M	51.1	M	24.1	M	42.6	M		

(7) Guidance Value selected is the most stringent of Federal, NY State and Griffiss AFB background soil screening levels. The superscripts are defined as follows:
- (g) GriffissAFB background soil screening levels as determined during the base wide remedial investigation.
- (h) Federal Requirements: EPA Risk based concentrations for industrial soil, Region 3.
- (i) State Requirements: Recommended state soil cleanup objectives from base wide remedial investigation.

(8) AFCEE Model QAPP, Version 1.1 method specific Practical Quantitation Limit (PQL). When the Guidance Value is below the PQL, achieving the Quantitation Limit is considered acceptable for meeting the Guidance Value.

(9) Analyzed using Method SW7471.

N/D = Not detected or below PQL, - = No value reported.

Hardfill 49A Test Pit, Soil Sampling
Analytical Results (ppm), May 27, 1999
Metals, Page 1 of 2

Metals, SW6010/7471	Guidance Values (1)	Practical Quantitation Limit for Soil (2)	Background Screening Level (a)	GSGHF49ATP9A		GSGHF49ATP9B		GSGHF49ATP5A		GSGHF49ATP5B		GSGHF49ATP1A		GSGHF49ATP1B	
Aluminum	18,306	50	18,306	10400	J	8120	J	10200	J	3920	J	9410	J	11400	J
Antimony	820[b]	40	N/D	0.93	M	N/D	M	1.3	M	N/D	M	3.5	M	1.7	M
Arsenic	3.3[c]	60	4.9	6.6	F	6.3	F	5.0	F	2.3	F	3.7	F	4.9	F
Barium	71	2	71	46.8		31.9		48.5		13.1		34.4		42.2	
Beryllium	0.16[c]	0.3	0.73	0.58		0.44		0.47		0.19	F	0.43		0.45	
Cadmium	1[c]	4	N/D	0.24	F	0.095	F	0.36	F	N/D		0.11	F	0.14	F
Calcium	23,821	10	23,821	3800	J	9000	J	76200	J	11400	J	7980	J	2070	J
Chromium	10[c]	7	22.6	12.0	M	9.0	M	12.4	M	4.1	M	10.2	M	12.1	M
Cobalt	19	7	19	6.0	F	6.0	F	5.9	F	2.8	F	5.0	F	5.9	F
Copper	25[c]	6	43	43.0	M	26.2	M	50.6	M	9.9	M	69.8	M	65.1	M
Iron	2,000[c]	7	47,350	19100		17800		16700		8830		14500		17900	
Lead	36	50	36	101	M	9.6	M	173	M	5.2	M	434	M	242	M
Magnesium	7,175	30	7,175	3250		2970		3800		1840		2630		2880	
Manganese	2,106	2	2,106	567	M	723	M	603	M	288	M	498	M	333	M
Mercury (3)	0.1[c]	0.1	N/D	0.64		0.043	F	0.12		N/D		0.048	F	0.075	F
Molybdenum	10,000[b]	8	N/D	0.98	R	14.9	R	0.64	R	N/D	R	N/D	R	N/D	R
Nickel	13[c]	15	46	14.8	F	13.0	F	13.1	F	6.2	F	11.9	F	13.3	F
Potassium	1,993	500	1,993	1380		1230		1750		932		1420		1330	
Selenium	2[c]	0.5	N/D	N/D		N/D		N/D		N/D		N/D		N/D	
Silver	10,000[b]	7	N/D	N/D		N/D		N/D		N/D		N/D		N/D	
Sodium	259	30	259	398		332		513		338		340		406	
Thallium	N/D	40	N/D	3.6	F	5.7	F	3.0	F	1.7	F	2.8	F	2.8	F
Vanadium	36	8	36	23.4		14.8		21.6		8.2		17.0		19.0	
Zinc	20[c]	2	120	85.1	R	48.2	R	79.1	R	22.3	R	76.1	R	76.7	R

(1) Guidance Value selected is the most stringent of Federal, NY State and Griffiss AFB background soil screening levels. The superscripts are defined as follows:
- (a) GriffissAFB background soil screening levels as determined during the base wide remedial investigation.
- (b) Federal Requirements: EPA Risk based concentrations for industrial soil, Region 3.
- (c) State Requirements: Recommended state soil cleanup objectives from base wide remedial investigation.

(2) AFCEE Model QAPP, Version 1.1 method specific Practical Quantitation Limit (PQL). When the Guidance Value is below the PQL, achieving the Quantitation Limit is considered acceptable for meeting the Guidance Value.

(3) Analyzed using Method SW7471.

N/D = Not detected or below PQL, - = No value reported.

Hard Fill 49A Test Pit, Soil Sampling
Analytical Results (ppm), May 27, 1999
Metals, Page 2 of 2

Metals, SW6010/7471	Guidance Values (1)	Practical Quantitation Limit for Soil (2)	Background Screening Level (a)	GSGHF49ATP1C						
Aluminum	18,306	50	18,306	11800	J					
Antimony	820[b]	40	N/D	2.8	M					
Arsenic	3.3[c]	60	4.9	4.3	F					
Barium	71	2	71	43.1						
Beryllium	0.16[c]	0.3	0.73	0.48						
Cadmium	1[c]	4	N/D	0.12	F					
Calcium	23,821	10	23,821	2400	J					
Chromium	10[c]	7	22.6	12.2	M					
Cobalt	19	7	19	6.5	F					
Copper	25[c]	6	43	42.4	M					
Iron	2,000[c]	7	47,350	18600						
Lead	36	50	36	760	M					
Magnesium	7,175	30	7,175	3080						
Manganese	2,106	2	2,106	766	M					
Mercury (3)	0.1[c]	0.1	N/D	0.055	F					
Molybdenum	10,000[b]	8	N/D	N/D	R					
Nickel	13[c]	15	46	15.1						
Potassium	1,993	500	1,993	1720						
Selenium	2[c]	0.5	N/D	N/D						
Silver	10,000[b]	7	N/D	N/D						
Sodium	259	30	259	1640						
Thallium	N/D	40	N/D	3.5	F					
Vanadium	36	8	36	20.6						
Zinc	20[c]	2	120	61.4	R					

(4) Guidance Value selected is the most stringent of Federal, NY State and Griffiss AFB background soil screening levels. The superscripts are defined as follows:
- (d) GriffissAFB background soil screening levels as determined during the base wide remedial investigation.
- (e) Federal Requirements: EPA Risk based concentrations for industrial soil, Region 3.
- (f) State Requirements: Recommended state soil cleanup objectives from base wide remedial investigation.

(5) AFCEE Model QAPP, Version 1.1 method specific Practical Quantitation Limit (PQL). When the Guidance Value is below the PQL, achieving the Quantitation Limit is considered acceptable for meeting the Guidance Value.

(6) Analyzed using Method SW7471.

N/D = Not detected or below PQL, - = No value reported.

APPENDIX B

TEST PIT LOGS

Test Pit Logs, Hardfill 49A

Test Pit 1

0-12 feet	Timbers, wood fragments, metal fragments, pipes, cables, floor tiles, and bricks (Hardfill), mixed with soil consisting of gray silt and sand with whole bullets and fragments, lead patinas on wood and soil surfaces. XRF readings: 3 feet – 450 ppm, 4 feet – 1,000 ppm, 8 feet – 800 ppm
12-13 feet	Gray silt, little fine sand, whole bullets and fragments. XRF readings: 13 feet – 700 ppm
13+ feet	Brown fine to medium sand

Grab samples obtained from the 4, 8 and 13-foot depths.

Test Pit 2

0-6 feet	Timbers, utility poles, concrete rubble, steel straps, cable, and wire (Hardfill) mixed with soil consisting of gray silt and sand with bullets and fragments, lead patinas on soil surfaces. XRF readings: 5 feet – 1,000 ppm
6-12 feet	Gray sand and silt, bullets, bullet fragments and lead patinas. XRF readings in soil range from 450-650 ppm. Root mass produced a reading of 7,000 ppm.
12-13 feet	Gray silt containing bullets. XRF reading 300 ppm
13+ feet	Brown fine to medium sand

Grab samples were obtained from the 5, 8 and 12-foot depths.

Test Pit 3

0-8 feet	Steel, timbers, crushed metal containers (Hardfill) mixed with soil consisting of gray silt and sand with bullets and lead patinas. XRF readings 4 feet – 450 ppm, 5 feet – 1,000 ppm, 5.5-6 feet – 500 to 1,300 ppm
8-9 feet	Dark gray silt, no visible bullets or fragments. XRF reading <400 ppm
9+ feet	Brown fine sand

Grab samples were obtained from the 5, 6 and 8-foot depths.

Test Pit 4

0-3 feet	Treated timbers, utility poles (Hardfill)
3-3.5 feet	Brown sand and silt with bullets, bullet fragments and lead patinas. XRF readings from 500-700 ppm.
3.5-4 feet	Gray silt, some clay with shell casings. XRF readings from 250- 300 ppm
4+ feet	Brown fine sand, little silt, wet at 6 feet. XRF readings < 200 ppm

Grab samples obtained from the 3, 4 and 5-foot depths

Test Pit 5

0-1 feet	Brown sand (Topsoil).
1-3 feet	Brown sand and gravel with gray mottling (Fill). Steel strap at 3 feet.
3-12 feet	Wood fragments (painted and unpainted), pieces of metal, utility poles, railroad ties, cable, concrete rubble (Hardfill) mixed with soil consisting of gray sand and silt with bullets, buckshot. Lead patinas on the wood fragments yield XRF reading of 1,200 ppm. Painted wood piece reads 3,200 ppm. No correlating concentrations in the surrounding soil. Obtained composite sample from this unit.
12-14+ feet	Brown sand and gravel grading to brown fine to medium sand.

Composite sample obtained from the 3-12 foot interval.
Grab sample obtained from the 14-foot depth.

Test Pit 6

0-1 feet	Brown sand, some silt, little gravel (Topsoil)
1-2 feet	Brown sand and gravel (Fill)
2-12 feet	Timbers, utility poles, railroad ties, steel straps, cables, wood fragments (Hardfill) mixed with soil consisting of silt and sand with bullets and lead patinas. Lead acid battery plates were encountered at a depth of 10-12 feet. Associated soils produced readings from 5,000-10,000 ppm.
12-14+ feet	Light gray fine sand, little. XRF readings ranged from 400-800 ppm. Soils were wet at 14 feet.

Grab samples were obtained at the 10 and 14 foot depths.

Test Pit 7

0-1 feet	Brown fine sand and gravel (Topsoil)
1-8 feet	Metal, wood, rebar, pipe, concrete rubble, copper pipe, crushed metal container with roof tar (Hardfill) mixed with soil consisting of sand and silt. Wood fragment at 2- foot depth produced XRF reading of 30,000 ppm.
8-9 feet	Dark gray silt, some clay, dense, banded with brown medium sand and silt, lead patinas, bullets and bullet fragments. Very moist to wet. XRF readings range from 500-900 ppm.
9+ feet	Brown fine to medium sand, wet

Grab samples were obtained from the 2, 8 and 9-foot depths

Test Pit 8

0-1 feet	Brown sand and gravel, little silt (Topsoil)
1-5 feet	Steel, cables, crushed metal sheeting, wood fragments (Hardfill)
5-6 feet	Gray silt and sand, some fine gravel
6+ feet	Brown fine to medium sand, wet

Grab samples obtained from the 2, 5 and 6-foot depths
Duplicate sample obtained from the 6-foot depth

Test Pit 9

0-0.25 feet	Bluish gray fine sand (Fill)
0.25-1 feet	Brown fine sand and gravel (Fill)
1-3 feet	SAA with sanitary refuse, plastic bags, bottles, paper etc. Medical waste consisting of syringes and blood vials encountered at 2 feet. Confetti-like material produced XRF reading of 1,000 ppm
3-10+ feet	Brown fine to medium sand and gravel

Grab samples obtained from the 3 and 8-foot depths

Test Pit 10

0-1 feet	Brown silt and gravel with roots (Topsoil)
1-10 feet	Concrete rubble, bricks, metal fragments, wood fragments (Hardfill) mixed with soil consisting of gray silt and sand. XRF readings: 2 feet (from piece of wood with lead patinas) – 1,000 ppm, 3 feet – 1,000 ppm
10-12 feet	Dark gray silt with gravel, bullets, bullets fragments and lead patinas. XRF readings range from 400-950 ppm
12+ feet	Brown fine to medium sand and gravel

Grab samples obtained from the 3, 10 and 11-foot intervals

Test Pit 11

0-1 feet	Brown fine sand and gravel (Topsoil)
1-8 feet	Wood fragments, timbers, concrete rubble, asphalt rubble (Hardfill) mixed with soil consisting of silt and sand with bullets, bullet fragments and lead patinas. XRF readings 2 feet – 2,400 ppm, 4 feet – 1,000 ppm, 6 feet – 1,700 ppm
8-10 feet	Brown sand, dense, containing many bullets. XRF readings to 5,000 ppm.
10+ feet	Light brown medium sand, wet

Grab samples obtained from the 2, 4 and 8-foot depths

Test Pit 12

0-1 feet	Brown fine sand and gravel (Topsoil)
1-6 feet	Wood fragments, timbers (Hardfill), mixed with soil consisting of silt. XRF reading from painted piece of wood 100,000 ppm. No corresponding reading in soils. No bullets at this location.
6+ feet	Light brown, fine to medium sand. Water table reached at 10 feet.

Grab samples obtained from the 5 and 6-foot depths

Test Pit 13

0-2	Brown fine sand, little silt (Fill)
2-8+ feet	Brown fine sand and gravel

Grab sample obtained from the 4-foot depth

Test Pit 14

0-1.75 feet	Brown fine sand, little silt (Fill)
1.75-5+ feet	Brown sand and gravel

Grab sample obtained from the 5-foot depth

Test Pit 15

0-0.5 feet	Brown silt with roots (Topsoil)
0.5-8 feet	Brown medium sand, little gravel
8-10+ feet	Brown coarse sand and gravel, pockets of light brown fine sand

Grab sample and duplicate sample obtained from the 2-foot depth

Test Pit 16

0-1 feet	Brown fine sand and gravel with roots (Topsoil)
1-4 feet	Brown medium sand, some gravel
4-10+ feet	Brown coarse sand and gravel, small lenses of light brown fine sand

Grab sample obtained from the 2-foot depth

Test Pit 17

0-1 feet	Brown sand, some silt and fine gravel (Topsoil)
1-2.5 feet	Dark gray silt and fine gravel with occasional timbers (Hardfill)
2.5+ feet	Brown fine to medium sand with manganese staining, wet

Grab samples obtained from the 2 and 3-foot depths

Test Pit 18

0-1 feet	Brown fine sand, some silt, little fine gravel (Topsoil)
1-4 feet	Bricks, wood fragments, asphalt, floor tile, concrete rubble, roof tile and plastic bags mixed with soil consisting of brown silt. No bullets, fragments, or lead patinas. Some wood fragments have lead paint but no corresponding soil contamination.
4-6 feet	Gray silt and sand with pieces of wood, wet. At 5 feet encountered small area with lead patinas and XRF reading of 2,200 ppm. Remainder of interval <200 ppm.
6-8+ feet	Brown sand and gravel, little silt, wet.

Grab samples obtained 5 and 6-foot depths

Test Pit 19

0-3 feet	Brown silt and sand, some fine gravel becomes mottled with gray at 1-3 feet (Fill)
3-11 feet	Brown sand and gravel, little silt. One lead fragment encountered but with no corresponding elevated XRF readings.
11+ feet	Brown medium sand and gravel

Grab sample obtained from the 2 and 3-foot depths

Test Pit 20

0-2 feet	Bluish gray fine sand, little silt consistent with the adjacent landfill to the north
2-12+ feet	Brown fine to medium sand, little sand, moist

Grab samples obtained from the 2 and 3-foot depths

Test Pit 21

0-1.5 feet	Bluish gray fine sand, little silt consistent with the adjacent landfill to the north
1.5-9 feet	Sanitary refuse consisting of papers, plastic bags, miscellaneous household refuse. Small pocket of sand at 3 feet with bullets and XRF readings in soil of 1,000-1,100 ppm. At 5 feet encountered large quantities of confetti-like material encountered in Test Pit 9. XRF reading on material 20,000 ppm, on soil 500-800 ppm.
9-12+ feet	Gray fine sand, little silt, wet at 11 feet.

Grab samples obtained from the 2.5, 5 and 10-foot depths

APPENDIX C

GROUNDWATER REPORT

DRAFT

INFORMAL TECHNICAL INFORMATION REPORT

HARDFILLS 49A, 49B, 49C AND 49D AND SMALL ARMS RANGE GROUNDWATER SAMPLING

Prepared for:

Areas of Interest
Long-Term Monitoring Program
Griffiss Air Force Base
Rome, New York

through

AFCEE
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Brooks AFB, TX 78235-5673

Prepared by:
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Contract No. F41624-95-D-8003
Delivery Order No. 11
Project No. JREZ 03-7040

Revision 0.0
August 2000

LIST OF ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
AOI	Area of Interest
BTOC	below top of casing
CLP	Contract Laboratory Program
COC	contaminant of concern
DO	Delivery Order
DQO	data quality objective
DRO	diesel-range organics
FPM	FPM Group, Ltd.
FSP	Field Sampling Plan
GFAA	gas furnace atomic absorption
HSP	Health and Safety Plan
ICP	inductively coupled plasma
ITS	Intertek Testing Services
ITIR	Informal Technical Information Report
LCS	laboratory control sample
LTM	long-term monitoring
MS/MSD	matrix spike/matrix spike duplicate
NTU	nepholometric turbidity units
NYS	New York State
Parsons	Parsons Engineering Science, Inc.
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
RL	reporting limits
SAR	Small Arms Range
SDG	Sample Delivery Group
STL	Severn Trent Laboratories

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B Field Sampling Forms

C Data Validation Reports and Analytical Results

1.0 INTRODUCTION

This Informal Technical Information Report (ITIR) presents the results for groundwater sampling events conducted at the Hardfill sites 49a, 49b, 49c, 49d and the Small Arms Range (SAR) in June 1999 and May 2000 by FPM Group, Ltd. (FPM), at the former Griffiss Air Force Base (AFB), Rome, New York.

In 1996, Parsons Engineering Science, Inc. (Parsons) implemented the following Work Plans: Remedial Design at Hardfills 49a, 49b, 49c, and 49d, Griffiss AFB (July 1996a) and Environmental Site Assessment Small Arms Range, Griffiss AFB (May 1996b). The collected samples were submitted to Intertek Testing Services (ITS) for analysis and the data were incorporated in reports prepared by Parsons: Predesign Investigation Report For Remedial Design at Hardfills 49a, 49b, 49c, and 49d, Griffiss AFB (February 1997a) and Final Investigation Report For Small Arms Range, Griffiss AFB (September 1997b). The ITS analytical results were thence deemed suspect.

The June 1999 sampling event was the initial re-sampling of the Hardfills/SAR, which was performed to fill data gaps caused by disqualification of previous laboratory analytical results from samples collected in September 1996. Although the analytical results for VOCs and SVOCs correlated well between the September 1996 and June 1999 sampling events, the analytical results for several metals exceeded New York State Class GA Groundwater Standards. In a letter report submitted by FPM in November 1999, it was hypothesized that the elevated metals concentrations measured in the unfiltered samples were likely associated with high turbidity levels observed in the samples (turbidity levels were generally greater than 500 nephelometric units (NTU)).

Additional sampling was recommended with analysis limited to only total (unfiltered) and dissolved (filtered) metals. To further assess the metals concentrations in groundwater at these sites, a low-flow sampling technique recommended by the United States Environmental Protection Agency (USEPA) to minimize turbidity during the collection of samples was employed (USEPA Region II, Ground Water Sampling Procedure, Low Stress (Low Flow) Purging and Sampling, March 1998). This second re-sampling event took place in May 2000. The results from this event were used to evaluate the initial conclusions based on the September 1996 results presented by Parsons (1997a and b), pertaining to remedial actions necessary to close these sites.

This report summarizes the results of the June 1999 and May 2000 groundwater sampling events as compared to the 1996 ITS results and separates the results according to each site: Hardfills 49a through d, and the SAR. The locations of these sites are shown in Figures 1-1 through 1-4. Refer to the Parsons Work Plans (Parsons, 1996a and b) and Field Sampling Plans for a detailed description of each site and investigative history.

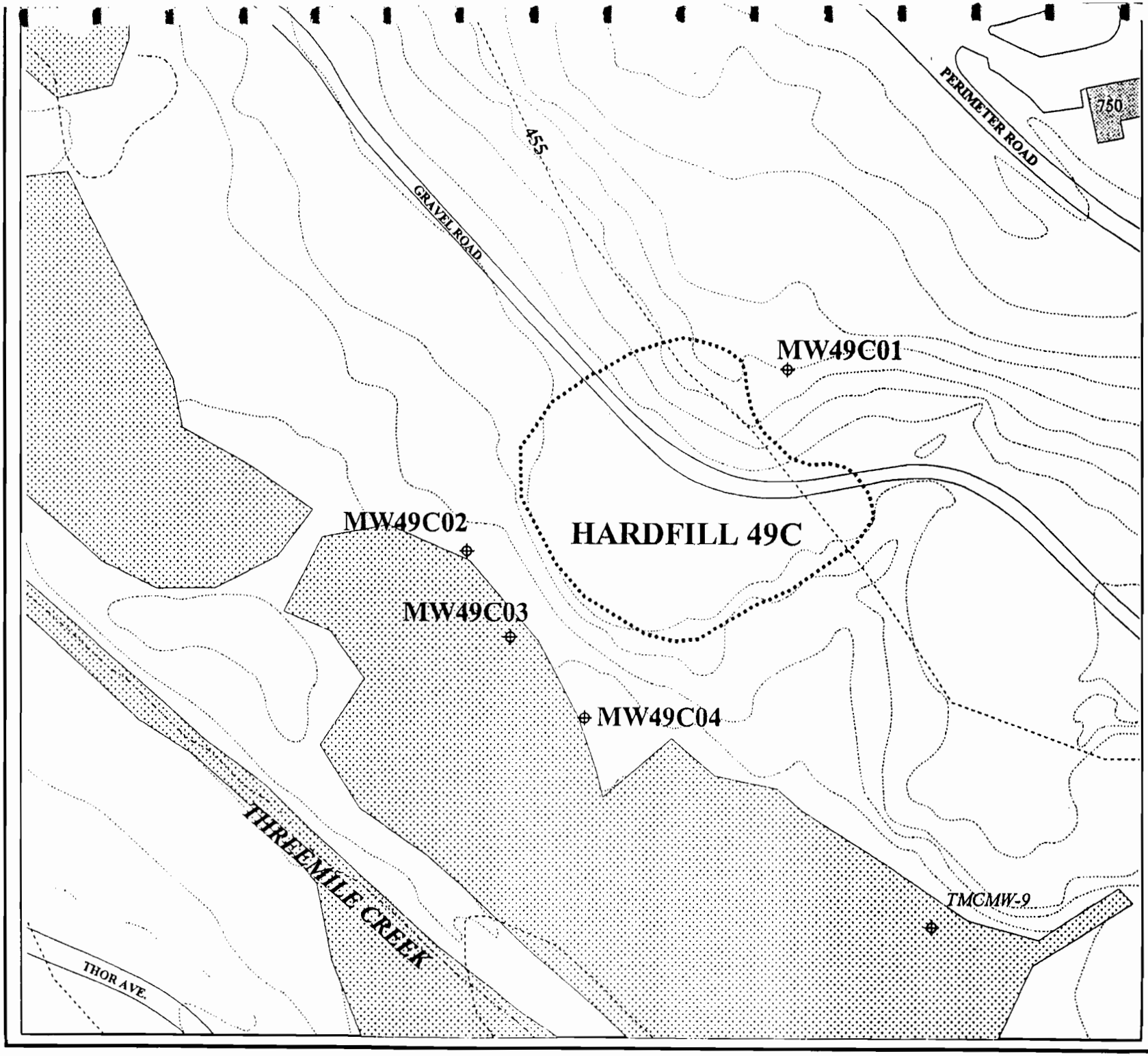


Figure 1-2
Hardfill 49c
Site Location Map

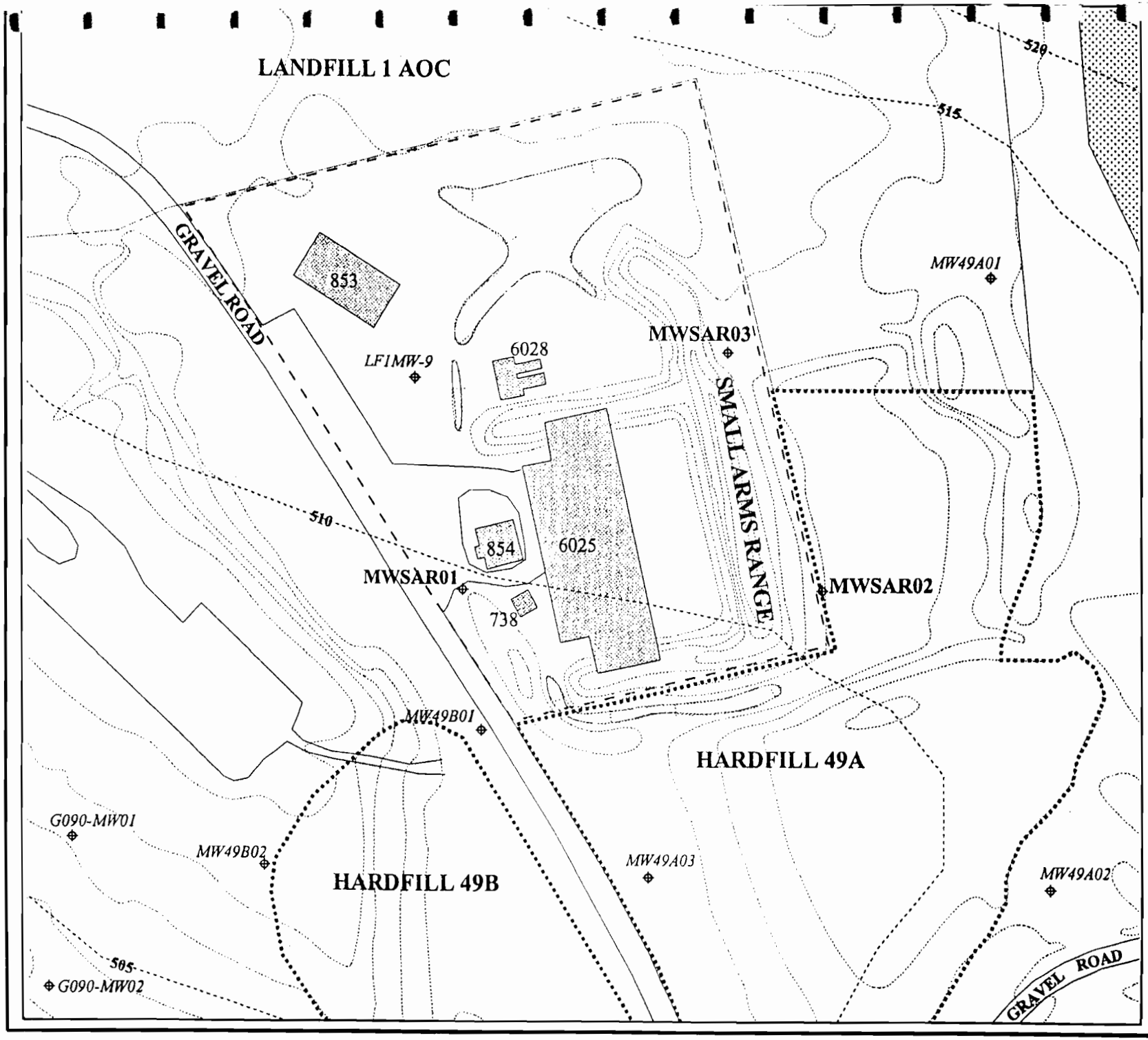


Figure 1-4
Small Arms Range
Site Location Map

2.0 FIELD SAMPLING AND ANALYTICAL ACTIVITIES

2.1 Field Sampling Activities

Groundwater sampling for both events was conducted according to the protocols for site investigation established in the above referenced work plans (Parsons 1996a and 1996b), including the incorporated Field Sampling Plans (FSP) and Health and Safety Plans (HSP). Refer to these documents for details pertaining to the project description and organization, site history and environmental setting, field operations, analytical methods, and quality assurance program. However, the current AFCEE Quality Assurance Project Plan (QAPP), Version 3.0, was followed with AFCEE-approved project-specific variances under FPM's Delivery Order 11 (Appendix A).

Table 2-1 presents a summary of field activities conducted at each site. Refer to the Field Sampling Plans (Parsons, 1996a and b) for a detailed description of sampling methods employed during the September 1996 and June 1999 sampling events.

To minimize disturbance of sediment in the bottom of the well and to prevent drawdown during purging which could mobilize otherwise immobile particulates, the USEPA low-flow purging and sampling method was used to collect groundwater samples during the 2000 sampling event. In wells MW49B02 (depth to water 35.4 ft below top of casing (BTOC)) and MW49C01 (depth to water 41.8 ft BTOC), however, the depth to groundwater was too deep to use a peristaltic pump (the limit is approximately 30 ft); these were therefore purged and sampled with a disposable bailer, using special care to minimize drawdown during bailer removal. Samples were collected for both "total" and "dissolved" metals analysis from all wells. Samples for "total" metals were submitted to the laboratory unfiltered and already preserved, having been acidified in the field using "prepreserved" 1:1 nitric acid provided by the laboratory; samples for "dissolved" metals analysis were submitted to the laboratory unpreserved and unfiltered. Upon receipt of the "dissolved" metals bottles, laboratory personnel filtered and then preserved the samples with 1:1 nitric acid.

Field Sampling Forms for both sampling events are included in Appendix B.

2.2 Analytical Testing Methods

The data quality was assessed in accordance with the quality assurance/quality control (QA/QC) requirements specified in the AFCEE QAPP Version 3.0 (including QAPP-specified analyte lists) and associated AFCEE-approved variances (Appendix A). The analytical testing was performed by Severn Trent Laboratories, Inc. (STL) located in Amherst, New York. For the June 1999 sampling event, the monitoring wells at the Hardfills and SAR sites were sampled for the following parameters according to the following methods: Volatile Organic Compounds (VOCs) by USEPA method SW8260B, Semivolatile Organic Compounds (SVOCs) by USEPA method SW8270C, Total Metals by inductively coupled plasma (ICP), USEPA method SW6010, Lead by Graphite Furnace Atomic Absorption (GFAA), USEPA method SW7421, Mercury by Cold Vapor, USEPA method SW7470A and Total Petroleum Hydrocarbons (TPH)-Diesel range by USEPA method SW8015 (Modified) Diesel Range Organics (DRO). For the 2000 sampling event, only the metals-related analyses were performed: Total and Dissolved/Soluble Metals by ICP, USEPA method SW6010, Lead by GFAA, USEPA method SW7421, and Mercury by Cold Vapor, USEPA method SW7470A.

3.0 DATA QUALITY ASSURANCE AND QUALITY CONTROL EVALUATION

A complete (100%) data review was performed on the samples collected during the groundwater sampling investigation, including both groundwater and associated QC samples. The analytical test methods and QA/QC requirements used for the groundwater sample analysis were as specified in the AFCEE Quality Assurance Project Plan (QAPP), Version 3.0, and associated AFCEE-approved variances.

The data were validated according to the protocols and QC requirements associated with the respective analytical methods and those discussed in the QAPP. For data usability purposes, all values were further evaluated, including positive and non-detect results that were qualified "R" (Rejected) according to QAPP. The data usability analysis was based on the reviewer's professional judgment and on an assessment of how this data would fare with respect to the USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Data Review (February 1994 (EPA 540/R-94/013)).

The data validation review assessed the following QA/QC criteria:

- Reporting and method detection limits
- Holding times, sample preservation and storage
- GC/MS tuning criteria
- Initial calibration
- Second source calibration verification
- Continuing calibration
- Method, ambient, equipment, and trip blanks
- Surrogate spike results
- Field duplicate results
- Matrix spikes/matrix spike duplicates (MS/MSD)
- Internal standard areas and retention times
- Laboratory control samples (LCS)
- Qualitative and quantitative compound identification
- Chain-of-custody (COC)
- Case narrative, AFCEE forms, and deliverables compliance

The items listed above were evaluated in terms of compliance with AFCEE QAPP and USEPA criteria and protocols. Full data validation reports were generated and these reports along with the qualified analytical results (annotated laboratory data sheets, Form 2s) can be found in Appendix C.

3.1 Data Usability Results

Data review for usability is a process that evaluates the validated data in context with the original data quality objectives (DQOs). The formal process of usability determination involves a

4.0 GROUNDWATER SAMPLING RESULTS

The results of the detected analytes for 1996, 1999, and 2000 are presented in Tables 4-1 through 4-5 for comparison. Similar to comparisons previously made by Parsons, detected analytes are compared to NYS Groundwater Standards and two times the upgradient well concentrations, as specified by USEPA Region 2 in comments to the original SAR Work Plan (Parsons, 1996b), dated July 12, 1996. (Although the criterion used in the Predesign Investigation Report For Remedial Design At Hardfills 49a, 49b, 49c, and 49d (Parsons, 1997a) was *three* times the upgradient well concentration, two times is applied for the latest rounds of sampling at the Hardfills as a conservative measure.) The groundwater results are summarized on an individual site basis in the following sections.

4.1 Hardfill 49a

The Hardfill 49a results summary of the groundwater sampling events conducted in September 1996, June 1999 and May 2000 is presented in Table 4-1. The well locations are shown in Figure 1-1. Results of interest include the following:

- 1999 results of VOCs were consistent with those measured in 1996; no VOCs were detected.
- 1999 results indicated wells MW49A03 and MW49A04 with phthalate compound detection at levels below reporting limits (RL) and well below NYS Groundwater Standards.
- 1999 TPH-diesel range results were similarly low compared to those detected in 1996.
- Unlike the previous sampling events, no detections of lead were reported in either the "total" or "dissolved" samples.
- 2000 metals results indicate upgradient well MW49A01 with similar metals detected as previously, except chromium, cobalt, copper, lead, and nickel were not detected in either the "total" or "dissolved" samples. Sodium was detected in MW49A01 at levels exceeding the NYS Groundwater Standard in both the "total" and "dissolved" samples. In accordance with previous evaluations, applying the two times upgradient well rule for wells which indicated metals at concentrations above NYS Groundwater Standards, well MW49A02 indicated exceedances for iron and manganese (in both "total" and "dissolved" samples), and MW49A04 for iron only (in the "total" sample only). The "total" and "dissolved" iron and manganese results for 2000 were less than the previous sampling events, except for "total" iron in MW49A02, which was slightly higher than the 1996 result, but approximately one order of magnitude less than the June 1999 results.

4.2 Hardfill 49b

The Hardfill 49b results summary of the groundwater sampling events conducted in September 1996, June 1999 and May 2000 is presented in Table 4-2. The well locations are shown in Figure 1-1. Results of interest include the following:

Table 4-1
1996, 1999, and 2000 Groundwater Analytical Results
Hardfill 49a

WELL ID	--	MW49A03				MW49A04			
SAMPLE ID	NYSDEC GW STANDARDS	MW49A03	MW49A03A	MW49A0313BA		MW49A04	MW49A04A	MW49A0414BA	
				total	soluble			total	soluble
DATE OF COLLECTION		9/3/96	6/24/99	5/1/00	5/1/00	9/4/96	6/24/99	5/1/00	5/1/00
Depth to Groundwater (ft BTOC)	--	14.93	15.65	12.67	12.67	16.41	16.52	14.41	14.41
VOCs (µg/L)									
NONE DETECTED	--	U	U	NA	NA	U	U	NA	NA
SVOCs (µg/L)									
bis(2-ethylhexyl) phthalate	5.00	U	4F	NA	NA	U	U	NA	NA
di-n-butyl phthalate	50.00	U	U	NA	NA	U	3F	NA	NA
TPH (mg/L)									
diesel components	--	U	0.14F	NA	NA	0.27F	0.36J	NA	NA
Metals (µg/L)									
aluminum	--	22538	79200M	138F	52.5F	684	26700	124F	U
antimony	3	33.7F	U	U	U	29.4F	U	U	U
arsenic	25	33.4	95.6M	U	U	1.1F	40.1	U	U
barium	1000	159	347M	14.2	15.1	22.6	208	14.7	11.9
beryllium	--	U	6.2M	U	U	U	1.5F	U	U
cadmium	5	U	U	U	U	U	U	U	U
calcium	--	73809	55200	113000	115000M	74701	75600	75200	71800
chromium	50	54.0F	106M	U	U	15.5F	38.9	U	U
cobalt	--	88.1	111M	U	U	U	38.7	U	U
copper	200	154	391M	3.3F	U	16.0F	96.1	U	U
iron	300	70918	198000M	112M	225	1899	63300	88.7	U
lead	25	45.7	209M	U	U	11.5	19.8	U	U
magnesium	--	14964	32300M	5240	5140	4602	10800	3030	2870
manganese	300	9054	23800M	13	2.6F	486	6770	231	6.8
mercury	1	0.15F	U	U	U	U	U	U	U
molybdenum	--	U	U	U	U	U	U	U	U
nickel	100	62.9F	176M	U	U	3.16F	39.5	U	U
potassium	--	6955	10100M	1200M	1260	1634F	5940	2390J	2120
selenium	10	U	U	U	U	U	U	U	U
silver	50	U	U	U	5.8M	U	U	U	U
sodium	20000	4857	3700M	3740M	2760	1565	2070	1050	U
thallium	--	U	63.8M	U	U	U	17.3F	U	U
vanadium	--	52.0F	148M	U	U	U	48.5	U	U
zinc	--	244	618M	U	7.1F	18.6F	163	U	9.4F

Notes:

Value - Indicates NYS Class GA Groundwater Standard exceedance.

-- - Indicates no NYS Class GA Groundwater Standard.

B - The analyte was found in an associated blank, as well as in the sample.

F - The analyte was positively identified but the associated numerical value is below the Reporting Limit (RL).

M - A matrix effect was present.

NA - Not Available.

R - The data is unusable due to deficiencies in the ability to analyze the sample and meet QC criteria.

U - The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.

For VOCs and SVOCs, only detected compounds are displayed.

Table 4-2
1996, 1999, and 2000 Groundwater Analytical Results
Hardfill 49b

WELL ID	--	MW49B03						MW49B04				MW49B05			
SAMPLE ID	NYSDEC GW STANDARDS	MW49B03	MW49B03A	MW49B0308BA		MW49B0308BC (dup)		MW49B04	MW49B04A	MW49B0405BA		MW49B05	MW49B05A	MW49B0512BA	
				total	soluble	total	soluble			total	soluble			total	soluble
DATE OF COLLECTION		9/4/96	6/22/99	5/2/00	5/2/00	5/2/00	5/2/00	9/4/96	6/22/99	5/2/00	5/2/00	9/4/96	6/22/99	5/2/00	5/2/00
Depth to Groundwater (ft BTO	--	9.21	9.83	8.36	8.36	8.36	8.36	5.19		4.57	4.57	13.06	13.36	11.74	11.74
VOCs (µg/L)															
NONE DETECTED	--	U	U	NA	NA	NA	NA	U	U	NA	NA	U	U	NA	NA
SVOCs (µg/L)															
di-n-butyl phthalate	50.00	U	U	NA	NA	NA	NA	U	1F	NA	NA	U	U	NA	NA
TPH (mg/L)															
diesel components	--	0.50F	0.38J	NA	NA	NA	NA	0.35F	0.43J	NA	NA	0.45F	1.2J	NA	NA
Metals (µg/L)															
aluminum	--	10146	44300	181F	U	195F	U	1850	25800	85.6F	U	1584	88300	406	47.2F
antimony	3	36.3F	U	U	U	U	U	56F	U	U	U	42.8F	U	U	U
arsenic	25	6.4	27.5	U	U	U	U	2.2F	18.3F	U	U	2.6F	62.4	U	U
barium	1000	117	273	26.3	23.3	25.2	23.3	33.7	174	7.2	5.8	73.3	355	50.6	45.4
beryllium	--	U	3.2	3.0B	U	2.8B	U	U	2.2	3.2B	U	U	5.40	U	U
cadmium	5	U	U	U	U	U	U	4.74F	3.4	U	U	U	U	U	U
calcium	--	131860	157000	130000B	125000B	128000B	126000B	129190	74100	56100B	57000B	156480	190000	184000B	179000B
chromium	50	29.2F	56.5	U	U	U	U	16.9F	34.5	10.8	U	17.5F	130	7.5	U
cobalt	--	31.6F	29.6	U	3.0F	U	4.5F	3.7F	24	U	3.2F	6.96F	57.80	U	U
copper	200	47.4F	151	U	U	U	U	20.7F	106	U	U	20.8F	402	4.3F	U
iron	300	30720	116000	227B	U	190B	U	4149	53400	180B	U	8327	176000	741B	U
lead	25	9.14	34	U	U	U	U	1.86F	33.40	U	U	8.03	174	U	U
magnesium	--	11179	24600	7750	7250	7580	7220	11835	13500	4510	4320	9579	34600	8770	8190
manganese	300	2013	4450	8.7J	1.8F	7.0J	1.2F	1230	11000	187	U	7298	3810	140	64.7B
mercury	1	U	U	U	U	U	U	U	U	U	U	U	U	U	U
molybdenum	--	U	U	U	U	U	U	U	U	U	U	U	U	U	U
nickel	100	19.2F	70.6	U	10.3B	U	9.4F	5.71F	64.8	U	9.0F	10.5F	137	U	9.3F
potassium	--	3763F	8490	2950J	3280	3050J	3030	1979F	6760	378F	U	8350	11600	5400J	5270
selenium	10	U	U	U	68.2	U	68.7	3.9F	U	U	30.7	U	U	U	99.6
silver	50	U	U	U	U	U	U	U	U	U	U	U	U	U	U
sodium	20000	22170	8850	7480	6180	7380	6290	13531	5020	5380	4460	8731	5800	7270	6430
thallium	--	U	23.1	U	U	U	U	U	22.6	U	U	U	27.5	U	U
vanadium	--	22.9F	82.9	U	U	U	U	3.46F	47.6	U	U	2.72F	150	U	U
zinc	--	74	261	14.2F	4.2F	18.4F	7.0F	38.1	140	U	6.1F	40.3	709	15.7F	4.8F

Notes:

☐ - Indicates NYS Class GA Groundwater Standard exceedance.

-- - Indicates no NYS Class GA Groundwater Standard.

B - The analyte was found in an associated blank, as well as in the sample.

F - The analyte was positively identified but the associated numerical value is below the Reporting Limit (RL).

J - The analyte was positively identified, the quantitation is an estimation.

NA - Not Available.

R - The data is unusable due to deficiencies in the ability to analyze the sample and meet QC criteria.

U - The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.

For VOCs and SVOCs, only detected compounds are displayed.

Table 4-3
1996, 1999, and 2000 Groundwater Analytical Results
Hardfill 49c

WELL ID	--	MW49C03					MW49C04			
SAMPLE ID	NYSDEC	MW49C03	MW49C03A	MW49C03D	MW49C0305BA		MW49C04	MW49C04A	MW49C0405BA	
	GW			field dup	total	soluble			total	soluble
DATE OF COLLECTION	STANDARDS	9/6/96	6/22/99	6/22/99	5/2/00	5/2/00	9/6/96	6/22/99	5/2/00	5/2/00
Depth to Groundwater (ft BTOC)	--	4.96	5.95	5.95	4.97	4.97	4.94	5.83	4.87	4.87
VOCs (µg/L)										
1,1,1-trichloroethane	5.00	14.00	4.30	4.00	NA	NA	U	U	NA	NA
1,1-dichloroethane	5.00	U	0.65F	0.61F	NA	NA	U	U	NA	NA
chloroform	7.00	U	U	U	NA	NA	U	U	NA	NA
SVOCs (µg/L)										
NONE DETECTED	--	U	U	U	NA	NA	U	U	NA	NA
TPH (mg/L)										
diesel components	--	0.14F	0.86J	0.96J	NA	NA	0.03F	0.19F	NA	NA
Metals (µg/L)										
aluminum	--	579	4860	4100	194F	U	912	3550	U	U
antimony	3	75.4F	UJ	UJ	U	U	67.8F	U	U	U
arsenic	25	U	U	U	U	7.4F	U	U	U	U
barium	1000	70.6	77.6	78.6	61.8	26.0	79.9	84.5	48.3	42.7
beryllium	--	U	1.6F	U	4.0B	U	U	U	4.9B	U
cadmium	5	3.38F	1.4J	UJ	U	U	3.49F	U	U	U
calcium	--	206670	156000B	156000B	145000B	133000B	166410	144000M	97900B	93400B
chromium	50	15.0F	4.1F	U	U	U	16.7F	U	U	U
cobalt	--	2.59F	11.3	13	16.8	4.5F	U	1.3F	U	3.7F
copper	200	22.8F	27.6J	38J	7.1	U	36.7F	39.9	U	U
iron	300	815	7810	6710	188B	U	1837	4940M	U	U
lead	25	23.7	5.2	5.3	U	U	20.90	U	U	U
magnesium	--	30837	24300	24600	12800	11800	20418	18700	13200	12400
manganese	300	7001	8350B	9400B	10200	4930B	199	505	230	214B
mercury	1	U	U	U	U	U	0.08F	U	U	U
molybdenum	--	U	U	U	U	U	U	U	U	U
nickel	100	7.05F	11.8	9.7F	U	11.6B	3.17F	U	U	10.2B
potassium	--	2908F	3330J	3120J	2550J	2300	3409F	2180	3490J	3470
selenium	10	U	U	U	U	76.60	U	U	U	57.0
silver	50	U	U	U	U	U	U	U	U	U
sodium	20000	14570	12600	12600	8340	7220	24252	13100	3470	2400
thallium	--	U	16.5F	14.2F	U	U	U	U	U	U
vanadium	--	U	9J	7.2J	U	U	U	6	U	U
zinc	--	97.2	72.4	63	13.1F	12.4F	46.4	50.2	14.0F	U

Notes:

Bold - Indicates NYS Class GA Groundwater Standard exceedance.

-- - Indicates no NYS Class GA Groundwater Standard.

B - The analyte was found in an associated blank, as well as in the sample.

F - The analyte was positively identified but the associated numerical value is below the Reporting Limit (RL).

J - The analyte was positively identified, the quantitation is an estimation.

NA - Not Available.

R - The data is unusable due to deficiencies in the ability to analyze the sample and meet QC criteria.

U - The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.

UJ - The analyte was analyzed for but not detected, however, the MDL is approximate and may or may not represent the actual limit of the quantitation.

For VOCs and SVOCs, only detected compounds are displayed.

Table 4-4
1996, 1999, and 2000 Groundwater Analytical Results
Hardfill 49d

WELL ID	--	MW49D04				MW49D05				MW49D06					
SAMPLE ID	NYSDEC GW STANDARDS	MW49D04	MW49D04A	MW49D0409BA		MW49D05	MW49D05A	MW49D0507BA		MW49D06	MW49D06A	MW49D0607BA		MW49D0607BC (dup)	
				total	soluble			total	soluble			total	soluble	total	soluble
DATE OF COLLECTION		9/5/96	6/21/99	5/3/00	5/3/00	9/5/96	6/21/99	5/3/00	5/3/00	9/5/96	6/22/99	5/3/00	5/3/00	5/3/00	5/3/00
Depth to Groundwater (ft BTOC)	--	8.50	10.15	9.16	9.16	6.80	8.47	7.36	7.36	4.83	10.24	6.63	6.63	6.63	6.63
VOCs (µg/L)															
chloroform	7.00	3.2F	U	NA	NA	U	U	NA	NA	U	U	NA	NA	NA	NA
SVOC' (µg/L)															
NONE DETECTED	U	U	U	NA	NA	U	U	NA	NA	U	U	NA	NA	NA	NA
TPH (mg/L)															
diesel components	--	0.22F	0.58F	NA	NA	0.14F	0.37J	NA	NA	0.25F	1.10	NA	NA	NA	NA
Metals (µg/L)															
aluminum	--	1083	5970	138F	U	2616	3000	593	U	783	674	218	U	189F	U
antimony	3	67.1F	U	U	U	86.5F	U	U	U	70.8F	U	U	U	U	U
arsenic	25	1.5F	U	U	U	2.3F	U	U	U	1.6F	U	U	U	U	U
barium	1000	154	181	144	119	142	154	91.6	70.4	138	184	173	129	172	132
beryllium	--	U	U	U	U	U	U	U	U	U	U	U	U	U	U
cadmium	5	3.34F	U	U	U	4.24F	U	U	U	3.19F	U	1.0	0.9F	U	1.5B
calcium	--	96645	95800	96600B	92400B	128300	116000	92700B	86000B	149040	220000	205000B	194000B	205000B	199000B
chromium	50	16.5F	5.5	U	U	19.6F	U	U	U	16.7F	U	U	U	U	U
cobalt	--	U	3.2F	U	U	8.17F	1.6F	U	U	6.74F	U	U	U	U	U
copper	200	35.2F	61.1	U	U	35.1F	16.4	19.0	15.5	22.1F	U	U	U	U	U
iron	300	2535	13000	2930	104	6921	3900	526	89.2F	5195	1200	2800	2070	3000	2360
lead	25	2.06F	3.8F	U	U	3.83F	U	U	U	U	U	U	U	U	U
magnesium	--	16276	18500	20600	19700	17001	16000	12200	11000	23946	38800	34800	33100	34800	33800
manganese	300	2312	1550	1010	861B	1697	1690	1330	657B	1348	1290	1150	1020B	1150	1090B
mercury	1	U	U	U	U	U	U	U	U	U	U	U	U	U	U
molybdenum	--	U	U	U	U	U	U	U	U	U	U	4.7F	U	U	U
nickel	100	4.81F	U	U	U	6.92F	U	U	5.5F	3.26F	U	U	U	U	U
potassium	--	3450F	2960	1210	1420J	4457F	3140	1630	2030J	2620F	2590	2000	2730J	2230	2420J
selenium	10	U	U	U	U	U	U	U	U	U	U	U	U	U	U
silver	50	U	U	U	U	U	U	U	U	U	U	U	U	U	U
sodium	20000	26963	2630	2040	1790	3251	2940	3140	2810	13624	8070	13300	13900	13300	14000
thallium	--	U	U	U	U	U	U	U	U	U	U	8.4F	U	U	U
vanadium	--	U	10.5	U	U	3.45F	5.6	U	U	U	1.7F	U	U	U	U
zinc	--	33.0	44.3	U	U	41.7	13.9F	U	14.5F	29.7	U	U	U	U	U

Notes:

- Indicates NYS Class GA Groundwater Standard exceedance.

-- - Indicates no NYS Class GA Groundwater Standard.

B - The analyte was found in an associated blank, as well as in the sample.

F - The analyte was positively identified but the associated numerical value is below the Reporting Limit (RL).

NA - Not Available.

R - The data is unusable due to deficiencies in the ability to analyze the sample and meet QC criteria.

U - The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.

For VOCs and SVOCs, only detected compounds are displayed.

- 1999 results of VOCs were consistent with those measured in 1996; no VOCs were detected.
- 1999 results indicated well MW49B04 with a phthalate compound detection at levels below the RL and well below the NYS Groundwater Standards.
- 1999 TPH-diesel range results were similarly low as those detected in 1996.
- Dissolved selenium was reported in all five wells at concentrations above the NYS Groundwater Standard of 10 µg/L, including upgradient well MW49B01, while it was not reported above the detection limit in "total" samples.
- 2000 metals results indicate upgradient well MW49B01 with similar metals detected as previously, except chromium, cobalt, copper, lead, and nickel were not detected above the reporting limit in either the "total" or "dissolved" samples. In accordance with previous evaluations, applying the two times upgradient well rule for wells which indicated metals at concentrations above NYS Groundwater Standards, MW49B02 (sampled with a bailer) indicated exceedances for iron and manganese (in both "total" and "dissolved" samples), and MW49B05 for "total" iron only. However, all of the results for "total" iron at Hardfill 49b were qualified with "B," indicating that iron was also present in a QC blank; "dissolved" manganese results above the reporting limit were similarly qualified with "B" for all Hardfill 49b samples. Lead was detected only in MW49B02, but was reported below the NYS Groundwater Standard (8.3 µg/L "total" lead).

4.3 Hardfill 49c

The Hardfill 49c results summary of the groundwater sampling events conducted in September 1996, June 1999 and May 2000 is presented in Table 4-3. The well locations are shown in Figure 1-2. Results of interest include the following:

- 1999 results of VOCs were consistent with those measured in 1996. 1,1,1-trichloroethane was detected in well MW49C03, but at a concentration three times lower than the 1996 result and below the NYS Groundwater Standard; a very low level of 1,1-dichloroethane was also detected in this well, which is indicative of potential degradation of 1,1,1-trichloroethane.
- 1999 results indicated no SVOC compounds detected.
- 1999 TPH-diesel range results were similarly low as those detected in 1996.
- Dissolved elenium was reported in all four wells at concentrations above the NYS Groundwater Standard of 10 µg/L, including upgradient well MW49C01, while it was not reported above the detection limit in "total" samples.
- 2000 metals results indicate upgradient well MW49C01 with similar metals detected as previously, except chromium, copper, lead, and nickel were not detected above the reporting limit in either the "total" or "dissolved" samples. In accordance with previous evaluations, applying the two times upgradient well rule for wells which indicated metals at concentrations above NYS Groundwater Standards, only MW49C03 indicated an exceedance, for manganese only (in both "total" and "dissolved" samples).

4.4 Hardfill 49d

The Hardfill 49d results summary of the groundwater sampling events conducted in September 1996, June 1999 and May 2000 is presented in Table 4-4. The well locations are shown in Figure 1-3. Results of interest include the following:

- 1999 VOC results indicated no detections, which was an improvement from the 1996 results when chloroform was present at low levels in several wells.
- 1999 results indicated no SVOC compounds detected.
- 1999 TPH-diesel range results were similarly low as those detected in 1996.
- 2000 metals results indicate upgradient well MW49D01 with similar metals detected as previously, except chromium, lead, and nickel were not detected above the reporting limit in either the "total" or "dissolved" samples. Sodium was detected in MW49D01 above the NYS Groundwater Standard in the "dissolved" sample. In accordance with previous evaluations, applying the two times upgradient well rule for wells which indicated metals at concentrations above NYS Groundwater Standards, each downgradient well except for MW49D08 indicated iron exceedances (in both "total" and "dissolved" samples for MW49D02, MW49D03, and MW49D06, otherwise in the "total" sample only). Exceedances for "total" manganese in MW49D06 were also reported. Although "dissolved" manganese levels in MW49D03 and MW49D06 also exceeded the two times upgradient well rule, these results were qualified with a "B," indicating that manganese was also present in a QC blank. Finally, both "total" and "dissolved" sodium exceedances were found in MW49D08, but these concentrations were qualified with an "M" signifying a matrix effect associated with their analysis.

4.5 Small Arms Range (SAR)

The SAR results summary of the groundwater sampling events conducted in September 1996, June 1999 and May 2000 is presented in Table 4-5. The well locations are shown in Figure 1-4. Results of interest include the following:

- 1999 VOC results indicated several compounds detected slightly above the NYS Groundwater Standards in upgradient well MWSAR03, which included 1,4-dichlorobenzene and vinyl chloride. MWSAR03 is downgradient of Landfill 1, which may be contributing to these contaminants. Additionally, trace levels of benzene and dichlorodifluoromethane were also detected in this well. These low contaminant levels do not pose any human health risk and may be attributable to an upgradient source.
- 1999 results indicated only SVOC compound 1,4-dichlorobenzene detected, at levels similar to those detected in the VOC analysis.
- 1999 TPH-diesel range results were similarly low as those detected in 1996.
- 2000 metals results indicate upgradient well MWSAR03 with similar metals detected as previously, except aluminum, arsenic, chromium, cobalt, copper, lead, and nickel were not detected above the reporting limit in either the "total" or "dissolved" samples. Total antimony was reported in MWSAR03 at 10.8F µg/L, above the NYS Groundwater Standard.

5.0 CONCLUSIONS

The following conclusions were reached based on data from the June 1999 and May 2000 groundwater sampling events:

- The overall correlation between the 1996 and 1999 sampling round was good for VOCs, SVOCs and TPH-diesel range. For VOC and SVOC analysis, the analytical results from the 1996 and 1999 for the Hardfills and SAR are reasonably similar. The results of the two sampling events generally indicated no detects to incidental trace level detections of VOCs and SVOCs. Also apparent in the two rounds were diesel-range hydrocarbons at only trace levels.

- With respect to metals, on a qualitative basis the analytical results from the 2000 sampling were significantly different from previous results, as several metals detected in the earlier sampling events were reported undetected in 2000. Both "total" and "dissolved" metals concentrations reported in samples collected during the 2000 sampling event were lower, up to two orders of magnitude lower in some cases. These differences are likely due to the less turbid groundwater samples collected during the 2000 sampling event using the low-flow purging and sampling technique. Turbidity levels were significantly lower for all samples collected during the 2000 sampling event (the maximum turbidity level achieved after sufficient purging of all the samples collected using the low-flow purging and sampling technique during 2000 was approximately 35 NTU at MW49D07; during the 1999 sampling event, the *minimum* turbidity level was 36 NTU, and over half of the samples collected were reported with turbidities exceeding 1000 NTU). Results exceeding NYS Groundwater Standards from previous sampling events were likely attributable to entrained suspended particulates dislodged from the bottom of the well or through the well screen by purging and sampling with a bailer (Puls and Barcelona, 1989, Ground Water Sampling for Metals Analysis, EPA/540/4-89/001); these particles, unlike those sampled using the low-flow methodology, are not representative of the mobile constituents in the Hardfills/SAR formations.

- In general, the 2000 sampling event results for "total" and "dissolved" metals were similar, with the exception of aluminum, iron, and manganese, indicating that for most metals, the total fraction of metals is in the dissolved phase. Contrastingly, the presence of aluminum, iron, and manganese may be largely associated with hydrous metal oxides (i.e., polymeric species) or inorganic/organic colloids (i.e., adsorbed species), both of which would likely be filtered out of the "dissolved" samples. Alternatively, dissolved aluminum, iron, and manganese species may precipitate out upon oxidation and/or colloid formation during filtration.

- During the 2000 sampling event, the main metals reported at levels exceeding NYS Groundwater Standards and more than two times the upgradient well concentrations were iron and manganese, and are likely associated with mobile, suspended particulates such as inorganic/organic colloids and/or hydrous metal complexes. Several studies suggest that

EXECUTIVE SUMMARY

FPM Group, Ltd. (FPM) is under contract with the Air Force Center for Environmental Excellence (AFCEE) to conduct a long-term monitoring (LTM) program for the groundwater at several Areas of Interest (AOIs) at Griffiss Air Force Base (AFB), Rome, New York. Two groundwater sampling events were conducted under this contract at the Hardfill sites 49a, 49b, 49c, 49d, and the Small Arms Range (SAR). The sampling events were performed to confirm the conclusions in the Predesign Investigation Report for Remedial Design at Hardfill 49a, 49b, 49c, and 49d, Griffiss AFB (Parsons Engineering Science, Inc. (Parsons), February 1997a) and the Final Investigation Report for the Small Arms Range, Griffiss AFB (Parsons, September 1997b), which were based on analytical results which were later questioned. This Informal Technical Information Report (ITIR) summarizes the results of the two groundwater sampling events.

The purpose of the June 1999 groundwater sampling event was to confirm previous conclusions that were based on suspicious laboratory results, from samples collected from the Hardfills and SAR sites in September 1996, including samples submitted for volatile organic compound (VOC), semivolatile organic compound (SVOC), total petroleum hydrocarbons (TPH)-diesel, and total metals analysis. 1999 results were similar to those obtained in September 1996, but total metals concentrations were, in many cases, higher than previously obtained levels and above regulatory standards (i.e., New York State [NYS] Class GA Groundwater Standards).

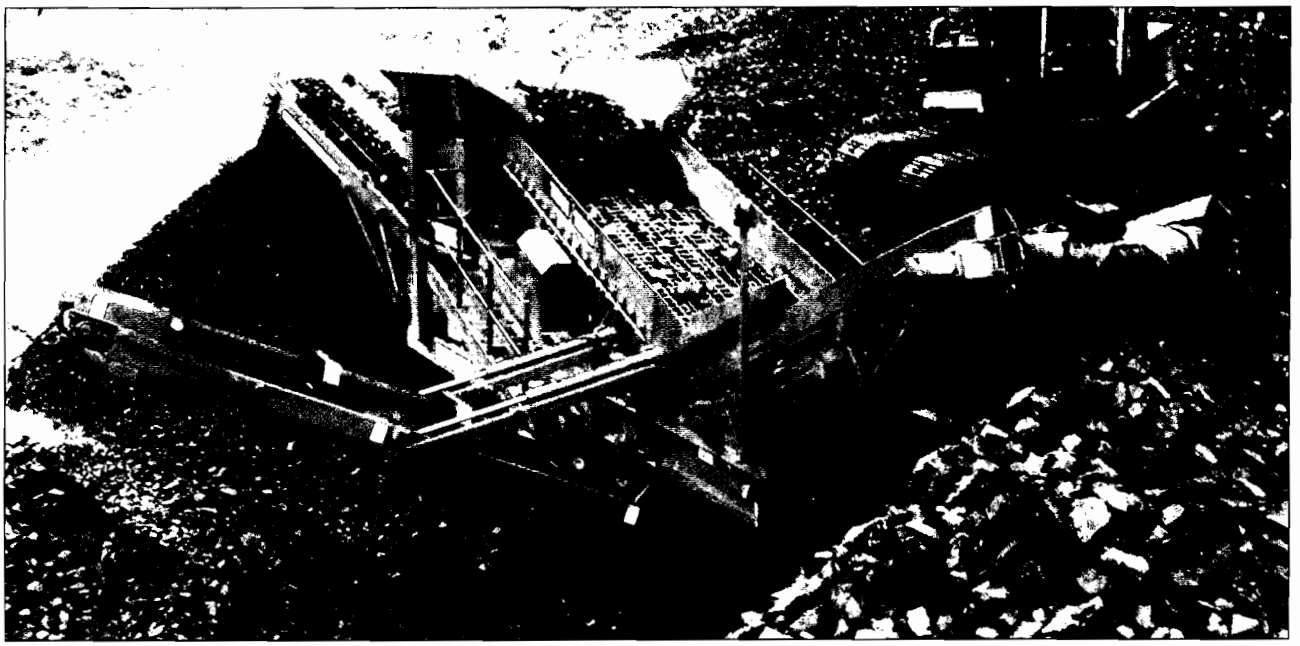
The purpose of the May 2000 groundwater sampling event was to assess whether the elevated metals concentrations from the June 1999 sampling event could be attributed to high turbidity levels in the samples, perhaps as a result of the agitation of groundwater resulting from the use of bailers to purge and sample the wells. Therefore, to minimize disturbances to the aquifer associated with purging and sampling with a disposable bailer, a low-flow sampling methodology was adopted for the May 2000 sampling event, and was performed according to the *United States Environmental Protection Agency (USEPA) Region II Ground Water Sampling Procedure, Low Stress (Low Flow) Purging and Sampling, March 1998.* In addition, groundwater samples were submitted for both total (unfiltered) and dissolved (filtered) metals analysis.

2000 results indicated that both total and dissolved metals results were generally lower than both previous sampling events, likely as a result of the low-flow purging and sampling procedure used to collect the samples. Metals reported at concentrations greater than NYS Groundwater Standards and two times the upgradient well concentrations (as specified by USEPA Region 2 in comments to the original SAR Work Plan [Parsons, May 1996]), generally included iron and manganese, which have been found to be ubiquitous in the soils in and surrounding the former Griffiss AFB, and whose source cannot be attributed to the Hardfills or the SAR. The recommendations included in previous documents (Parsons 1997a and b) were upheld by the analytical results obtained during the 1999 and 2000 sampling events, namely that groundwater remediation for these sites was not recommended, based on the present and potential use of groundwater for each site, contaminant properties and concentrations, and site hydrogeological conditions.

APPENDIX D

POWER SCREENING EQUIPMENT

Titan 1800



The Powerscreen Titan 1800 is designed to suit the medium to large volume producer.

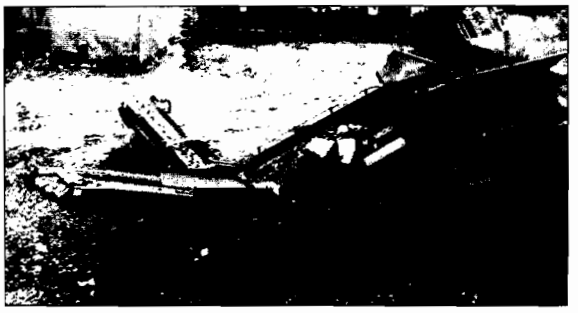
The machine can handle material which is not uniform in size or shape and allows unrestricted access to the screenbox and heavy duty oversize tail conveyor.

Advantages:

- High capacity -400 TPH, (depending on mesh sizes and material type).
- Quick set up time typically under 15 minutes.
- Maximum mobility with heavy duty, low ground pressure crawler tracks.
- Optional tri-axle bogie system allows the track machine to be transported without the need for a low loader.
- Removable heavy duty pendant remote control system.
- Optional radio control system available if required.
- Radial fines conveyor.
- The oversize discharge conveyor can collect top and bottom deck material or top deck material only.
- Access walkway for screenbox.
- Hydraulically folding hopper sides.
- Linear vibration screenbox yielding more capacity and providing greater screening efficiency.
- Hopper exit opening 0.85m x 1.2m (or with tie bar removed completely open), enabling screening of large items i.e. tree stumps, logs, bolders, etc.

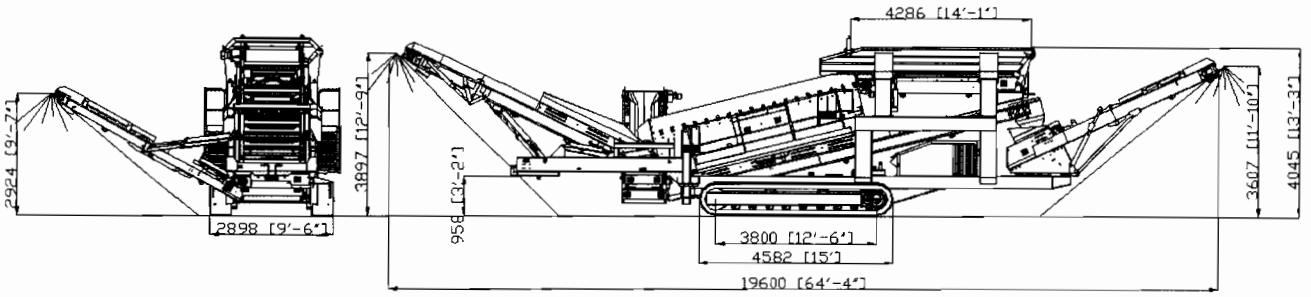
Applications include:

Recycling.
Sand and Gravel.
Topsoil.
Coal.
Crushed stone.
Compost.

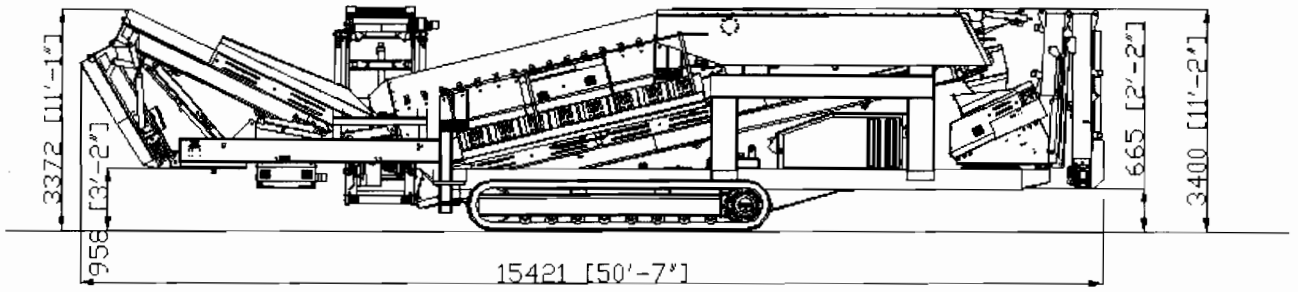


POWERSCREEN®
A Terex Company

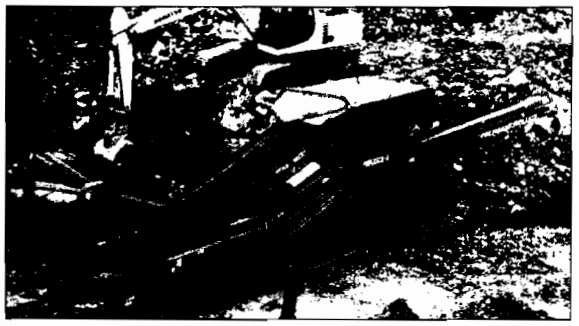
Titan 1800



Titan 1800 in working position.



Titan 1800 in transport position.



Distributed and Serviced by:

Technical Dimensions:

Total weight: 32,500kg (71,650 lbs) Track / Roll-in Bogie.

Total weight: 30,000 kg (66,140 lbs) Track

Width (transport): 2.9 m (9' 6")

Length (transport): 15.4 m (50' 7")

Height (transport): 3.7 m (12' 3") Roll-in Bogie

Height (transport): 3.4 m (11' 2") Track

Hopper capacity: 7.6m³ (9.94 yrd³)

Screenunit: Linear Vibration 4.88m x 1.55m (16' x 5') Screen.

Powerunit Diesel Hydraulic with Deutz BF4M1012C - 82kW (110 Hp).

Engine protection shut down system.

Powerscreen International Distribution Ltd.
Coalisland Road, Dungannon, N. Ireland, BT71 4DR.
Tel: +44 (0) 28 87 740701. Fax: +44 (0) 28 87 747231/747116
Email: mail@powerscreen.co.uk Internet: www.powerscreen.co.uk

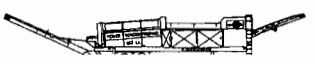
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POWERSCREEN®
A Terex Company

• Mobile Screening Excellence •
Dry Screening • Washing • Recycling



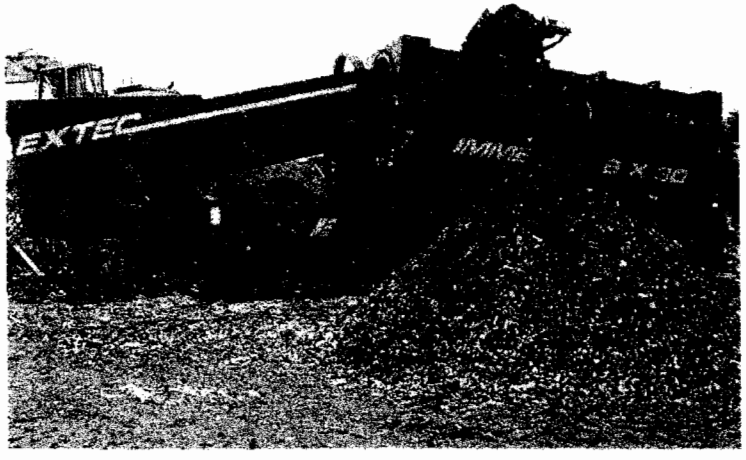


TROMMEL SCREENS





Oversize material not passing the screen.



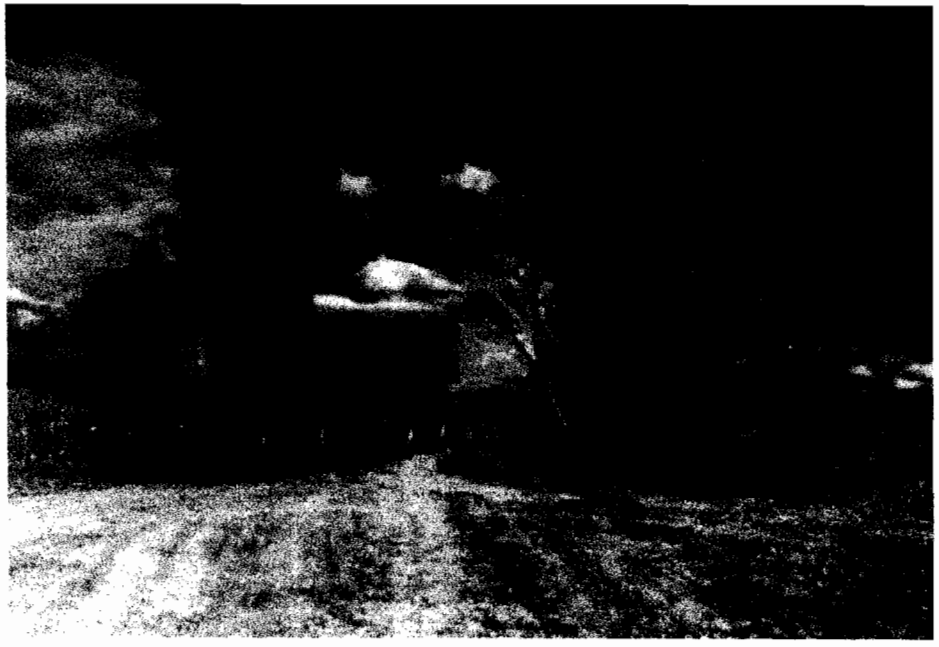
Material passing the screen.

The Trommel screen is a rotary screen in which the material is fed in one end and gets tumbled as it passes down the inclined screen. As the material tumbles, loose soil is removed from pieces too large to pass the screen. Oversize material, not passing the screen, comes out the end. The removed soil will pass the screen and drop onto a conveyor below the screen.

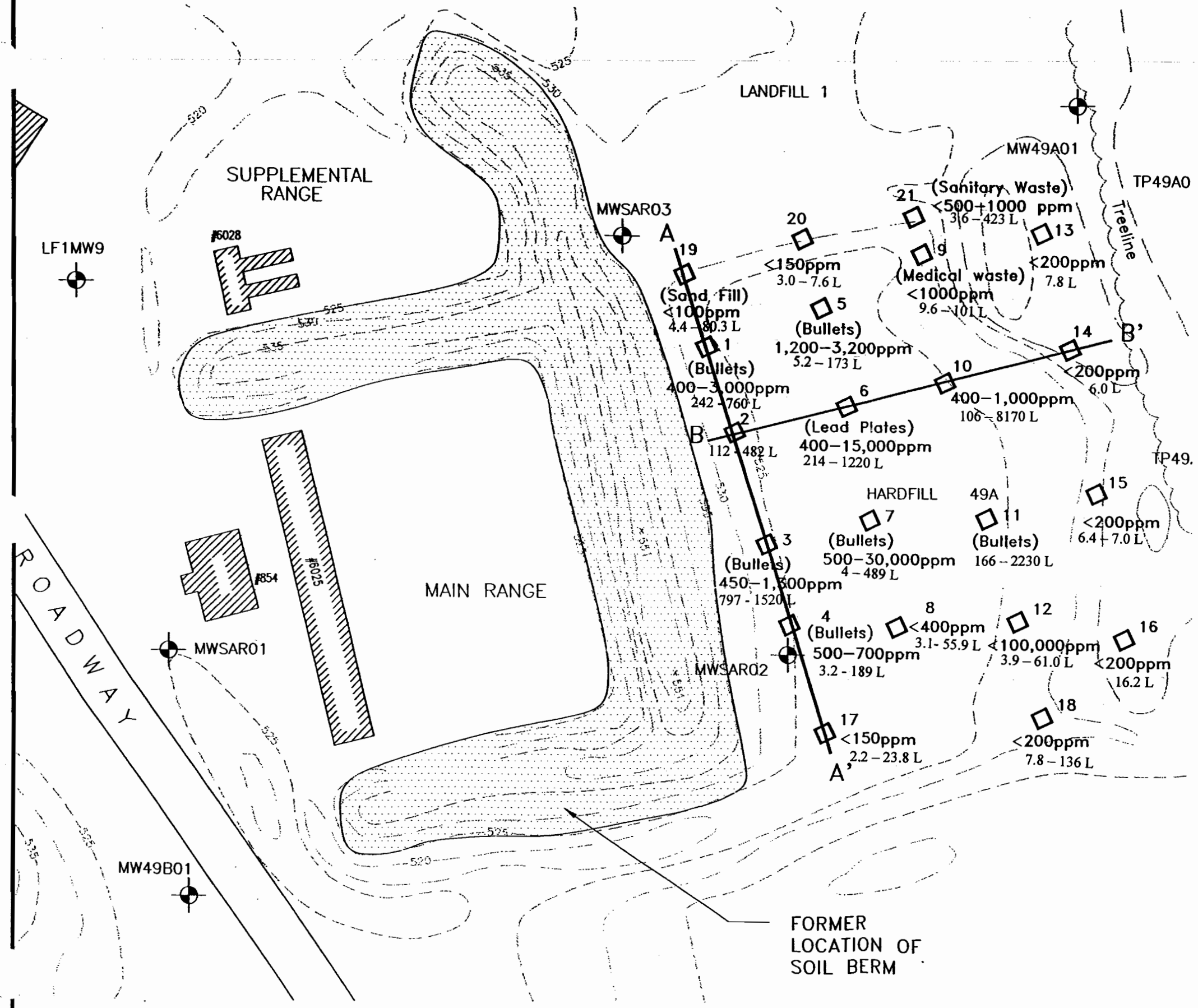
RUBBER TIRE LOADERS



Rubber tire loader.



Truck loading with a rubber tire loader.



NOTES:

1. ALL LOCATIONS ARE APPROXIMATE.
2. TOPOGRAPHY DOES NOT REPRESENT CURRENT CONDITIONS.
3. ALL INFORMATION IS PRELIMINARY AND SUBJECT TO CHANGE.

* LEAD CONCENTRATIONS ARE BASED ON X-RAY FLUORESCENCE METER.

L TOTAL LEAD (ppm) BASED ON LABORATORY ANALYTICAL

LEGEND

MWSAR02 — EXISTING MONITORING WELL

16 — TEST PIT LOCATION

<200ppm — ESTIMATED LEAD CONCENTRATION *

FORMER BERMED AREA

0 25 50
SCALE: 1" = 50'

AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE
GRIFFISS AIR FORCE BASE - NEW YORK

CROSS SECTION LOCATIONS

PARSONS ENGINEERING SCIENCE, INC.

Reference (Peer, 1999)

NO.	REVISION	BY	DATE

PROJECT NUMBER: 1566-045-001-03 DATE
SCALE: 1" = 50' DESIGNED BY: MB 6/99
DRAWN BY: HFP 6/99
CHECKED BY: MB 6/99

FILENAME: 156601F1B

FIGURE 1.2