FINAL

Part II

Quality Assurance Project Plan Addendum No. 1 for the Phase I Remedial Investigation of the Erie Burning Grounds at the Ravenna Army Ammunition Plant, Ravenna, Ohio

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ACRONYMS

ASTM	American Society for Testing and Materials
DQO	data quality objectives
EBG	Erie Burning Grounds
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
HTRW	Hazardous, Toxic, and Radioactive Waste
MCX	Mandatory Center of Expertise
MRD	Missouri River District
MS	matrix spike
MSD	matrix spike duplicate
QA	quality assurance
QAMP	Quality Assurance Management Plan (Quanterra)
QAPP	Quality Assurance Project Plan
QC	quality control
RI	Remedial Investigation
RVAAP	Ravenna Army Ammunition Plant
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedures
USACE	U.S. Army Corps of Engineers
USCS	United Soil Classification System

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INTRODUCTION

This Quality Assurance Project Plan (QAPP) Addendum addresses supplemental project-specific information pertaining to the Phase I Remedial Investigation for the Erie Burning Grounds (EBG) at the Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio. Each QAPP section is presented documenting adherence to the Site-wide QAPP or stipulating additional project-specific requirements.

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1.0 PROJECT DESCRIPTION

1.1 SITE HISTORY/BACKGROUND INFORMATION

This information is contained in Section 1.1 of the Phase I Remedial Investigation (RI) Sampling and Analysis Plan (SAP) Addendum for Erie Burning Grounds (EBG).

1.2 PAST DATA COLLECTION ACTIVITY/CURRENT STATUS

This information is contained in Section 1.2 of the Phase I RI SAP Addendum for EBG.

1.3 PROJECT OBJECTIVES AND SCOPE

This information is contained in Chapter 3.0 of the Phase I RI SAP Addendum for EBG.

1.4 SAMPLE NETWORK DESIGN AND RATIONALE

This information is contained in Chapter 4.0 of the Phase I RI SAP Addendum for EBG.

1.5 PARAMETERS TO BE TESTED AND FREQUENCY

Sample matrix types, analytical parameters, and analytical methods are discussed in Chapter 4.0 of the Phase I RI SAP Addendum. These are summarized in Table 1-1 of this Quality Assurance Project Plan (QAPP) Addendum, in conjunction with anticipated sample numbers, quality assurance (QA) sample frequencies, and field quality control (QC) sample frequencies.

1.6 PROJECT SCHEDULE

The EBG Phase I RI project schedule is discussed in Chapter 2.0 of the SAP Addendum.

Table 1-1. Sampling and Analytical Requirements for the Phase I RI at Erie Burning Grounds

Parameter	Methods	Field Samples	Field Duplicate Samples	Site Source Water[a]	Sampler Rinsates	Trip Blanks	Total A-E Samples	USACE QA Split Samples	USACE Trip Blanks
Soils									
Volatile Organics, TCL	SW-846, 5035/8260B	12	1	-	-	-	13	1	-
Semivolatile Organics, TCL	SW-846, 8270C	104	11	-	-	-	115	11	-
PCBs, TCL	SW-846, 8082	12	1	-	-	-	13	1	-
Explosives	SW-846, 8330	104	11	-	-	-	115	11	-
Propellants	SW-846, 8330	62	6	-	-	-	68	6	-
Metals, TAL	SW-846, 6010B/7471	106	11	-	-	-	117	11	-
Cyanide	SW-846, 9011/9010	106	11	-	-	-	117	11	-
Grain Size	ASTM D422	11	-	-	-	-	11	-	-
Moisture Content	ASTM D2216	11	-	-	-	-	11	-	-
Atterberg Limits	ASTM D4318	11	-	-	-	-	11	-	-
USCS Classification	N/A	11	-	-	-	-	11	-	-
Sediments									
Volatile Organics, TCL	SW-846, 5035/8260B	16	2	-	-	-	18	2	-
Semivolatile Organics, TCL	SW-846, 8270C	106	11	-	-	-	117	11	-
PCBs	SW-846, 8082	17	2	-	-	-	19	2	-
Explosives	SW-846, 8330	106	11	-	-	-	117	11	-
Propellants	SW-846, 8330	28	3	-	-	-	31	3	-
Metals, TAL	SW-846, 6010B/7471	106	11	-	-	-	117	11	-
Cyanide	SW-846, 9011/9010	106	11	-	-	-	117	11	-
Total Organic Carbon	SW-846, 9060	10	-	-	-	-	10	-	-
Grain Size	ASTM D422	14	-	-	-	-	14	-	-
Atterberg Limit	ASTM D4318	4	-	-	-	-	4	-	-
USCS Classification	N/A	4	-	-	-	-	4	-	-

Table 1-1 (continued)

Parameter	Methods	Field Samples	Field Duplicate Samples	Site Source Water[a]	Sampler Rinsates	Trip Blanks	Total A-E Samples	USACE QA Split Samples	USACE Trip Blanks
Surface Waters									
Volatile Organics, TCL	SW-846, 8260B	18	2	2	1	2	25	2	1
Semivolatile Organics, TCL	SW-846, 8270C	18	2	2	1	-	23	2	-
PCBs, TCL	SW-846, 8082	18	2	2	1	-	23	2	-
Explosives	SW-846, 8330	18	2	2	1	-	23	2	-
Propellants	SW-846, 8330	18	2	2	1	-	23	2	-
Metals (total), TAL	SW-846, 6010A/7470	18	2	2	1	-	23	2	-
Cyanide	SW-846, 9010	18	2	2	1	-	23	2	-

[a]Source waters = one potable water source and one ASTM water supply lot for the project.

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2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The functional project organization and responsibilities are described in Chapter 2.0 of the Facility-wide Field Sampling Plan (FSP) Phase I RI SAP Addendum.

Analytical support for this work has been assigned to Quanterra Environmental Services, Inc. The majority of analyses will be completed by Quanterra's North Canton, Ohio facility, with explosive determinations being performed by the Knoxville, Tennessee facility and nitrocellulose/nitroguanidine analyses being performed by the Sacramento, California facility. These laboratories have been validated by the U.S. Army Corp of Engineers (USACE) Missouri River District (MRD) Hazardous, Toxic, and Radioactive Waste (HTRW) Mandatory Center of Expertise (MCX), Omaha, Nebraska. Quanterra Environmental Services' Quality Assurance Management Plan (QAMP) Revision 3, November 1998 is available for review upon request. The laboratory's organizational structure, roles, and responsibilities are identified in Section 1 of their QAMP and facility-specific appendices.

Analytical Facilities

Quanterra Environmental Services, Inc.
North Canton, OH
4101 Shuffel Drive, N.W.
North Canton, OH 44720

Tel: (330) 497-9396
Fax: (330) 497-0772

Quanterra Environmental Services, Inc.
Knoxville, TN
5815 Middlebrook Pike
Knoxville, TN 37921

Tel: (423) 588-6401
Fax: (423) 584-4315

Quanterra Environmental Services, Inc.
Sacramento, CA
880 Riverside Parkway
West Sacramento, CA 95605

Tel: (916) 373-5600
Fax: (916) 372-1059

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3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT

3.1 DATA QUALITY OBJECTIVES

Data quality objectives (DQO) summaries for this investigation will follow Tables 3-1 and 3-2, as presented in the Facility-wide QAPP. All QC parameters stated in the specific SW-846 methods will be adhered to for each chemical listed. SW-846 Method references found in the Facility-wide QAPP have been revised to the Update III Methods (i.e., 8260A is now 8260B, 8270B is now 8270C, etc.). Laboratories are required to comply with all methods as written; recommendations are considered requirements.

3.2 LEVEL OF QUALITY CONTROL EFFORT

QC efforts will follow Section 3.2 of the Facility-wide QAPP. Field QC measurements will include field source water blanks, trip blanks, field duplicates, and equipment rinsate blanks. Laboratory QC measurements will include method blanks, laboratory control samples, laboratory duplicates, and matrix spike/matrix spike duplicate (MS/MSD) samples.

3.3 ACCURACY, PRECISION, AND SENSITIVITY OF ANALYSIS

Accuracy, precision, and sensitivity goals identified in the Facility-wide QAPP Section 3.3 and Tables 3-1 through 3-3 will be imposed for these investigations.

3.4 COMPLETENESS, REPRESENTATIVENESS, AND COMPARABILITY

Completeness, representativeness, and comparability goals identified in the Facility-wide QAPP Section 3.4 (Tables 3-1 and 3-2) will be imposed for these investigations.

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4.0 SAMPLING PROCEDURES

Sampling procedures are discussed in the Facility-wide FSP and the SAP Addendum for the Phase I RI at EBG.

Tables 4-1 and 4-2 summarize sample container, preservation, and holding time requirements for soil, sediment, and water matrices for these investigations. The number of containers required is estimated in these tables.

Table 4-1. Container Requirements for Soil and Sediment Samples for the Erie Burning Grounds Phase I RI

Analyte Group	Approx. No. of Bottles, incl. Field QC	Container	Minimum Sample Size	Preservative	Holding Time
Volatile Organic Compounds	34	1 - 4 oz. glass jar with Teflon-lined cap (no headspace)	20 g	Cool, 4°C	14 d
Semivolatile Organic Compounds	254	1 – 8 oz glass jar with Teflon®-lined cap	100 g	Cool, 4°C	14 d (extraction) 40 d (analysis)
PCB Compounds	-	Use same container as SVOC	100 g	Cool, 4°C	14 d (extraction) 40 d (analysis)
Explosive Compounds	254	1 – 4 oz glass jar with Teflon®-lined cap	100 g	Cool, 4°C	14 d (extraction) 40 d (analysis)
Metals	256	1 – 4 oz wide mouth polybottle	50 g	Cool, 4°C	180 d
Cyanide	-	Use same container as metals	25 g	Cool, 4°C	14 d
Total Organic Carbon	10	Use same container as SVOC	10 g	Cool, 4°C	28 d

Table 4-2. Container Requirements for Water Samples for Erie Burning Grounds Phase I RI[a]

Analyte Group	Approx. No. of Bottles, incl. Field QC	Container	Minimum Sample Size	Preservative	Holding Time
Volatile Organic Compounds	56	2 - 40 mL glass vials with Teflon®-lined septum (no headspace)	80 mL	HCl to pH <2 Cool, 4°C	14 d
Semivolatile Organic Compounds	50	2 - L amber glass bottles with Teflon®-lined lid	1000 mL	Cool, 4°C	7 d (extraction) 40 d (analysis)
PCB Compounds	50	2 - L amber glass bottles with Teflon®-lined lid	1000 mL	Cool, 4°C	7 d (extraction) 40 d (analysis)
Explosive Compounds	50	2 - L amber glass bottles with Teflon®-lined lid	1000 mL	Cool, 4°C	7 d (extraction) 40 d (analysis)
Propellant Compounds	50	2 - L amber glass bottles with Teflon®-lined lid	1000 mL	Cool, 4°C	7 d (extraction) 40 d (analysis)
Metals (total)	25	1 - L polybottle	500 mL	HNO_3 to pH <2 Cool, 4°C	180 d
Cyanide	25	1 - L polybottle	500 mL	NaOH to pH >12 Cool, 4°C	14 d

[a]One sample will be tripled in volume for the laboratory to perform appropriate laboratory QC analysis.

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5.0 SAMPLE CUSTODY

5.1 FIELD CHAIN-OF-CUSTODY PROCEDURES

Sample handling, packaging, and shipment procedures will follow those identified in Section 5.1 of the Facility-wide QAPP.

5.2 LABORATORY CHAIN-OF-CUSTODY PROCEDURES

Laboratory chain of custody will follow handling and custody procedures identified in Section 8.5.3 of the Quanterra QAMP.

5.3 FINAL EVIDENCE FILES CUSTODY PROCEDURES

Custody of evidence files will follow those criteria defined in Section 5.3 of the Facility-wide QAPP.

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6.0 CALIBRATION PROCEDURES AND FREQUENCY

6.1 FIELD INSTRUMENTS/EQUIPMENT

Field instruments and equipment calibrations will follow those identified in Section 6.1 of the Facility-wide QAPP.

6.2 LABORATORY INSTRUMENTS

Calibration of laboratory equipment will follow procedures identified in Section 8.5.4 of the Quanterra QAMP, corporate, and facility-specific operating procedures.

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7.0 ANALYTICAL PROCEDURES

7.1 LABORATORY ANALYSIS

Analytical methods, parameters and quantitation or detection limits are those listed in Table 3-3 of the Facility-wide QAPP.

Quanterra's QAMP Section 8.0 and the facility-specific addenda for the North Canton, Knoxville, and Sacramento facilities will be followed during the analysis of these samples. The following laboratory Standard Operating Procedures (SOPs) will implement the defined U.S. Environmental Protection Agency (EPA) Methods.

- GC/MS Volatile Organics Analysis Based on Methods 8240B and 8260B, SW846, CORP-MS-0002, Rev. 2, 12/15/97.

- GC/MS Semivolatile Analysis Based on Methods 8270C, SW846, CORP-MS-0001, Rev. 2, 12/15/97.

- Gas Chromatographic Analysis Based on Method 8000A, 8010B, 8020A, 8021A, 8080A, 8081, 8082, 8150B, and 8051, SW846, CORP-GC-0001, Rev. 5.1, 3/30/99.

- Extraction and Cleanup of Organic Compounds from Waters and Soils, Based on SW846 3500 Series, 3600 Series, 8150, 8151, and 600 Series Methods, CORP-OP-0001, Rev. 3.4, 4/15/99.

- Total Organic Carbon and Total Inorganic Carbon, NC-WC-0017, Rev. 2, 2/15/99.

- Inductively Coupled Plasma-Atomic Emission Spectroscopy, Spectrometric Method for Trace Element Analysis, Methods 6010B and 200.7, CORP-MT-0001, Rev. 2, 12/15/97.

- Graphite Furnace Atomic Absorption Spectroscopy, SW846 Methods 7000A and MCAWW 200 series methods, CORP-MT-0003, Rev. 1, 08/22/95.

- Mercury in Aqueous Samples by Cold Vapor Atomic Absorption, SW846 7470A and MCAWW 245.1, CORP-MT-0005NC, Rev. 1.1, 04/19/97.

- Mercury in Solid Samples by Cold Vapor Atomic Absorption, SW846 7471A and MCAWW 245.5, CORP-MT-0007NC, Rev. 1.1, 04/17/97.

- Analysis of Nitroaromatic and Nitramine Explosives by High Performance Liquid Chromatography, KNOX-LC-0001, Rev. 1, 04/28/97.

- Preparation and Analysis of Nitrocellulose in Aqueous, Soil, and Sediments by Colorimetric Autoanalyzer, SAC-WC-0050, Rev. 0.0.

- Determination of Nitroaromatics, Nitramines, and Specialty Explosives in Water and Soil by High Performance Liquid Chromatography/Ultraviolet Detector (HPLC/UV) and Liquid Chromatography/ Thermospray/Mass Spectrometry (LC/TSP/MS), SAC-LC-0001, Rev. 5.0.

Quanterra facilities will at all times maintain a safe and contaminant-free environment for the analysis of samples. The laboratories will demonstrate through instrument blanks, holding blanks, and analytical method blanks that the laboratory environment and procedures will not and do not impact analytical results.

Quanterra facilities will also implement all reasonable procedures to maintain project reporting levels for all sample analyses. Where contaminant and sample matrix analytical interferences impact the laboratory's ability to obtain project reporting levels, the laboratory will institute sample clean-up processes, minimize dilutions, adjust instrument operational parameters, or propose alternative analytical methods or procedures. Elevated reporting levels will be kept to a minimum throughout the execution of this work.

7.2 FIELD SCREENING ANALYTICAL PROTOCOLS

Procedures for field analysis are identified in the Facility-wide FSP Chapter 6.0 and in Chapter 4.0 of the Phase I RI SAP Addendum for EBG. Only screening of samples for organic vapors using an photoionization detector will be conducted. Headspace analysis will not be conducted.

8.0 INTERNAL QUALITY CONTROL CHECKS

8.1 FIELD SAMPLE COLLECTION

Field QC sample types, numbers, and frequencies are identified in Chapter 4.0 of the Phase I SAP Addendum. In general, field duplicates will be collected at a frequency of 10%, field equipment rinsates and blanks will be collected at a frequency of 5% for samples collected with non-dedicated equipment, and volatile organic trip blanks will accompany all shipments containing volatile organic water samples.

8.2 FIELD MEASUREMENT

Refer to Chapter 4.0 of the Phase I RI SAP Addendum for EBG for details regarding these measurements.

8.3 LABORATORY ANALYSIS

Analytical QC procedures will follow those identified in the referenced EPA methodologies. These will include method blanks, laboratory control samples, MS, MSD, laboratory duplicate analysis, calibration standards, internal standards, surrogate standards, and calibration check standards.

Quanterra facilities will conform to their QAMP, facility-specific appendices, and implement their established SOPs to perform the various analytical methods required by the project. QC frequencies will follow those identified in Section 8.3 of the Facility-wide QAPP.

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9.0 DATA REDUCTION, VALIDATION, AND REPORTING

9.1 DATA REDUCTION

Sample collection and field measurements will follow the established protocols defined in the Facility-wide QAPP, Facility-wide FSP, and EBG Phase I RI SAP Addendum. Laboratory data reduction will follow Quanterra's QAMP Section 8.6 guidance and conform to general direction provided by the Facility-wide QAPP.

9.2 DATA VALIDATION

Data validation will follow the direction provided in the Facility-wide QAPP.

9.3 DATA REPORTING

Analytical data reports will follow the direction provided in the Facility-wide QAPP.

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10.0 PERFORMANCE AND SYSTEM AUDITS

10.1 FIELD AUDITS

A minimum of one field surveillance for each medium being sampled during the investigation will be performed by the Science Applications International Corporation (SAIC) QA Officer and/or the SAIC Field Team Leader. These audits will encompass the sampling of surface soils, subsurface soils, well installation, and well sampling. Surveillances will follow SAIC QAPP No. 18.3.

USACE, EPA Region V, or Ohio EPA audits may be conducted at the discretion of the respective agency.

10.2 LABORATORY AUDITS

Routine MRD HTRW MCX on-site laboratory audits will be conducted by the USACE. EPA Region V or Ohio EPA audits may be conducted at the discretion of the respective agency.

Internal performance and systems audits will be conducted by Quanterra's QA staff as defined in the laboratory QAMP, Section 9.2.

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11.0 PREVENTIVE MAINTENANCE PROCEDURES

11.1 FIELD INSTRUMENTS AND EQUIPMENT

Maintenance of all field analytical and sampling equipment will follow directions provided in Section 11.1 of the Facility-wide QAPP.

11.2 LABORATORY INSTRUMENTS

Routine and preventive maintenance for all laboratory instruments and equipment will follow the direction of Section 8.11 of Quanterra's QAMP.

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12.0 SPECIFIC ROUTINE PROCEDURES TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS

12.1 FIELD MEASUREMENTS DATA

Field data will be assessed as outlined in Section 12.1 of the Facility-wide QAPP.

12.2 LABORATORY DATA

Laboratory data will be assessed as outlined in Section 12.2 of the Facility-wide QAPP.

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13.0 CORRECTIVE ACTIONS

13.1 SAMPLE COLLECTION/FIELD MEASUREMENTS

Field activity corrective action protocol will follow directions provided in Section 13.1 of the Facility-wide QAPP.

13.2 LABORATORY ANALYSES

Laboratory activity corrective action protocol will follow directions provided in Section 13.2 of the Facility-wide QAPP and Section 9.1 of Quanterra's QAMP.

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14.0 QA REPORTS TO MANAGEMENT

Procedures and reports will follow the protocol identified in Section 14.0 of the Facility-wide QAPP and those directed by Section 9.4 of Quanterra's QAMP.

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15.0 REFERENCES

Additional references to the Facility-wide QAPP are:

Quanterra Environmental Services, Inc. 1998. Quality Assurance Management Plan, Rev. 3, November 2, 1998.

GC/MS Volatile Organics Analysis Based on Methods 8240B and 8260B, SW846, CORP-MS-0002, Rev. 2, 12/15/97.

GC/MS Semivolatile Analysis Based on Methods 8270C, SW846, CORP-MS-0001, Rev. 2, 12/15/97.

Gas Chromatographic Analysis Based on Method 8000A, 8010B, 8020A, 8021A, 8080A, 8081, 8082, 8150B, and 8051, SW846, CORP-GC-0001, Rev. 5.1, 3/30/99.

Extraction and Cleanup of Organic Compounds from Waters and Soils, Based on SW846 3500 Series, 3600 Series, 8150, 8151, and 600 Series Methods, CORP-OP-0001, Rev. 3.4, 4/15/99.

Total Organic Carbon and Total Inorganic Carbon, NC-WC-0017, Rev. 2, 2/15/99.

Inductively Coupled Plasma-Atomic Emission Spectroscopy, Spectrometric Method for Trace Element Analysis, Methods 6010B and 200.7, CORP-MT-0001, Rev. 2, 12/15/97.

Graphite Furnace Atomic Absorption Spectroscopy, SW846 Methods 7000A and MCAWW 200 series methods, CORP-MT-0003, Rev. 1, 08/22/95.

Mercury in Aqueous Samples by Cold Vapor Atomic Absorption, SW846 7470A and MCAWW 245.1, CORP-MT-0005NC, Rev. 1.1, 04/19/97.

Mercury in Solid Samples by Cold Vapor Atomic Absorption, SW846 7471A and MCAWW 245.5, CORP-MT-0007NC, Rev. 1.1, 04/17/97.

Analysis of Nitroaromatic and Nitramine Explosives by High Performance Liquid Chromatography, KNOX-LC-0001, Rev. 1, 04/28/97.

Preparation and Analysis of Nitrocellulose in Aqueous, Soil, and Sediments by Colorimetric Autoanalyzer, SAC-WC-0050, Rev. 0.0.

Determination of Nitroaromatics, Nitramines, and Specialty Explosives in Water and Soil by High Performance Liquid Chromatography/Ultraviolet Detector (HPLC/UV) and Liquid Chromatography/ Thermospray/Mass Spectrometry (LC/TSP/MS), SAC-LC-0001, Rev. 5.0.

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