2-402.56 - 1190

Department of Energy

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JAN 07 1998

DOE-0311-98

Mr. James A. Saric, Remedial Project Manager
U.S. Environmental Protection Agency
Region V-SRF-5J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

PROJECT SPECIFIC PLAN FOR LEAD DELINEATION IN THE AREA 2 PHASE 1 FIRING RANGE - FINAL DOCUMENT

This letter serves to transmit the final Project Specific Plan (PSP) for sampling at Area 2 Phase 1 (A2P1) Firing Range. An earlier draft had been informally submitted to you on November 11, 1997. This final version incorporated the Ohio Environmental Protection Agency (OEPA) comments received on the draft and documents the sampling activities completed on December 2, 1997.

If you have questions or comments regarding the sampling of the West Soil Stockpile, please contact Kathleen Nickel at (513) 648-3166.

Sincerely,

Johnny Reising

Johnny W. Reising
Fernald Remedial Action
Project Manager

FEMP:Nickel

Enclosure: As Stated

Recycled and Recyclable

cc w/enc:

T. Schneider, OPEA-Dayton (3 copies total of enc)
F. Barker, Tetra Tech
AR Coordinator, FDF/73

cc w/o enc:

EDC, FDF/52-7

PROJECT SPECIFIC PLAN FOR LEAD DELINEATION IN THE AREA 2, PHASE I FIRING RANGE

Project Number: 20.03.13.04

Revision 0
November 1997

APPROVAL:

Anthony P. Klimek — 11/18/97
Anthony Klimek, Area 2, Phase I Project Manager — Date
Soil Characterization and Excavation Project

Vicky L. Zimmerman — 11/18/97
Vicky Zimmerman, Area Characterization Lead — Date
Soil Characterization and Excavation Project

Mike Frank — 11/19/97
Mike Frank, Field Sampling Manager — Date
Soil Characterization and Excavation Project

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Soil Characterization and Excavation Project

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

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ACRONYMS AND ABBREVIATIONS

A2PI	Area 2, Phase I
AFP	Active Flyash Pile
CERCLA	Sitewide Comprehensive Environment Response, Compensation, and Liability Act
DOE	U.S. Department of Energy
DQO	Data Quality Objective
FEMP	Fernald Environmental Management Project
FAL	Field Activity Log
FRL	final remediation level
GFAA	graphite furnace atomic absorption
GPS	Global Positioning System
ICP	inductively coupled plasma
IFP	Inactive Flyash Pile
LAN	local area network
mg/kg	milligrams per kilogram
ppm	parts per million
PSP	Project Specific Plan
PWID	Project Waste Identification Document
RCRA	Resource Conservation and Recovery Act
QA	Quality Assurance
QC	Quality Control
SCEP	Soil Characterization and Excavation Project
SCQ	Sitewide CERCLA Quality Assurance Project Plan
SEP	Sitewide Excavation Plan
SF	South Field
SWUs	Southern Waste Units
TCLP	Toxicity Characteristic Leaching Procedure
V/FCN	Variance/Field Change Notice
WDSS	Waste Disposition Support Services
XRF	x-ray fluorescence

1.0 INTRODUCTION

This Project-Specific Plan (PSP) describes the data collection activities necessary to delineate the extent of lead contamination in the Fernald Environmental Management Project (FEMP) Area 2, Phase I (A2PI) South Field Firing Range. The sampling strategy contained herein is designed to determine the extent of lead contamination above its final remediation level (FRL) of 400 milligrams per kilogram (mg/kg) and whether the material possesses the toxicity characteristic as defined by the Resource Conservation and Recovery Act (RCRA). Data from this sampling effort will determine the viability of field sieving the material from the firing range to isolate the lead bullets. Stipulations for contingency sampling are provided under this PSP. The data generated from this sampling effort will be used to further refine the excavation design of the Southern Waste Units (SWUs).

Sampling and analysis activities will be consistent with the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ), and Data Quality Objective (DQO) SL-048, Revision 1 (see Appendix A).

1.1 PROJECT BACKGROUND

The A2PI area is located in the southwestern portion of the FEMP and encompasses the SWUs of Operable Unit 2 and soil from Operable Unit 5. The SWUs include the Inactive Flyash Pile (IFP), South Field (SF) where the firing range is located, and the Active Flyash Pile [AFP (see Figure 1-1)]. The southwest edge of the SF forms a soil embankment that was used as a catchment area for lead ammunition for over 35 years by FEMP site security. Previous data indicate elevated lead concentrations and the potential presence of RCRA-characteristic [Toxicity Characteristic Leaching Procedure (TCLP)] lead concentrations.

A Removal Site Evaluation was conducted in 1992 to assess lead contamination at the SF firing range and to determine whether the nature and extent of contamination warranted a removal action. Approximately 300 cubic yards of soil containing spent lead ammunition was estimated to be present in this area. In January and February 1992, vertical and horizontal borings were placed in the western embankment of the SF just east of the FEMP running track/firing range, and samples were collected for the analysis of lead. Sampling results indicated that a removal action was not necessary. Data from

this sampling effort can be found in the Operable Unit 2 Remedial Investigation [U.S. Department of Energy (DOE) 1995].

In October 1996, additional real-time measurements were performed using a field portable x-ray fluorescence (XRF) spectrometer (Texas Nuclear Technologies, Spectrace 9000) to further define the extent of lead-contaminated soil. A field investigation was conducted along the western edge of the SF and 34 sample points were collected. Tables 1-1, 1-2, and 1-3 summarize the results of the October 1996 sampling event. Thirteen samples collected at varying depths exhibited concentrations above the lead FRL. The highest XRF reading [2906 parts per million (ppm)] was located at PB-37. The highest XRF reading at a depth of 1 to 2 feet (1065 ppm) was located at PB-19. No exceedance of the lead FRL was present in any sample at a depth greater than 2 feet.

Details on the correlation between the XRF spectrometer and laboratory analyses are being compiled. As a general rule, the XRF results for lead correspond to approximately 75% of the lead results from the FEMP on-site laboratory analysis. Therefore, XRF readings of 300 mg/kg or above were used to indicate the potential for material to exceed the lead FRL of 400 mg/kg.

1.2 PROJECT OBJECTIVES

As part of the predesign investigation for the remediation of A2PI, this sampling effort will delineate the extent of lead contamination in the firing range, estimate the amount of material to be excavated, and provide analytical data to determine proper disposition of the excavated material. Data will be evaluated to determine if field sieving bullets from the soil would render the soil noncharacteristic, thereby potentially allowing disposition of the sieved soil to the OSDF. Sampling will be conducted to a total depth of 5 feet at each of the predetermined sample locations shown in Appendix B. To determine if the soil is RCRA-characteristic, additional TCLP soil samples will be collected and analyzed at the FEMP on-site laboratory.

1.3 SCOPE

Twenty-four locations will be sampled in the A2PI SF firing range (see Appendix B). The area to be sampled, as well as the sample point locations, is based upon process knowledge, RI/FS data, subsequent soil sampling, and real-time measurements (XRF). The samples will be analyzed for lead by either the graphite furnace atomic absorption (GFAA) method or the inductively coupled plasma

(ICP) spectroscopy method. Three of the collected samples will be analyzed for lead by the TCLP method as well as total lead; the TCLP samples will be collected from an area of high density bullet debris, an area of moderate density bullet debris, and an area of low density bullet debris. Each of these three samples will be split; one split sample will be sieved in the field and analyzed in accordance with SW846, Volume 1C, Section 8.4 and one split sample not sieved in the field will be submitted for analysis in accordance with SW846. All sampling and analysis activities will be consistent with the SCQ and DQO SL-048, Rev. 2 (see Appendix A).

1.4 KEY PERSONNEL

Key personnel responsible for conducting work in accordance with this PSP are listed in Table 1-4.

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TARGET ANALYTE LIST
AREA 2 PHASE I FIRING RANGE SAMPLING
Project Number 20.03.13.04

TAL A2PI-PB-B

Method 1311		
1	ASL B	Lead (TCLP)
GFAA or ICP		
2	ASL B	Total Lead

Pre-design investigation sampling

TARGET ANALYTE LIST
AREA 2 PHASE I FIRING RANGE SAMPLING
Project Number 20.03.13.04

1190

TAL A2PI-PB-A

GFAA or ICP Method		
1	ASL B	Total Lead

Pre-design investigation sampling

APPENDIX C

TARGET ANALYTE LISTS (TAL)

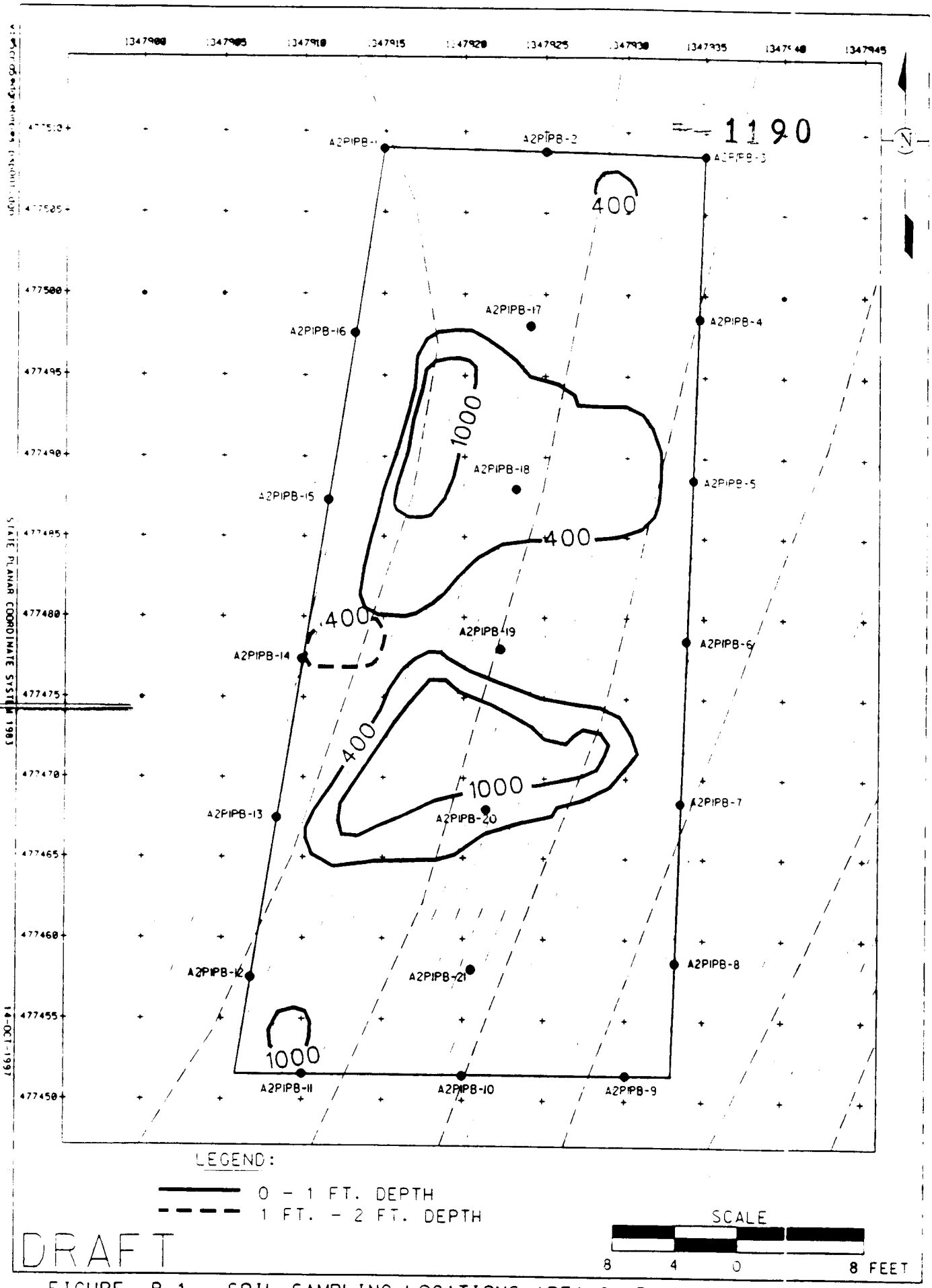

FIGURE B-1. SOIL SAMPLING LOCATIONS AREA 2, PHASE I FIRING RANGE.

TABLE B-1
Area 2 Phase I Firing Range Soil Sample Identification
(continued)

1190

Location	Depth Interval (ft)	Easting	Northing	TAL
A2PIPB-23-1-TM-Y	0-1	TBD	TBD	B
A2PIPB-23-2-TM	1-2	TBD	TBD	B
A2PIPB-23-2-TM-Y	1-2	TBD	TBD	B
A2PIPB-23-3-TM	2-3	TBD	TBD	B
A2PIPB-23-3-TM-Y	2-3	TBD	TBD	B
A2PIPB-24-1-TM	0-1	TBD	TBD	B
A2PIPB-24-1-TM-Y	0-1	TBD	TBD	B
A2PIPB-24-2-TM	1-2	TBD	TBD	B
A2PIPB-24-2-TM-Y	1-2	TBD	TBD	B
A2PIPB-24-3-TM	2-3	TBD	TBD	B
A2PIPB-24-3-TM-Y	2-3	TBD	TBD	B

TBD = To be determined

TABLE B-1
Area 2 Phase I Firing Range Soil Sample Identification
(continued)

Location	Depth Interval (ft)	Easting	Northing	TAL
A2PIPB-20-7-M	3-3.5	1347921.41	477468.02	A
A2PIPB-20-7-M-Y-V	3-3.5	1347921.41	477468.02	TBD
A2PIPB-20-8-M	4.5-5	1347921.41	477468.02	A
A2PIPB-20-8-M-Y-V	4.5-5	1347921.41	477468.02	TBD
A2PIPB-21-1-M	0-0.5	1347920.52	477458.09	A
A2PIPB-21-1-M-Y-V	0-0.5	1347920.52	477458.09	TBD
A2PIPB-21-2-M	0.5-1	1347920.52	477458.09	A
A2PIPB-21-2-M-Y-V	0.5-1	1347920.52	477458.09	TBD
A2PIPB-21-3-M	1-1.5	1347920.52	477458.09	A
A2PIPB-21-3-M-Y-V	1-1.5	1347920.52	477458.09	TBD
A2PIPB-21-4-M	1.5-2	1347920.52	477458.09	A
A2PIPB-21-4-M-Y-V	1.5-2	1347920.52	477458.09	TBD
A2PIPB-21-5-M	2-2.5	1347920.52	477458.09	A
A2PIPB-21-5-M-Y-V	2-2.5	1347920.52	477458.09	TBD
A2PIPB-21-6-M	2.5-3	1347920.52	477458.09	A
A2PIPB-21-6-M-Y-V	2.5-3	1347920.52	477458.09	TBD
A2PIPB-21-7-M	3-3.5	1347920.52	477458.09	A
A2PIPB-21-7-M-Y-V	3-3.5	1347920.52	477458.09	TBD
A2PIPB-21-8-M	4.5-5	1347920.52	477458.09	A
A2PIPB-21-8-M-Y-V	4.5-5	1347920.52	477458.09	TBD
A2PIPB-22-1-TM	0-1	TBD	TBD	B
A2PIPB-22-1-TM-Y	0-1	TBD	TBD	B
A2PIPB-22-2-TM	1-2	TBD	TBD	B
A2PIPB-22-2-TM-Y	1-2	TBD	TBD	B
A2PIPB-22-3-TM	2-3	TBD	TBD	B
A2PIPB-22-3-TM-Y	2-3	TBD	TBD	B
A2PIPB-23-1-TM	0-1	TBD	TBD	B

TABLE B-1
Area 2 Phase I Firing Range Soil Sample Identification
(continued)

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Location	Depth Interval (ft)	Easting	Northing	TAL
A2PIPB-19-1-M-Y-V	0-0.5	1347922.28	477478.04	TBD
A2PIPB-19-2-M	0.5-1	1347922.28	477478.04	A
A2PIPB-19-2-M-Y-V	0.5-1	1347922.28	477478.04	TBD
A2PIPB-19-3-M	1-1.5	1347922.28	477478.04	A
A2PIPB-19-3-M-Y-V	1-1.5	1347922.28	477478.04	TBD
A2PIPB-19-4-M	1.5-2	1347922.28	477478.04	A
A2PIPB-19-4-M-Y-V	1.5-2	1347922.28	477478.04	TBD
A2PIPB-19-5-M	2-2.5	1347922.28	477478.04	A
A2PIPB-19-5-M-Y-V	2-2.5	1347922.28	477478.04	TBD
A2PIPB-19-6-M	2.5-3	1347922.28	477478.04	A
A2PIPB-19-6-M-Y-V	2.5-3	1347922.28	477478.04	TBD
A2PIPB-19-7-M	3-3.5	1347922.28	477478.04	A
A2PIPB-19-7-M-Y-V	3-3.5	1347922.28	477478.04	TBD
A2PIPB-19-8-M	4.5-5	1347922.28	477478.04	A
A2PIPB-19-8-M-Y-V	4.5-5	1347922.28	477478.04	TBD
A2PIPB-20-1-M	0-0.5	1347921.41	477468.02	A
A2PIPB-20-1-M-Y-V	0-0.5	1347921.41	477468.02	TBD
A2PIPB-20-2-M	0.5-1	1347921.41	477468.02	A
A2PIPB-20-2-M-Y-V	0.5-1	1347921.41	477468.02	TBD
A2PIPB-20-3-M	1-1.5	1347921.41	477468.02	A
A2PIPB-20-3-M-Y-V	1-1.5	1347921.41	477468.02	TBD
A2PIPB-20-4-M	1.5-2	1347921.41	477468.02	A
A2PIPB-20-4-M-Y-V	1.5-2	1347921.41	477468.02	TBD
A2PIPB-20-5-M	2-2.5	1347921.41	477468.02	A
A2PIPB-20-5-M-Y-V	2-2.5	1347921.41	477468.02	TBD
A2PIPB-20-6-M	2.5-3	1347921.41	477468.02	A
A2PIPB-20-6-M-Y-V	2.5-3	1347921.41	477468.02	TBD

1190

TABLE B-1
Area 2 Phase I Firing Range Soil Sample Identification
(continued)

Location	Depth Interval (ft)	Easting	Northing	TAL
A2PIPB-17-4-M	1.5-2	1347924.06	477498.08	A
A2PIPB-17-4-M-Y-V	1.5-2	1347924.06	477498.08	TBD
A2PIPB-17-5-M	2-2.5	1347924.06	477498.08	A
A2PIPB-17-5-M-Y-V	2-2.5	1347924.06	477498.08	TBD
A2PIPB-17-6-M	2.5-3	1347924.06	477498.08	A
A2PIPB-17-6-M-Y-V	2.5-3	1347924.06	477498.08	TBD
A2PIPB-17-7-M	3-3.5	1347924.06	477498.08	A
A2PIPB-17-7-M-Y-V	3-3.5	1347924.06	477498.08	TBD
A2PIPB-17-8-M	4.5-5	1347924.06	477498.08	A
A2PIPB-17-8-M-Y-V	4.5-5	1347924.06	477498.08	TBD
A2PIPB-18-1-M	0-0.5	1347923.21	477487.97	A
A2PIPB-18-1-M-Y-V	0-0.5	1347923.21	477487.97	TBD
A2PIPB-18-2-M	0.5-1	1347923.21	477487.97	A
A2PIPB-18-2-M-Y-V	0.5-1	1347923.21	477487.97	TBD
A2PIPB-18-3-M	1-1.5	1347923.21	477487.97	A
A2PIPB-18-3-M-Y-V	1-1.5	1347923.21	477487.97	TBD
A2PIPB-18-4-M	1.5-2	1347923.21	477487.97	A
A2PIPB-18-4-M-Y-V	1.5-2	1347923.21	477487.97	TBD
A2PIPB-18-5-M	2-2.5	1347923.21	477487.97	A
A2PIPB-18-5-M-Y-V	2-2.5	1347923.21	477487.97	TBD
A2PIPB-18-6-M	2.5-3	1347923.21	477487.97	A
A2PIPB-18-6-M-Y-V	2.5-3	1347923.21	477487.97	TBD
A2PIPB-18-7-M	3-3.5	1347923.21	477487.97	A
A2PIPB-18-7-M-Y-V	3-3.5	1347923.21	477487.97	TBD
A2PIPB-18-8-M	4.5-5	1347923.21	477487.97	A
A2PIPB-18-8-M-Y-V	4.5-5	1347923.21	477487.97	TBD
A2PIPB-19-1-M	0-0.5	1347922.28	477478.04	A

TABLE B-1
Area 2 Phase I Firing Range Soil Sample Identification 1190
(continued)

Location	Depth Interval (ft)	Easting	Northing	TAL
A2PIPB-15-7-M	3-3.5	1347911.50	477487.27	A
A2PIPB-15-7-M-Y-V	3-3.5	1347911.50	477487.27	TBD
A2PIPB-15-8-M	4.5-5	1347911.50	477487.27	A
A2PIPB-15-8-M-Y-V	4.5-5	1347911.50	477487.27	TBD
A2PIPB-16-1-M	0-0.5	1347913.12	477497.60	A
A2PIPB-16-1-M-Y-V	0-0.5	1347913.12	477497.60	TBD
A2PIPB-16-2-M	0.5-1	1347913.12	477497.60	A
A2PIPB-16-2-M-Y-V	0.5-1	1347913.12	477497.60	TBD
A2PIPB-16-3-M	1-1.5	1347913.12	477497.60	A
A2PIPB-16-3-M-Y-V	1-1.5	1347913.12	477497.60	TBD
A2PIPB-16-4-M	1.5-2	1347913.12	477497.60	A
A2PIPB-16-4-M-Y-V	1.5-2	1347913.12	477497.60	TBD
A2PIPB-16-5-M	2-2.5	1347913.12	477497.60	A
A2PIPB-16-5-M-Y-V	2-2.5	1347913.12	477497.60	TBD
A2PIPB-16-6-M	2.5-3	1347913.12	477497.60	A
A2PIPB-16-6-M-Y-V	2.5-3	1347913.12	477497.60	TBD
A2PIPB-16-7-M	3-3.5	1347913.12	477497.60	A
A2PIPB-16-7-M-Y-V	3-3.5	1347913.12	477497.60	TBD
A2PIPB-16-8-M	4.5-5	1347913.12	477497.60	A
A2PIPB-16-8-M-Y-V	4.5-5	1347913.12	477497.60	TBD
A2PIPB-17-1-M	0-0.5	1347924.06	477498.08	A
A2PIPB-17-1-M-Y-V	0-0.5	1347924.06	477498.08	TBD
A2PIPB-17-2-M	0.5-1	1347924.06	477498.08	A
A2PIPB-17-2-M-Y-V	0.5-1	1347924.06	477498.08	TBD
A2PIPB-17-3-M	1-1.5	1347924.06	477498.08	A
A2PIPB-17-3-M-Y-V	1-1.5	1347924.06	477498.08	TBD

TABLE B-1
Area 2 Phase I Firing Range Soil Sample Identification
(continued)

1190

Location	Depth Interval (ft)	Easting	Northing	TAL
A2PIPB-14-1-M-Y-V	0-0.5	1347909.88	477477.39	TBD
A2PIPB-14-2-M	0.5-1	1347909.88	477477.39	A
A2PIPB-14-2-M-Y-V	0.5-1	1347909.88	477477.39	TBD
A2PIPB-14-3-M	1-1.5	1347909.88	477477.39	A
A2PIPB-14-3-M-Y-V	1-1.5	1347909.88	477477.39	TBD
A2PIPB-14-4-M	1.5-2	1347909.88	477477.39	A
A2PIPB-14-4-M-Y-V	1.5-2	1347909.88	477477.39	TBD
A2PIPB-14-5-M	2-2.5	1347909.88	477477.39	A
A2PIPB-14-5-M-Y-V	2-2.5	1347909.88	477477.39	TBD
A2PIPB-14-6-M	2.5-3	1347909.88	477477.39	A
A2PIPB-14-6-M-Y-V	2.5-3	1347909.88	477477.39	TBD
A2PIPB-14-7-M	3-3.5	1347909.88	477477.39	A
A2PIPB-14-7-M-Y-V	3-3.5	1347909.88	477477.39	TBD
A2PIPB-14-8-M	4.5-5	1347909.88	477477.39	A
A2PIPB-14-8-M-Y-V	4.5-5	1347909.88	477477.39	TBD
A2PIPB-15-1-M	0-0.5	1347911.50	477487.27	A
A2PIPB-15-1-M-Y-V	0-0.5	1347911.50	477487.27	TBD
A2PIPB-15-2-M	0.5-1	1347911.50	477487.27	A
A2PIPB-15-2-M-Y-V	0.5-1	1347911.50	477487.27	TBD
A2PIPB-15-3-M	1-1.5	1347911.50	477487.27	A
A2PIPB-15-3-M-Y-V	1-1.5	1347911.50	477487.27	TBD
A2PIPB-15-4-M	1.5-2	1347911.50	477487.27	A
A2PIPB-15-4-M-Y-V	1.5-2	1347911.50	477487.27	TBD
A2PIPB-15-5-M	2-2.5	1347911.50	477487.27	A
A2PIPB-15-5-M-Y-V	2-2.5	1347911.50	477487.27	TBD
A2PIPB-15-6-M	2.5-3	1347911.50	477487.27	A
A2PIPB-15-6-M-Y-V	2.5-3	1347911.50	477487.27	TBD

TABLE B-1
Area 2 Phase I Firing Range Soil Sample Identification — 1190
(continued)

Location	Depth Interval (ft)	Easting	Northing	TAL
A2PIPB-12-4-M-Y-V	1.5-2	1347906.80	477457.54	TBD
A2PIPB-12-5-M	2-2.5	1347906.80	477457.54	A
A2PIPB-12-5-M-Y-V	2-2.5	1347906.80	477457.54	TBD
A2PIPB-12-6-M	2.5-3	1347906.80	477457.54	A
A2PIPB-12-6-M-Y-V	2.5-3	1347906.80	477457.54	TBD
A2PIPB-12-7-M	3-3.5	1347906.80	477457.54	A
A2PIPB-12-7-M-Y-V	3-3.5	1347906.80	477457.54	TBD
A2PIPB-12-8-M	4.5-5	1347906.80	477457.54	A
A2PIPB-12-8-M-Y-V	4.5-5	1347906.80	477457.54	TBD
A2PIPB-13-1-M	0-0.5	1347908.37	477467.47	A
A2PIPB-13-1-M-Y-V	0-0.5	1347908.37	477467.47	TBD
A2PIPB-13-2-M	0.5-1	1347908.37	477467.47	A
A2PIPB-13-2-M-Y-V	0.5-1	1347908.37	477467.47	TBD
A2PIPB-13-3-M	1-1.5	1347908.37	477467.47	A
A2PIPB-13-3-M-Y-V	1-1.5	1347908.37	477467.47	TBD
A2PIPB-13-4-M	1.5-2	1347908.37	477467.47	A
A2PIPB-13-4-M-Y-V	1.5-2	1347908.37	477467.47	TBD
A2PIPB-13-5-M	2-2.5	1347908.37	477467.47	A
A2PIPB-13-5-M-Y-V	2-2.5	1347908.37	477467.47	TBD
A2PIPB-13-6-M	2.5-3	1347908.37	477467.47	A
A2PIPB-13-6-M-Y-V	2.5-3	1347908.37	477467.47	TBD
A2PIPB-13-7-M	3-3.5	1347908.37	477467.47	A
A2PIPB-13-7-M-Y-V	3-3.5	1347908.37	477467.47	TBD
A2PIPB-13-8-M	4.5-5	1347908.37	477467.47	A
A2PIPB-13-8-M-Y-V	4.5-5	1347908.37	477467.47	TBD
A2PIPB-14-1-M	0-0.5	1347909.88	477477.39	A

TABLE B-1
Area 2 Phase I Firing Range Soil Sample Identification
(continued)

1190

Location	Depth Interval (ft)	Easting	Northing	TAL
A2PIPB-10-7-M-Y-V	3-3.5	1347919.98	477451.51	TBD
A2PIPB-10-8-M	4.5-5	1347919.98	477451.51	A
A2PIPB-10-8-M-Y-V	4.5-5	1347919.98	477451.51	TBD
A2PIPB-11-1-M	0-0.5	1347910.00	477451.58	A
A2PIPB-11-1-M-Y-V	0-0.5	1347910.00	477451.58	TBD
A2PIPB-11-2-M	0.5-1	1347910.00	477451.58	A
A2PIPB-11-2-M-Y-V	0.5-1	1347910.00	477451.58	TBD
A2PIPB-11-3-M	1-1.5	1347910.00	477451.58	A
A2PIPB-11-3-M-Y-V	1-1.5	1347910.00	477451.58	TBD
A2PIPB-11-4-M	1.5-2	1347910.00	477451.58	A
A2PIPB-11-4-M-Y-V	1.5-2	1347910.00	477451.58	TBD
A2PIPB-11-5-M	2-2.5	1347910.00	477451.58	A
A2PIPB-11-5-M-Y-V	2-2.5	1347910.00	477451.58	TBD
A2PIPB-11-6-M	2.5-3	1347910.00	477451.58	A
A2PIPB-11-6-M-Y-V	2.5-3	1347910.00	477451.58	TBD
A2PIPB-11-7-M	3-3.5	1347910.00	477451.58	A
A2PIPB-11-7-M-Y-V	3-3.5	1347910.00	477451.58	TBD
A2PIPB-11-8-M	4.5-5	1347910.00	477451.58	A
A2PIPB-11-8-M-Y-V	4.5-5	1347910.00	477451.58	TBD
A2PIPB-12-1-M	0-0.5	1347906.80	477457.54	A
A2PIPB-12-1-M-Y-V	0-0.5	1347906.80	477457.54	TBD
A2PIPB-12-2-M	0.5-1	1347906.80	477457.54	A
A2PIPB-12-2-M-Y-V	0.5-1	1347906.80	477457.54	TBD
A2PIPB-12-3-M	1-1.5	1347906.80	477457.54	A
A2PIPB-12-3-M-Y-V	1-1.5	1347906.80	477457.54	TBD
A2PIPB-12-4-M	1.5-2	1347906.80	477457.54	A

TABLE B-1
Area 2 Phase I Firing Range Soil Sample Identification
(continued)

1190

Location	Depth Interval (ft)	Easting	Northing	TAL
A2PIPB-9-2-M-Y-V	0.5-1	1347930.04	477451.56	TBD
A2PIPB-9-3-M	1-1.5	1347930.04	477451.56	A
A2PIPB-9-3-M-Y-V	1-1.5	1347930.04	477451.56	TBD
A2PIPB-9-4-M	1.5-2	1347930.04	477451.56	A
A2PIPB-9-4-M-Y-V	1.5-2	1347930.04	477451.56	TBD
A2PIPB-9-5-M	2-2.5	1347930.04	477451.56	A
A2PIPB-9-5-M-Y-V	2-2.5	1347930.04	477451.56	TBD
A2PIPB-9-6-M	2.5-3	1347930.04	477451.56	A
A2PIPB-9-6-M-Y-V	2.5-3	1347930.04	477451.56	TBD
A2PIPB-9-7-M	3-3.5	1347930.04	477451.56	A
A2PIPB-9-7-M-Y-V	3-3.5	1347930.04	477451.56	TBD
A2PIPB-9-8-M	4.5-5	1347930.04	477451.56	A
A2PIPB-9-8-M-Y-V	4.5-5	1347930.04	477451.56	TBD
A2PIPB-10-1-M	0-0.5	1347919.98	477451.51	A
A2PIPB-10-1-M-Y-V	0-0.5	1347919.98	477451.51	TBD
A2PIPB-10-2-M	0.5-1	1347919.98	477451.51	A
A2PIPB-10-2-M-Y-V	0.5-1	1347919.98	477451.51	TBD
A2PIPB-10-3-M	1-1.5	1347919.98	477451.51	A
A2PIPB-10-3-M-Y-V	1-1.5	1347919.98	477451.51	TBD
A2PIPB-10-4-M	1.5-2	1347919.98	477451.51	A
A2PIPB-10-4-M-Y-V	1.5-2	1347919.98	477451.51	TBD
A2PIPB-10-5-M	2-2.5	1347919.98	477451.51	A
A2PIPB-10-5-M-Y-V	2-2.5	1347919.98	477451.51	TBD
A2PIPB-10-6-M	2.5-3	1347919.98	477451.51	A
A2PIPB-10-6-M-Y-V	2.5-3	1347919.98	477451.51	TBD
A2PIPB-10-7-M	3-3.5	1347919.98	477451.51	A

1190

TABLE B-1
Area 2 Phase I Firing Range Soil Sample Identification
(continued)

Location	Depth Interval (ft)	Easting	Northing	TAL
A2PIPB-7-5-M	2-2.5	1347933.52	477468.47	A
A2PIPB-7-5-M-Y-V	2-2.5	1347933.52	477468.47	TBD
A2PIPB-7-6-M	2.5-3	1347933.52	477468.47	A
A2PIPB-7-6-M-Y-V	2.5-3	1347933.52	477468.47	TBD
A2PIPB-7-7-M	3-3.5	1347933.52	477468.47	A
A2PIPB-7-7-M-Y-V	3-3.5	1347933.52	477468.47	TBD
A2PIPB-7-8-M	4.5-5	1347933.52	477468.47	A
A2PIPB-7-8-M-Y-V	4.5-5	1347933.52	477468.47	TBD
A2PIPB-8-1-M	0-0.5	1347933.21	477458.57	A
A2PIPB-8-1-M-Y-V	0-0.5	1347933.21	477458.57	TBD
A2PIPB-8-2-M	0.5-1	1347933.21	477458.57	A
A2PIPB-8-2-M-Y-V	0.5-1	1347933.21	477458.57	TBD
A2PIPB-8-3-M	1-1.5	1347933.21	477458.57	A
A2PIPB-8-3-M-Y-V	1-1.5	1347933.21	477458.57	TBD
A2PIPB-8-4-M	1.5-2	1347933.21	477458.57	A
A2PIPB-8-4-M-Y-V	1.5-2	1347933.21	477458.57	TBD
A2PIPB-8-5-M	2-2.5	1347933.21	477458.57	A
A2PIPB-8-5-M-Y-V	2-2.5	1347933.21	477458.57	TBD
A2PIPB-8-6-M	2.5-3	1347933.21	477458.57	A
A2PIPB-8-6-M-Y-V	2.5-3	1347933.21	477458.57	TBD
A2PIPB-8-7-M	3-3.5	1347933.21	477458.57	A
A2PIPB-8-7-M-Y-V	3-3.5	1347933.21	477458.57	TBD
A2PIPB-8-8-M	4.5-5	1347933.21	477458.57	A
A2PIPB-8-8-M-Y-V	4.5-5	1347933.21	477458.57	TBD
A2PIPB-9-1-M	0-0.5	1347930.04	477451.56	A
A2PIPB-9-1-M-Y-V	0-0.5	1347930.04	477451.56	TBD
A2PIPB-9-2-M	0.5-1	1347930.04	477451.56	A

1190

TABLE B-1
Area 2 Phase I Firing Range Soil Sample Identification
(continued)

Location	Depth Interval (ft)	Easting	Northing	TAL
A2PIPB-5-8-M	4.5-5	1347934.28	477488.59	A
A2PIPB-5-8-M-Y-V	4.5-5	1347934.28	477488.59	TBD
A2PIPB-6-1-M	0-0.5	1347933.86	477478.60	A
A2PIPB-6-1-M-Y-V	0-0.5	1347933.86	477478.60	TBD
A2PIPB-6-2-M	0.5-1	1347933.86	477478.60	A
A2PIPB-6-2-M-Y-V	0.5-1	1347933.86	477478.60	TBD
A2PIPB-6-3-M	1-1.5	1347933.86	477478.60	A
A2PIPB-6-3-M-Y-V	1-1.5	1347933.86	477478.60	TBD
A2PIPB-6-4-M	1.5-2	1347933.86	477478.60	A
A2PIPB-6-4-M-Y-V	1.5-2	1347933.86	477478.60	TBD
A2PIPB-6-5-M	2-2.5	1347933.86	477478.60	A
A2PIPB-6-5-M-Y-V	2-2.5	1347933.86	477478.60	TBD
A2PIPB-6-6-M	2.5-3	1347933.86	477478.60	A
A2PIPB-6-6-M-Y-V	2.5-3	1347933.86	477478.60	TBD
A2PIPB-6-7-M	3-3.5	1347933.86	477478.60	A
A2PIPB-6-7-M-Y-V	3-3.5	1347933.86	477478.60	TBD
A2PIPB-6-8-M	4.5-5	1347933.86	477478.60	A
A2PIPB-6-8-M-Y-V	4.5-5	1347933.86	477478.60	TBD
A2PIPB-7-1-M	0-0.5	1347933.52	477468.47	A
A2PIPB-7-1-M-Y-V	0-0.5	1347933.52	477468.47	TBD
A2PIPB-7-2-M	0.5-1	1347933.52	477468.47	A
A2PIPB-7-2-M-Y-V	0.5-1	1347933.52	477468.47	TBD
A2PIPB-7-3-M	1-1.5	1347933.52	477468.47	A
A2PIPB-7-3-M-Y-V	1-1.5	1347933.52	477468.47	TBD
A2PIPB-7-4-M	1.5-2	1347933.52	477468.47	A
A2PIPB-7-4-M-Y-V	1.5-2	1347933.52	477468.47	TBD

=- 1190

TABLE B-1
Area 2 Phase I Firing Range Soil Sample Identification
(continued)

Location	Depth Interval (ft)	Easting	Northing	TAL
A2PIPB-4-3-M	1-1.5	1347934.65	477498.56	A
A2PIPB-4-3-M-Y-V	1-1.5	1347934.65	477498.56	TBD
A2PIPB-4-4-M	1.5-2	1347934.65	477498.56	A
A2PIPB-4-4-M-Y-V	1.5-2	1347934.65	477498.56	TBD
A2PIPB-4-5-M	2-2.5	1347934.65	477498.56	A
A2PIPB-4-5-M-Y-V	2-2.5	1347934.65	477498.56	TBD
A2PIPB-4-6-M	2.5-3	1347934.65	477498.56	A
A2PIPB-4-6-M-Y-V	2.5-3	1347934.65	477498.56	TBD
A2PIPB-4-7-M	3-3.5	1347934.65	477498.56	A
A2PIPB-4-7-M-Y-V	3-3.5	1347934.65	477498.56	TBD
A2PIPB-4-8-M	4.5-5	1347934.65	477498.56	A
A2PIPB-4-8-M-Y-V	4.5-5	1347934.65	477498.56	TBD
A2PIPB-5-1-M	0-0.5	1347934.28	477488.59	A
A2PIPB-5-1-M-Y-V	0-0.5	1347934.28	477488.59	TBD
A2PIPB-5-2-M	0.5-1	1347934.28	477488.59	A
A2PIPB-5-2-M-Y-V	0.5-1	1347934.28	477488.59	TBD
A2PIPB-5-3-M	1-1.5	1347934.28	477488.59	A
A2PIPB-5-3-M-Y-V	1-1.5	1347934.28	477488.59	TBD
A2PIPB-5-4-M	1.5-2	1347934.28	477488.59	A
A2PIPB-5-4-M-Y-V	1.5-2	1347934.28	477488.59	TBD
A2PIPB-5-5-M	2-2.5	1347934.28	477488.59	A
A2PIPB-5-5-M-Y-V	2-2.5	1347934.28	477488.59	TBD
A2PIPB-5-6-M	2.5-3	1347934.28	477488.59	A
A2PIPB-5-6-M-Y-V	2.5-3	1347934.28	477488.59	TBD
A2PIPB-5-7-M	3-3.5	1347934.28	477488.59	A
A2PIPB-5-7-M-Y-V	3-3.5	1347934.28	477488.59	TBD

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TABLE B-1
Area 2 Phase I Firing Range Soil Sample Identification
(continued)

1190

Location	Depth Interval (ft)	Easting	Northing	TAL
A2PIPB-2-6-M	2.5-3	1347925.00	477508.78	A
A2PIPB-2-6-M-Y-V	2.5-3	1347925.00	477508.78	TBD
A2PIPB-2-7-M	3-3.5	1347925.00	477508.78	A
A2PIPB-2-7-M-Y-V	3-3.5	1347925.00	477508.78	TBD
A2PIPB-2-8-M	4.5-5	1347925.00	477508.78	A
A2PIPB-2-8-M-Y-V	4.5-5	1347925.00	477508.78	TBD
A2PIPB-3-1-M	0-0.5	1347934.99	477508.55	A
A2PIPB-3-1-M-Y-V	0-0.5	1347934.99	477508.55	TBD
A2PIPB-3-2-M	0.5-1	1347934.99	477508.55	A
A2PIPB-3-2-M-Y-V	0.5-1	1347934.99	477508.55	TBD
A2PIPB-3-3-M	1-1.5	1347934.99	477508.55	A
A2PIPB-3-3-M-Y-V	1-1.5	1347934.99	477508.55	TBD
A2PIPB-3-4-M	1.5-2	1347934.99	477508.55	A
A2PIPB-3-4-M-Y-V	1.5-2	1347934.99	477508.55	TBD
A2PIPB-3-5-M	2-2.5	1347934.99	477508.55	A
A2PIPB-3-5-M-Y-V	2-2.5	1347934.99	477508.55	TBD
A2PIPB-3-6-M	2.5-3	1347934.99	477508.55	A
A2PIPB-3-6-M-Y-V	2.5-3	1347934.99	477508.55	TBD
A2PIPB-3-7-M	3-3.5	1347934.99	477508.55	A
A2PIPB-3-7-M-Y-V	3-3.5	1347934.99	477508.55	TBD
A2PIPB-3-8-M	4.5-5	1347934.99	477508.55	A
A2PIPB-3-8-M-Y-V	4.5-5	1347934.99	477508.55	TBD
A2PIPB-4-1-M	0-0.5	1347934.65	477498.56	A
A2PIPB-4-1-M-Y-V	0-0.5	1347934.65	477498.56	TBD
A2PIPB-4-2-M	0.5-1	1347934.65	477498.56	A
A2PIPB-4-2-M-Y-V	0.5-1	1347934.65	477498.56	TBD

TABLE B-1
Area 2 Phase I Firing Range Soil Sample Identification

1190

Location	Depth Interval (ft)	Easting	Northing	TAL
A2PIPB-1-1-M	0-0.5	1347914.93	477508.94	A
A2PIPB-1-1-M-Y-V	0-0.5	1347914.93	477508.94	TBD
A2PIPB-1-2-M	0.5-1	1347914.93	477508.94	A
A2PIPB-1-2-M-Y-V	0.5-1	1347914.93	477508.94	TBD
A2PIPB-1-3-M	1-1.5	1347914.93	477508.94	A
A2PIPB-1-3-M-Y-V	1-1.5	1347914.93	477508.94	TBD
A2PIPB-1-4-M	1.5-2	1347914.93	477508.94	A
A2PIPB-1-4-M-Y-V	1.5-2	1347914.93	477508.94	TBD
A2PIPB-1-5-M	2-2.5	1347914.93	477508.94	A
A2PIPB-1-5-M-Y-V	2-2.5	1347914.93	477508.94	TBD
A2PIPB-1-6-M	2.5-3	1347914.93	477508.94	A
A2PIPB-1-6-M-Y-V	2.5-3	1347914.93	477508.94	TBD
A2PIPB-1-7-M	3-3.5	1347914.93	477508.94	A
A2PIPB-1-7-M-Y-V	3-3.5	1347914.93	477508.94	TBD
A2PIPB-1-8-M	4.5-5	1347914.93	477508.94	A
A2PIPB-1-8-M-Y-V	4.5-5	1347914.93	477508.94	TBD
A2PIPB-2-1-M	0-0.5	1347925.00	477508.78	A
A2PIPB-2-1-M-Y-V	0-0.5	1347925.00	477508.78	TBD
A2PIPB-2-2-M	0.5-1	1347925.00	477508.78	A
A2PIPB-2-2-M-Y-V	0.5-1	1347925.00	477508.78	TBD
A2PIPB-2-3-M	1-1.5	1347925.00	477508.78	A
A2PIPB-2-3-M-Y-V	1-1.5	1347925.00	477508.78	TBD
A2PIPB-2-4-M	1.5-2	1347925.00	477508.78	A
A2PIPB-2-4-M-Y-V	1.5-2	1347925.00	477508.78	TBD
A2PIPB-2-5-M	2-2.5	1347925.00	477508.78	A
A2PIPB-2-5-M-Y-V	2-2.5	1347925.00	477508.78	TBD

APPENDIX B

SAMPLE LOCATIONS AND IDENTIFICATION

-- 1190

7.C. Sample Collection Reference:

Sample Collection Reference: SMPL-01, EQT-06

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8. Quality Control Samples: (Place an "X" in the appropriate selection box.)

8.A. Field Quality Control Samples:

Trip Blanks	X *	Container Blanks	X ++
Field Blanks	X +	Duplicate Samples	X
Equipment Rinsate Samples	X	Split Samples	X **
Preservative Blanks		Performance Evaluation Samples	
Other (specify)			

*For volatile organics only
** Split samples will be collected where required by EPA or OEPA.
+ Taken at the discretion of the Project Manager (if warranted by field conditions)
++ One per Area and Phase per container type (i.e. stainless steel core liner/ plastic core liner/Geoprobe tube).

8.B. Laboratory Quality Control Samples:

Method Blank	X	Matrix Duplicate/Replicate	X
Matrix Spike	X	Surrogate Spikes	
Tracer Spike			

Other (specify) Per SCQ

9. Other: Please provide any other germane information that may impact the data quality or gathering of this particular objective, task or data use.

6.A. Data Types with appropriate Analytical Support Level Equipment Selection and SCQ Reference: (Place an "X" to the right of the appropriate box or boxes selecting the type of analysis or analyses required. Then select the type of equipment to perform the analysis if appropriate. Please include a reference to the SCQ Section.)

1.	pH	X •	2.	Uranium	X •	3.	BTX ☐
	Temperature	X •		Full Radiological	X •		TPH ☐
	Specific Conductance	X •		Metals	X •		Oil/Grease ☐
	Dissolved Oxygen	X •		Cyanide	☐		
	Technetium-99	X •		Silica	☐		

4.	Cations	☐	5.	VOA	X •	6. Other (specify)
	Anions	☐		BNA	X •	
	TOC	☐		Pesticides	X •	
	TCLP	X •		PCB	X •	
	CEC	☐		COD	☐	

•If constituent is identified for delineation in the individual PSP.

6.B. Equipment Selection and SCQ Reference:

Equipment Selection		Refer to SCQ Section
ASL A	X, RTRAK / HPGe / XRF	SCQ Section: Not Applicable
ASL B	X	SCQ Section: App. G Tables G-1&G-3
ASL C		SCQ Section:
ASL D	X	SCQ Section: App. G Tables G-1&G-3
ASL E		SCQ Section:

7.A. Sampling Methods: (Put an X in the appropriate selection.)

Biased	X	Composite	☐	Environmental	X	Grab	X	Grid	X
Intrusive	X	Non-Intrusive	☐	Phased	☐	Source	☐		

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7.B. Sample Work Plan Reference: This DQO is being written prior to the PSPs.

Background samples: OU5 RI

Data Quality Objectives
Delineating the Extent of Media Constituents of Concern

1A. Task/Description: Delineating the extent of contamination above the FRLs

1.B. Project Phase: (Put an X in the appropriate selection.)

RI ☐ FS ☐ RD ☒ RA ☐ R/A ☐ OTHER ☐

1.C. DQO No.: SL-048, Rev. 1 DQO Reference No.:_____

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2. Media Characterization: (Put an X in the appropriate selection.)

Air ☐ Biological ☐ Groundwater ☒ Sediment ☒ Soil ☒

Waste ☒ Wastewater ☐ Surface water ☐ Other (specify) ____

---

3. Data Use with Analytical Support Level (A-E): (Put an X in the appropriate Analytical Support Level selection(s) beside each applicable Data Use.)

Site Characterization
A ☒ B ☒ C ☐ D ☒ E ☐

Risk Assessment
A ☐ B ☐ C ☐ D ☐ E ☐

Evaluation of Alternatives
A ☐ B ☐ C ☐ D ☐ E ☐

Engineering Design
A ☒ B ☒ C ☐ D ☒ E ☐

Monitoring during remediation
A ☒ B ☒ C ☐ D ☒ E ☐

Other
A ☐ B ☐ C ☐ D ☐ E ☐

4.A. Drivers: Remedial Action Work Plans, Applicable or Relevant and Appropriate Requirements (ARARs) and the OU2 and/or OU5 Record of Decision (ROD).

4.B. Objective: Delineate the extent of media contaminated with a COC (or COCs) with respect to the action level(s) of interest.

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5. Site Information (Description):

All data will undergo an evaluation by the Project Team, including a comparison for consistency with historical data. Deviations from QC considerations resulting from evaluating inputs to the decision from Section 3, must be justified in the PSP such that the objectives of the decision rule in Section 5 are met.

7.4 Independent Assessment

Independent assessment shall be performed by the FEMP QA organization by conducting surveillances. Surveillances will be planned and documented in accordance with Section 12.3 of the SCQ.

7.5 Data Management

Upon receipt from the laboratory, all results will be entered into the SED as qualified data using standard data entry protocol. The required ASL B data will undergo analytical validation by the FEMP validation team. A minimum of ten percent (10%) of field data will be validated by the FEMP QA validation team. The Project Manager will be responsible to determine data usability as it pertains to supporting the DQO decision of determining delineation of media COC's.

7.6 Applicable Procedures

Sample collection will be described in the PSP with a listing of applicable procedures. Typical related plans and procedures are the following:

- Sitewide Excavation Plan (SEP)
- Sitewide CERCLA Quality Assurance Project Plan (SCQ).
- SMPL-01, *Solids Sampling*
- SMPL-21, *Collection of Field Quality Control Samples*
- EQT-06, *Geoprobe® Model 5400 Operation and Maintenance*
- EQT-23, *Operation of ADCAM Series Analyzers with Gamma Sensitive Detectors*
- EQT-30, *Operation of Radiation Tracking Vehicle Sodium Iodide Detection System*

the potential for Decision Error 1. A very conservative approach to delineation may be utilized, where the boundaries of the contaminated media are extended to the first known vertical and horizontal sample locations that reveal concentrations below the desired action level.

7.3 QC Considerations

Laboratory work will follow the requirements specified in the SCQ. If analysis is to be carried out by an off-site laboratory, it will be a Fluor Daniel Fernald approved full service laboratory. Laboratory quality control measures include a media prep blank, a laboratory control sample (LCS), matrix duplicates and matrix spike.

Typical Field QC samples are not required for ASL B analysis. However the PSPs may specify appropriate field QC samples for the media type with respect to the ASL in accordance with the SCQ, such as field blanks, trip blanks, and container blanks. All field QC samples will be analyzed at the associated field sample ASL. The frequency of field QC sampling is as follows: Duplicate samples will be taken at a minimum of one per 20 samples. Rinsates will be performed at a minimum of one per 20 on all field equipment that is re-used. Trip blanks will be taken at a minimum of one per shipping container when analyzing for volatile organic compounds (VOCs). For VOCs, container blanks will be taken at a minimum of one per Area and Phase per container type (i.e. stainless steel core liner/plastic core liner/Geoprobe tube) when using uncertified containers. Field blanks are not necessary for soil metal analysis, as it is unlikely in ambient field conditions to have metals cross contamination, however, the probability of cross contamination with liquid samples and semi-volatile organic compounds is much higher, therefore for liquid samples and samples that will be analyzed for semi-volatile organic compounds (SVOCs) field blanks will be taken at a minimum of one per 20 samples. ASL and validation requirements are as follows:

- Real-time data will be analyzed to ASL A, and no field QC samples are required.

- If physical samples are analyzed for Pre-design Investigations and/or Pre-certification delineations, 100% of the data will be analyzed per ASL B requirements. 90% of the data will require only a Certificate of Analysis, the other 10% will require the Certificate of Analysis and all associated QA/QC results, and will be validated to ASL B.

- If samples are analyzed for WAC Attainment and/or RCRA Characteristic Areas Delineation, 100% of the data will be analyzed and reported to ASL B. The ASL B package will include a Certificate of Analysis along with all associated QA/QC results. In addition, 10% of the data will be validated to ASL B.

- If delineation data are also to be used for Certification, all data will be analyzed and reported to ASL D, and 10% will be validated to ASL D. In addition, the data must meet the data quality objectives specified in the Certification DQO.

extensive as it actually is. This error can result in a remediation design that fails to incorporate media contaminated with COC(s) above the action level(s). This could result in the re-mobilization of excavation equipment and delays in the remediation schedule. Also, this could result in media contaminated above action levels remaining after remediation is considered complete, posing a potential threat to human health and the environment.

Decision Error 2 - This decision error occurs when the decision maker determines that the extent of media contaminated above COC action levels is more extensive than it actually is. This error could result in more excavation than necessary, and this excess volume of materials being transferred to the OSDF, or an off-site disposal facility if contamination levels exceed the OSDF WAC.

True State of Nature for the Decision Errors - The true state of nature for Decision Error 1 is that the maximum extent of contamination above the FRL is more extensive than was determined. The true state of nature for Decision Error 2 is that the maximum extent of contamination above the FRL is not as extensive as was determined. Decision Error 1 is the more severe error.

7.0 Optimizing Design for Useable Data

7.1 Sample Collection

A sampling and analytical testing program will delineate the extent of COC contamination in a given area with respect to the action level of interest. Existing data, process knowledge, modeled concentration data, and the origins of contamination will be considered when determining the lateral and vertical extent of sample collection. The cost of collecting and analyzing additional samples, will be weighed against the benefit of reduced uncertainty in the delineation model. This will determine the sampling density. Individual PSPs will identify the locations and depths to be sampled, the sampling density necessary to obtain the desired accuracy of the delineation, and if samples will be analyzed by the on-site or off-site laboratory. The PSP will also identify the sampling increments to be selectively analyzed for concentrations of the COC(s) of interest, along with field work requirements. Analytical requirements will be listed in the PSP. The chosen analytical methodologies are able to achieve a detection limit capable of resolving the COC action level. For real-time methodologies, the field data will be used to bias the physical sampling necessary for COC delineation.

7.2 COC Delineation

The media COC delineation will use all data collected under the PSP, and if deemed appropriate by the Project Lead, may also include existing data obtained from physical samples, and if applicable, information obtained through real-time screening. The delineation may be accomplished through modeling (e.g. kriging) of the COC concentration data with a confidence limit specific to project needs that will reduce

specific plan will identify the optimal sampling density.

Action Levels - COCs must be delineated with respect to a specific action level, such as FRLs and On-Site Disposal Facility (OSDF) WAC concentrations. Specific media FRLs are established in the OU2 and OU5 RODs, and the WAC concentrations are published in the OU5 ROD. Media COCs may also require delineation with respect to other action levels that act as remediation drivers, such as Benchmark Toxicity Values (BTVs) and As Low As Reasonably Achievable (ALARA) levels.

4.0 The Boundaries of the Situation

Temporal Boundaries - Sampling must be completed within a time frame sufficient to meet the remediation schedule. Time frames must allow for the scheduling of sampling and analytical activities, the collection of samples, analysis of samples and the processing of analytical data when received.

Scale of Decision Making - The decision made based upon the data collected in this investigation will be the extent of COC contamination at or above the appropriate action level. This delineation will result in media contaminant concentration information being incorporated into engineering design, and the attainment of established remediation goals.

Parameters of Interest - The parameters of interest are the COCs that have been determined to require additional delineation before remediation design can be finalized with the optimal degree of accuracy.

5.0 Decision Rule

If existing data provide an unacceptable level of uncertainty in the COC delineation model, then additional sampling will take place to decrease the model uncertainty. When deciding what additional data is needed, the costs of additional sampling and analysis must be weighed against the benefit of reduced uncertainty in the delineation model, which will eventually be used for assigning excavation, or for other purposes.

6.0 Limits on Decision Errors

In order to be useful, data must be collected with sufficient areal and depth coverage, and at sufficient density to ensure an accurate delineation of COC concentrations. Analytical sensitivity and reproducibility must be sufficient to differentiate the COC concentrations below their respective target levels.

Types of Decision Errors and Consequences

Decision Error 1 - This decision error occurs when the decision maker determines that the extent of media contaminated with COCs above action levels is not as

DATA QUALITY OBJECTIVES
Delineating the Extent of Constituents of Concern in Pre-design Investigation and Remediation Sampling

Members of Data Quality Objectives (DQO) Scoping Team
The members of the DQO team include a project lead, a project engineer, a field lead, a statistician, a lead chemist, a sampling supervisor, and a data management lead.

Conceptual Model of the Site
Media is considered contaminated if the concentration of a constituent of concern (COC) exceeds the final remediation levels (FRLs). The extent of specific media contamination was estimated and published in the Operable Unit 5 Feasibility Study (FS). These estimates were based on kriging analysis of available data for media collected during the Remedial Investigation (RI) effort and other FEMP environmental characterization studies. Maps outlining contaminated media boundaries were generated for the Operable Unit 5 FS by overlaying the results of the kriging analysis data with isoconcentration maps of the other constituents of concern (COCs), as presented in the Operable Unit 5 RI report, and further modified by spatial analysis of maps reflecting the most current media characterization data. A sequential remediation plan has been presented that subdivides the FEMP into seven construction areas. During the course of remediation, areas of specific media may require additional characterization so remediation can be carried out as thoroughly and efficiently as possible. As a result, additional sampling may be necessary to accurately delineate a volume of specific media as exceeding a target level, such as the FRL or the Waste Attainment Criterion (WAC). Each individual Project-Specific Plan (PSP) will identify and describe the particular media to be sampled.

1.0 Statement of Problem

If the extent (depth and/or area) of the media COC contamination is unknown, then it must be defined with respect to the appropriate target level (FRL, WAC, or other specified media concentration).

2.0 Identify the Decision

Delineate the horizontal and/or vertical extent of media COC contamination in an area with respect to the appropriate target level.

3.0 Inputs That Affect the Decision

Informational Inputs - Historical data, process history knowledge, the modeled extent of COC contamination, and the origins of contamination will be required to establish a sampling plan to delineate the extent of COC contamination. The desired precision of the delineation must be weighed against the cost of collecting and analyzing additional samples in order to determine the optimal sampling density. The project-

Control Number _____

Fernald Environmental Management Project -- 1190

Data Quality Objectives

Title:	Delineating the Extent of Constituents of Concern in Pre-design Investigation and Remediation Sampling
Number:	SL-048
Revision:	1
Final Draft:	October 3, 1997
Contact Name:	Eric Kroger

Approval: William D. Kelley Date: 10-3-97
William D. Kelley
DQO Coordinator

Approval: _____ Date: 10/03/97
for Joan White
Project Lead

Rev. #	0	1	2	3	4	5	6
Effective Date:	9/19/97						

APPENDIX A

DATA QUALITY OBJECTIVE SL-048, REV. 2

file to be entered into the SED. The Data Manager will maintain records into the Soils Master List so as to accurately reflect the sampling.

6.0 DATA MANAGEMENT

A data management process will be implemented to ensure proper management of data following completion of field activities. As specified in Section 5.1 of the SCQ, daily activities will be recorded on the Field Activity Log, with sufficient detail to be able to reconstruct a particular situation without reliance on memory. The Field Activity Log should describe general soil descriptions at depth. If the Geoprobe is used for sample collection, soil descriptions will be recorded on lithologic logs.

Electronically recorded data from the Geodimeter and GPS will be downloaded to disks on a daily basis, or as the project requires. Technicians will review the data for completeness and accuracy and then download it onto the local area network (LAN). Once on the LAN, the Data Management Lead will perform an evaluation of the data. Once complete, the data will be sent to the loader where it will be loaded onto the Oracle system and an error log will be generated. The data will then be made available to users through both the Graphical Information System and Microsoft Access software. The survey lead will retain all downloaded data on disk for future reference and archive.

Field documentation, such as the Field Activity Log, Chain of Custody forms, lithologic logs, and the Sample Collection Log will undergo an internal quality assurance/quality control (QA/QC) review by the technicians. Copies will then be generated and delivered to Data Management, who will perform an evaluation of the data. From this point, the paper-generated data will be sent to data entry personnel for input into the Oracle system. Field logs may be completed in the field and maintained in loose-leaf form. Copies of all field documentation will also be provided to the A2PI Characterization Lead on a daily basis.

The technicians will forward the original field documentation for submission to FEMP QA personnel who will perform an additional review. Copies will then be generated and delivered to data entry personnel for input into the Sitewide Environmental Database (SED).

The list of planned sample points will be entered into the Soils Master List in the ORACLE system by the SCEP Data Manager. This table serves as the starting point for tracking sample data electronically. As sample points are surveyed, actual northings and eastings will be transmitted through an electronic

SMPL-01, *Solids Sampling*

SMPL-21, *Collection of Field Quality Control Samples* -- 1190

Trimble Pathfinder Pro-XL GPS Operation Manual.

On-site laboratory methods will be documented in data packages.

5.0 QUALITY ASSURANCE AND QUALITY CONTROL REQUIREMENTS

5.1 PROJECT REQUIREMENTS FOR INDEPENDENT ASSESSMENTS

Project management has ultimate responsibility for the quality of the work processes and the results of the sampling activities covered by this PSP. The FEMP Quality Assurance (QA) organization will conduct independent assessments of the work process and operations to assure the quality of performance. Assessment will encompass technical and procedural requirements of this PSP and the SCQ. Independent assessment will be performed by conducting surveillances. At a minimum, one surveillance will be conducted during implementation of this PSP, consisting of monitoring/observing ongoing project activity and work areas to verify conformance to specified requirements. Surveillances will be planned and documented according to Section 12.3 of the SCQ.

5.2 FIELD CHANGES

If field conditions require changes or variances, verbal approval must be obtained from the Field Sampling Manager, Characterization Lead, Real-Time Manager (if applicable), and the QA Lead before the changes may be implemented (electronic mail is acceptable). Changes to the PSP will be noted in the applicable field activity logs and on a Variance/Field Change Notice Form (V/FCN). The completed V/FCN must be received by QA within seven working days of verbal approval of the variance and will include the signatures of the Project Manager, Characterization Lead, Field Sampling Manager, Real-Time Manager (if applicable), Analytical Customer Support, and the QA representative.

If field conditions require the moving of a preselected sample location, the Field Sampling Manager can move the location up to three feet without obtaining authorization from the Characterization Lead or completing a variance, provided the location change (distance and direction) is noted on the Field Activity Log. Relocated sample points will be resurveyed as stated in Section 2.3.

5.3 APPLICABLE PROCEDURES

Work performed under this PSP will be conducted in accordance with the following procedures:

ADM-02, Field Project Prerequisites

EQT-05, *Geodimeter 4000 Survey System-Operation, Maintenance, and Calibration*

EQT-06, *Geoprobe Model 5400-Operation and Maintenance*

4.0 HEALTH AND SAFETY -- 1190

Technicians will conform to precautionary surveys performed by personnel representing the Utility Engineer, Industrial Hygiene, and Radiological Control as applicable. Concurrence with applicable safety permits will be indicated by the signature of each technician assigned to this project. Technicians will be expected to comply with permit requirements when performing their assigned duties.

A project specific health and safety matrix will not be required for this activity. Compliance with the applicable Environmental Monitoring Procedures and all applicable FDF permits will suffice. Safety and health requirements have been built into these procedures and any additional requirements will be established on the permits. A safety briefing will be conducted prior to the initiation of field activities by the Health and Safety Contact.

The Field Sampling Manager will ensure that each field crew member performing sampling/surveying related activities has been briefed on all applicable health and safety requirements for this A2PI investigation and that the briefing has been documented. Field crew members who do not receive a briefing on these requirements will not participate in the execution of sampling activities related to the completion of assigned project responsibilities. A copy of applicable safety permits/surveys issued for worker safety and health will be posted at each sampling location area.

3.0 LABORATORY SAMPLE PREPARATION

Soil samples collected for laboratory analysis will be prepared in a consistent manner by the on-site and off-site laboratories. Preparation of all soil samples (for total lead and TCLP lead) for analysis will be in accordance with SW846, Volume 1C, Section 8.4. All analysis will be conducted to ASL B; 10 percent of all ASL B data will include method QA/QC for validation.

TABLE 2-1
AREA 2, PHASE I FIRING RANGE SAMPLING AND ANALYTICAL REQUIREMENTS

ANALYTE	METHOD	SAMPLE MATRIX	LAB	ASL	PRESERVE	HOLDING TIME	CONTAINER	TAL
Total Lead	GFAA/ICP	Solid	On-site or Off-site	B	Cool to 4°C	6 months	500 mL glass or plastic	A2PI-PB-A
TCLP Lead Total Lead	TCLP (sieved)	Solid	On-site or Off-site	B	Cool to 4° C	6 months	500 mL glass or plastic	A2PI-PB-B
TCLP Lead Total Lead	TCLP (nonsieved)	Soild	On-site or Off-site	B	Cool to 4° C	6 months	500 mL glass or plastic	A2PI-PB-B
Archive	TBD	Solid	On-site or Off-site	B	Cool to 4° C	6 months	500 mL glass or plastic	TBD

TBD = To be determined

collected in a 40 mL sample container from the homogenized material and will be noted on the Sample Collection Log.

2.7 BOREHOLE ABANDONMENT

Due to the slope of the soil in the area to be sampled and the surrounding material composition, collapse of the sampling void is expected to be immediate. Therefore, no borehole abandonment is deemed necessary. Sampling personnel will physically collapse the surface of the boreholes. Water should not be allowed to collect in boreholes.

2.8 DECONTAMINATION REQUIREMENTS

Sampling equipment will be decontaminated before transport to the field, during the sampling program as needed, and after all sampling is completed to limit the introduction of contaminants from the equipment to the sampled media. Sampling equipment will be wiped clean or rinsed to remove visible soils (Level I decontamination). The decontamination of equipment will be required if the beta-gamma detector exhibits greater than 100 corrected counts per minute and will be a Level II decontamination as referenced in procedure SMPL-01.

2.9 DISPOSITION OF WASTE REQUIREMENTS

During completion of sampling activities, field personnel may generate small amounts of unused soil, waters, contact waste, and residual sample media (archive samples not submitted for analysis). Management of these waste streams will be coordinated with Soil Characterization and Excavation Project (SCEP) Waste Disposition Support Services (WDSS), through the Project Waste Identification Document (PWID) process (for this project PWID 467). Field generation of decontamination waters will be minimized by decontaminating equipment at a facility that discharges to the Advanced Wastewater Treatment Facility, when possible. Contact-waste generation (i.e., disposable gloves) will be minimized by limiting contact with sample media. This waste stream will be evaluated against dumpster criteria during the PWID process. If it does not meet these criteria, an alternative disposition will be identified. Any excess soils will be returned to the boring location.

more than one container may be used. When the container(s) is (are) 75% full, the sample technicians will notify the SCEP Waste Management Field Representative who will arrange for disposition.

The purpose of sieving the split samples is to determine if the sieved material will pass the TCLP analysis for lead and at what bullet density. An evaluation of split sample (high bullet density, moderate bullet density, and low bullet density) data will be conducted. If the field sieved sample does not exhibit characteristic toxicity for lead, the excavated media may be field sieved, the lead bullets commercially recycled, and the residual noncharacteristic material disposed onsite in the OSDF. This disposition would result in a significant cost savings. Should the sample exhibit characteristic toxicity for lead after field sieving, the excavated media must be disposed at a commercial permitted offsite facility. Unsieved material that does not exhibit characteristic toxicity for lead may be disposed in the OSDF. If the unsieved material does not pass the TCLP for lead, the material will be disposed at a commercial permitted offsite facility.

All applicable field measurements and sample collection information will be recorded on the Sample Collection Log, the Field Activity Log, and the Chain of Custody/Request for Analysis Form. The method of sample collection will be specified in the Field Activity Log. Samples will be assigned a unique sample number (see Section 2.2) that will appear on the Sample Collection Log, and the Chain of Custody/Request for Analysis. The sample number will be used to identify the sample during analysis, data entry, and data management. The appropriate TAL identifier from Appendix C will also be listed on each Chain of Custody/Request for Analysis.

2.6 FIELD QUALITY CONTROL REQUIREMENTS

Since all analytical for this sampling effort are for lead analysis and will be performed at ASL B, no QC samples (duplicates, rinseates, field blanks, or container blanks) are required.

The Characterization Lead may initiate split samples for quality assurance purposes and have the samples analyzed at separate laboratories to compare results or at the request of the Ohio Environmental Protection Agency. Split samples will be collected and handled as specified in Section 6.6 of SMPL-21. Samples will be homogenized in the field prior to placing material into the sample container. Split sample(s) to be analyzed at an off-site laboratory will be screened at the on-site FEMP laboratory for alpha/beta activity prior to sample shipment. The alpha/beta screen sample will be

analysis. Soil samples collected for laboratory analysis of total lead by GFAA or ICP, as well as for TCLP lead analysis, will be prepared according to SW846, Volume 1C, Section 8.4.

Samples analyzed for lead (not TCLP lead) that exhibit concentrations above 200 ppm will be evaluated; selected archived samples will be analyzed by the TCLP method to determine if the material possesses the toxicity characteristic. Following data validation, if required, any archived samples not submitted for analysis will be removed from archive, taken back to their respective sample locations, and the sample media placed on the ground. Sample containers will be frisked to determine disposition. Coordination for archive sample disposition will be conducted by Soils Characterization and Excavation Project (SCEP) Waste Disposition Support Services (WDSS).

In addition to the potential TCLP analysis noted above, three soil samples will be collected for total lead analysis and lead analysis by the TCLP method. These samples will be collected from an area of high density bullets/bullet fragments, from an area of moderate density bullets/bullet fragments, and from an area of low density bullets/bullet fragments. Prior to collection of these samples, the A2PI Characterization Lead will be contacted; the sample locations will be determined in the field based on visual observation of bullet density by the Characterization Lead and the sample technicians. These locations will be flagged and surveyed following sample collection.

Each of the three soil samples collected for total lead and TCLP analysis will be homogenized and split. One split sample will be sieved in the field and submitted for analysis in accordance with SW846, Volume 1C, Section 8.4. The other split sample (designated with "Y") will be submitted for analysis in accordance with SW846, Volume 1C, Section 8.4 (not field sieved). Both the total lead and TCLP lead analysis will be performed at ASL B (see Appendix C).

The soil sample sieved in the field will be initially sieved through a No. 10 (2 mm) screen. If bullets/bullet fragments are still visible in the sample media, the sample will be screened on progressively finer meshed screens until no bullets/bullet fragments are visible. The screen sizes used for sieving will be noted in the Field Activity Logs, especially the screen size at which bullets/bullet fragments were no longer visible. Lead sieved from the sample will be placed into a 5-gallon container labeled by the sampling technicians with the date, contents, and radiological survey data. If necessary,

moved up to three feet in radius from the original location without obtaining authorization from the Characterization Lead or completing a variance. The distance and direction in which the location is moved will be noted on the Field Activity Log (FAL). Sample locations moved more than three feet from the original location must be documented on a Variance/Field Change Notice (V/FCN), and resurveyed (see Section 5.2). Survey information will be downloaded at the completion of each instrument job and transferred electronically to the Survey Lead with an attached hard copy.

2.4 RADIOLOGICAL FIELD SURVEY

No radiological field survey (sodium iodide or high purity germanium detector systems) are necessary for this sampling effort.

2.5 SOIL SAMPLING

Twenty-one locations will be sampled in the A2PI firing range area (see Appendix B); all 21 locations will be sampled for total lead and additionally, 3 locations will be sampled for TCLP lead analysis. All borings will be placed to a total depth of 5 feet (3 feet below the deepest known contamination point, in accordance with the Sitewide Excavation Plan). Designated sample intervals not collected (i.e., refusal due to obstruction) will be documented on a V/FCN. All soil samples retrieved will be frisked by a radiological technician.

All samples will be collected using a 2-inch or 3-inch diameter hand auger or Geoprobe, in accordance with SMPL-01, *Solids Sampling*. Prior to collection of the soil samples, the field sampling technician will remove all surface vegetation within a 6-inch radius from the points to be sampled using a stainless steel trowel, taking care not to remove any of the surface soil. If the hand auger is used, each 6-inch sample interval will be collected individually with a clean auger. If the Geoprobe is used, the sample will be collected in a single core with a core sampler.

Samples will be collected in 6-inch intervals to a 3-foot depth and all intervals will be submitted for analysis; sampling and analytical requirements are listed in Table 2-1. Additional samples will be collected at the 3.5-foot interval (or where bullets/bullet fragments are not visible) and at the 5-foot interval or bottom of the boring (in instances of refusal) and submitted for analysis. Each sample will be homogenized and split with one split submitted for total lead analysis at the FEMP on-site laboratory by GFAA or ICP (see Appendix C for TALs) and the other split archived for future TCLP lead

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2.0 FIELD ACTIVITY

2.1 GENERAL

Sample locations will be determined using survey instrumentation [Geodimeter or the Global Positioning System (GPS)] and recorded in field notebooks prior to sample collection.

2.2 SAMPLE NUMBERING SYSTEM

All soil samples will be assigned a unique sample number (see Appendix B) that is divided into up to five parts as follows:

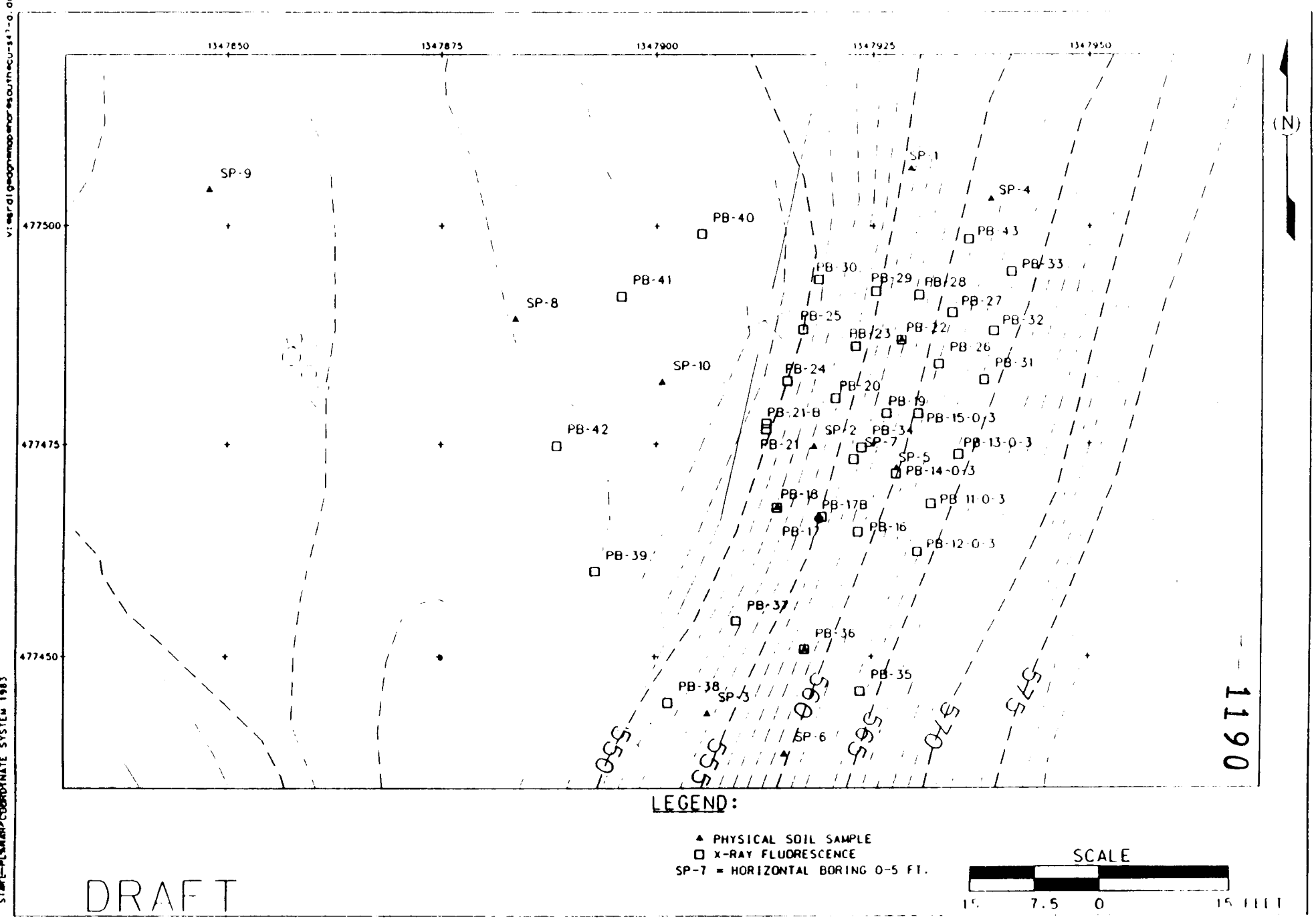
Part 1	"A2PIPB" - all samples are prefaced with this designator indicating Area 2, Phase I (A2PI) lead-contaminated (PB) area
Part 2	Sample point location number (1 or 2 digits)
Part 3	Depth interval from 1 (0 to 0.5 ft) to 8 (4.5 to 5 ft); every 6-inch interval to 3.5 ft (7 intervals) and one 6-inch interval at the boring bottom (5 ft)
Part 4	Analytical suite designators with "M" for metal constituents (lead), "TM" for TCLP metals (lead), or "R" for alpha/beta screen (if required)
Part 5	Quality control/archive designator (as required); "Y" for split, "V" for archive.

The following are examples of sample identifications:

A2PIPB-4-2-M	A2PI lead-contaminated area, sample point location 4, depth interval 2 (0.5 to 1 ft), analyzed for metals (lead)
A2PIPB-7-7-M-V	A2PI lead-contaminated area, sample point location 7, depth interval 7 (sample interval at interface where bullets are no longer discernible), analyzed for metals (lead), archived for potential future analysis
A2PIPB-7-2-TM-Y	A2PI lead-contaminated area, sample point location 7, depth interval 2, split sample.

2.3 SURVEY INSTRUMENTATION

The easting and northing coordinates (Ohio South Zone) and elevations of each sample location will be determined using standard survey practices and instrumentation (Geodimeter or the GPS) prior to other field activities. These locations will be identified with a numbered surveyor's flag. If surface or subsurface obstacles prevent sample collection at the designated location, the sample location can be



LEGEND:

▲ PHYSICAL SOIL SAMPLE
□ X-RAY FLUORESCENCE
SP-7 = HORIZONTAL BORING 0-5 FT.

SCALE

15 7.5 0 15 FEET

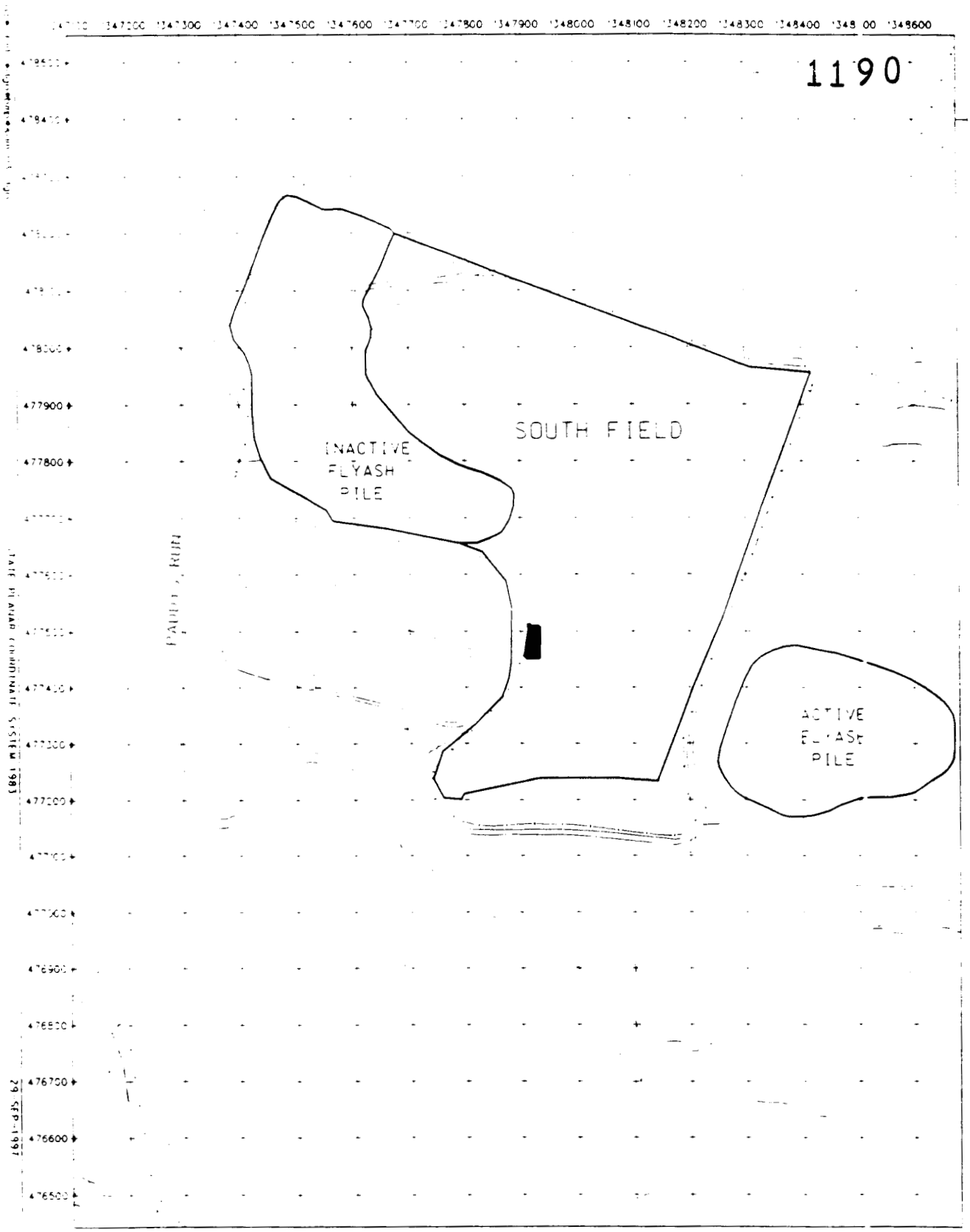
DRAFT

FIGURE 1-2. EXISTING SOIL AND X-RAY FLUORESCENCE DATA FOR ARPI FORMER FIRING RANGE

24 OCT 1997

STATE PLANE COORDINATE SYSTEM 1983

000054



LEGEND:

LEAD CONTAMINATED SOIL SAMPLING AREA

SCALE

250 175 0 250 FEET

DRAFT

FIGURE 1-1. SOUTHERN WASTE UNITS SAMPLING LOCATION MAP

TABLE 1-4
KEY PERSONNEL
AREA 2, PHASE I FIRING RANGE LEAD-CONTAMINATED SOIL INVESTIGATION

TITLE	PRIMARY	ALTERNATE
DOE Contact	Kathy Nickel	Rob Janke
A2PI Project Manager	Tony Klimek	Pat Riley
A2PI Characterization Lead	Vicky Zimmerman	Mike Rolfes
Field Sampling Manager	Mike Frank	Tom Buhrlage
Real-Time Manager	Joan White	Dale Seiller
Surveying Lead	Jim Schwing	John Deho
Data Management Contact	Mike Rolfes	Vicky Zimmerman
Health and Safety Contact	Jack Patrick	Lewis Wiedeman
Quality Assurance Contact	Reinhard Friske	Harold Swiger
Laboratory Contact	Al Bacon	Bill Westerman
Waste Disposition Field Representative	Linda Barlow	John Muskoff
Data Validation	Jenine Rogers	Jim Cross

TABLE 1-3
TOTAL LEAD CONCENTRATIONS, AREA 2, PHASE I FIRING RANGE, 2-3 FOOT DEPTH
OCTOBER 1996
(continued)

Location	X-Ray Fluorescence (ppm)	Physical Soil Sample (ppm)[a]
PB-34	37	71/82
PB-35	NA	NA
PB-36	NA	NA
PB-37	53	NA
PB-38	NA	NA
PB-39	NA	NA
PB-40	NA	NA
PB-41	NA	NA
PB-42	NA	NA
PB-43	NA	NA

[a] first value is analysis by inductively coupled argon plasma (ICP); second value is analysis by graphite furnace atomic absorption (GFAA).
[b] 2- to 5- foot interval composited.
[c] Average of two readings.
ND - not detected
NA - not analyzed

TABLE 1-3
TOTAL LEAD CONCENTRATIONS, AREA 2, PHASE I FIRING RANGE, 2-3 FOOT DEPTH
OCTOBER 1996

Location	X-Ray Fluorescence (ppm)	Physical Soil Sample (ppm)[a]
PB-11-0-3	10	NA
PB-12-0-3	32	NA
PB-13-0-3	19	NA
PB-14-0-3	14	NA
PB-15-0-3	14	NA
PB-16	17[b]	NA
PB-17B	ND	NA
PB-18	11	NA
PB-19	2	NA
PB-20	2	NA
PB-21	NA	NA
PB-21B	25 (24-30 inches) 42 (30-36 inches)	NA
PB-22	28[c]	NA
PB-23	27	NA
PB-24	17	NA
PB-25	31	NA
PB-26	ND	NA
PB-27	7	NA
PB-28	NA	NA
PB-29	NA	NA
PB-30	NA	NA
PB-31	NA	NA
PB-32	NA	NA
PB-33	NA	NA

TABLE 1-2
TOTAL LEAD CONCENTRATIONS, AREA 2, PHASE I FIRING RANGE, 1-2 FOOT DEPTH
OCTOBER 1996
(continued)

Location	X-Ray Fluorescence (ppm)	Physical Soil Sample (ppm)[a]
PB-34	495	412/402
PB-35	15	NA
PB-36	NA	NA
PB-37	233	NA
PB-38	22[b]	NA
PB-39	NA	NA
PB-40	NA	NA
PB-41	NA	NA
PB-42	NA	NA
PB-43	NA	NA

[a] First value is analysis by inductively coupled argon plasma (ICP); second value is analysis by graphite furnace atomic absorption (GFAA).
[b] Average of two readings.
ND - not detected
NA - not analyzed

TABLE 1-2
TOTAL LEAD CONCENTRATIONS, AREA 2, PHASE I FIRING RANGE, 1-2 FOOT DEPTH
OCTOBER 1996

Location	X-Ray Fluorescence (ppm)	Physical Soil Sample (ppm)[a]
PB-11-0-3	19	NA
PB-12-0-3	3	NA
PB-13-0-3	35	NA
PB-14-0-3	367	NA
PB-15-0-3	9	NA
PB-16	75	NA
PB-17B	ND	NA
PB-18	254	NA
PB-19	1065	NA
PB-20	30	NA
PB-21	NA	NA
PB-21B	296 (12-18 inches) 33 (18-24 inches)	210/293 56/56
PB-22	41	32/37
PB-23	30[b]	NA
PB-24	29[b]	NA
PB-25	41[b]	NA
PB-26	23	NA
PB-27	24	NA
PB-28	2	NA
PB-29	138	NA
PB-30	166	NA
PB-31	10	NA
PB-32	NA	NA
PB-33	NA	NA

TABLE 1-1
TOTAL LEAD CONCENTRATIONS, AREA 2, PHASE I FIRING RANGE, 0-1 FOOT DEPTH
OCTOBER 1996
(continued)

Location	X-Ray Fluorescence (ppm)	Physical Soil Sample (ppm)[a]
PB-34	583	NA
PB-35	55[b]	NA
PB-36	42	49/57
PB-37	2906	NA
PB-38	101	NA
PB-39	76 (0-6 inches)	NA
PB-40	34[b] (0-6 inches) 11 (6-12 inches)	NA
PB-41	31 (0-6 inches)	NA
PB-42	92 (0-6 inches)	NA
PB-43	61[b] (0-6 inches) 10 (6-12 inches)	NA

[a] First value is analysis by inductively coupled argon plasma (ICP); second value is analysis by graphite furnace atomic absorption (GFAA).
[b] Average of two readings.
NA = not analyzed

TABLE 1-1
TOTAL LEAD CONCENTRATIONS, AREA 2, PHASE I FIRING RANGE, 0-1 FOOT DEPTH
OCTOBER 1996

Location	X-Ray Fluorescence (ppm)	Physical Soil Sample (ppm)[a]
PB-11-0-3	132	110/112
PB-12-0-3	65	NA
PB-13-0-3	51	NA
PB-14-0-3	1165	NA
PB-15-0-3	99	NA
PB-16	167	NA
PB-17B	440	NA
PB-18	1142	1431/1398
PB-19	866	NA
PB-20	211	NA
PB-21	104	NA
PB-21B	13 (0-6 inches) 388 (6-12 inches)	NA
PB-22	609	423/445
PB-23	494	NA
PB-24	481	NA
PB-25	1013	NA
PB-26	63[b]	NA
PB-27	49[b]	NA
PB-28	292	NA
PB-29	452	NA
PB-30	1573	NA
PB-31	75	NA
PB-32	107	NA
PB-33	96	NA