PART II

FINAL

QUALITY ASSURANCE PROJECT PLAN ADDENDUM

FOR THE

FACILITY-WIDE GROUNDWATER MONITORING PROGRAM

RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO

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Prepared for

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ACRONYMS

A-E	Architect-Engineer
COC	chain of custody
CX	Center of Expertise
EPA	U.S. Environmental Protection Agency
FSAP	Field Sampling & Analysis Plan
FWGWMP	Facility-Wide Groundwater Monitoring Program
HTRW	Hazardous, Toxic, and Radioactive Waste
ICP	inductively coupled plasma
LCS	laboratory control sample
MS	matrix spike
MSD	matrix spike duplicate
NG	nitroglycerin
PCB	polychlorinated biphenyls
QA	quality assurance
QC/MRL	Quality Control/Method Reporting Level
QMP	Quality Management Plan
QAPP	Quality Assurance Project Plan
QC	quality control
RVAAP	Ravenna Army Ammunition Plant
SAP	Sampling and Analysis Plan
TAL	Target Analyte List
TCL	Target Compound List
USACE	U.S. Army Corps of Engineers

INTRODUCTION

This Quality Assurance Project Plan (QAPP) Addendum addresses supplemental project-specific information in relation to the revised Facility-wide QAPP for the Ravenna Army Ammunition Plant (RVAAP) (USACE 2001a). Each section of this QAPP Addendum is presented documenting adherence to the Facility-wide QAPP or stipulating project-specific addendum requirements.

Primary analytical direction for these projects will be obtained from the identified U.S. Environmental Protection Agency (EPA) SW-846 Methods, the U.S. Army Corps of Engineers (USACE) Shell Document for Analytical Chemistry Requirements (version 1.0, 2 Nov 98), and the USACE Louisville District Chemistry Guideline (USACE 2001b).

1.0 PROJECT DESCRIPTION

1.1. SITE HISTORY/BACKGROUND INFORMATION

This information is contained in Section 1.1 of the Facility-Wide Sampling and Analysis Plan (FSAP), and Section 1.2 of the Facility-Wide Groundwater Monitoring Program (FWGWMP) Sampling and Analysis Plan (SAP) Addendum.

1.2. PAST DATA COLLECTION ACTIVITY/CURRENT STATUS

This information is contained in Section 1.0 of the FWGWMP SAP Addendum.

1.3. PROJECT OBJECTIVES AND SCOPE

This information is contained in Section 3.0 of the FWGWMP SAP Addendum.

1.4. SAMPLE NETWORK DESIGN AND RATIONALE

This information is contained in Section 3.0 of the FWGWMP SAP Addendum.

1.5. PARAMETERS TO BE TESTED AND FREQUENCY

Sample matrix types and analytical parameters are discussed in Section 4.0 of the FWGWMP SAP Addendum. These sampling and analysis requirements are summarized in Table 1-1 of this QAPP addendum in conjunction with anticipated sample numbers, quality assurance (QA) sample frequencies, and field quality control (QC) sample frequencies. Additional sample volumes for matrix spike (MS)/matrix spike duplicates (MSD) samples will be annotated in the field logbooks.

Table 1-1 Sampling and Analytical Requirements for the FWGWMP

Parameter	Methods	No. of Field Samples	No. of Field Dup. Samples	No. of Rinsate Samples	No. of Trip Blanks	Total A-E Samples	USACE QA Dups./ Splits	QA Trip Blanks	MS/MSD Samples
Volatile Organics, TCL	SW-846, 5030/8260B	36	4	4	4	48	4	4	4
Semivolatile Organics, TCL	SW-846, 3540/8270C	36	4	4		44	4		4
Pesticides	SW-846, 3540/8081A	36	4	4		44	4		4
PCBs	SW-846, 3540/8082	36	4	4		44	4		4
Explosives	SW-846, 8330	36	4	4		44	4		4
Propellants	SW846, 8330 Mod.	36	4	4		44	4		4
Metals (TAL)	SW-846, 6010B/6020/7470A	36	4	4		44	4		4
Nitrate-Nitrite	EPA 353.2	4	1	1		6	1		1
Cyanide	SW-846, 9011/9012A	36	4	4		44	4		4

A-E = Architect-Engineer
MS/MSD = Matrix Spike/Matrix Spike Duplicate
PCBs = Polychlorinated biphenyls
USACE = U.S Army Corps of Engineers
QA = Quality Assurance
TAL = Target Analyte List
TCL = Target Compound List

1.6. PROJECT SCHEDULE

The FWGWMP schedule of implementation is discussed in Section 3.2 of the FWGWMP SAP Addendum.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The functional project organization and responsibilities are described in Section 2.0 of the Facility-wide SAP and Section 2.1 of the FWGWMP SAP Addendum. Analytical support for this work will be performed by a contracted laboratory validated by the USACE Hazardous, Toxic, and Radioactive Waste (HTRW) Center of Expertise (CX), Omaha, Nebraska.

The QA laboratory will be contracted through the Louisville USACE. Comprehensive data validation will be independently performed by the Louisville USACE.

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT

3.1. DATA QUALITY OBJECTIVES

Data quality objective summaries for this investigation will follow Tables 3-1 and 3-2 in the Facility-wide QAPP. All QC parameters stated in the specific EPA SW-846 methods will be adhered to for each chemical listed. The 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. Concurrence with the USACE Shell Document for Analytical Chemistry Requirements, version 1.0, November 2, 1998 (USACE 1998), and USACE Louisville District Chemistry Guideline (USACE 2001b) is expected.

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 (LCSs), laboratory duplicates, MS/MSD samples, and surrogates, if applicable. LCS measurements will include the standard mid-level analyte concentration, plus a QC/Method Reporting Level (QC/MRL) low-level concentration per the USACE Louisville District Chemistry Guideline. It is recognized that the laboratory will routinely perform and monitor the QC/MRL; however, guidance check limits will be utilized as advisory and corrective action will not be required for individual analyte variances.

3.3 ACCURACY, PRECISION, AND SENSITIVITY OF ANALYSIS

Program accuracy, precision, and sensitivity goals identified in Section 3.3 and Tables 3-1 through 3-9 of the Facility-wide QAPP will be imposed for the FWGWMP. In addition, the

USACE Louisville District Chemistry Guideline identifies analytical method quality objectives related to individual method QC protocol.

Program and project reporting levels are identified in Tables 3-1 through 3-9 of the Facility-wide QAPP. Laboratories will make all reasonable attempts to meet these levels for each individual sample analysis. When samples require dilution, both the minimum dilution and quantified dilution must be reported. The contracted laboratory will screen all samples to determine optimum dilution ranges. Dilution runs will be performed to quantitate high target analyte concentrations within the upper half of the calibration range, thus reducing the degree of dilution as much as possible. In addition, a five times less diluted run will then be performed to report other target analyte reporting levels as low as possible without destroying analytical detectors and instrumentation. If there are matrix interferences, non-target analyte, or high target analyte concentrations that preclude analysis of an undiluted sample, the laboratory project manager will contact the USACE (Louisville District), forward analytical and chromatographic information from diluted runs, and obtain direction on how to proceed.

3.4 COMPLETENESS, REPRESENTATIVENESS, AND COMPARABILITY

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

4.0 SAMPLING PROCEDURES

Sampling procedures are discussed in Section 4.0 of the Facility-wide SAP and Section 4.0 the FWGWMP SAP Addendum.

Table 4-1 summarizes sample container, preservation, and holding time requirements for the soil, sediment, and water matrices for this investigation. The number of containers required is estimated in this table.

As noted in the Facility-wide QAPP, additional sample volumes will be provided, when necessary, for the express purpose of performing associated laboratory QC (MS/MSD). These laboratory QC samples will be designated in the field records (sample manager's logbook) and identified for the laboratory on respective chain-of-custody (COC) documentation.

Table 4-1 Container Requirements for the FWGWMP

Analyte Group	Approx. No. of Containers[a]	Container	Minimum Sample Size	Preservative	Holding Time
Volatile Organic Compounds		3 -40 mL glass vials with Teflon®-lined septum (no headspace)	80 mL	HCl to pH <2 Cool, 4°C	14 d
Semivolatile Organic Compounds		2 - 1L amber glass bottle with Teflon®-lined lid	1000 mL	Cool, 4°C	7 d (extraction) 40 d (analysis)
Pesticide Compounds		2 - 1L amber glass bottle with Teflon®-lined lid	1000 mL	Cool, 4°C	7 d (extraction) 40 d (analysis)
PCBs		2 - 1L amber glass bottle with Teflon®-lined lid	1000 mL	Cool, 4°C	7 d (extraction) 40 d (analysis)
Explosive Compounds		1 - 1L amber glass bottle with Teflon®-lined lid	1000 mL	Cool, 4°C	7 d (extraction) 40 d (analysis)
Propellant Compounds		1 - 1L amber glass bottle with Teflon®-lined lid	1000 mL	Cool, 4°C	7 d (extraction) 40 d (analysis)
Metals		1 - 1L polybottle	500 mL	HNO_3 to pH <2 Cool, 4°C	180 d; Hg @ 28 d
Hexavalent Chromium		500 mL polybottle	100 mL	Cool, 4°C	1 d
Nitrate-Nitrite		250-mL polybottle	100 mL	H_2SO_4 to pH <2, Cool, 4°C	28 d
Cyanide		500 mL polybottle	500 mL	NaOH to pH >12 Cool, 4°C	14 d

[a]Includes volume for QC and MS/MSD samples.

5.0 SAMPLE CUSTODY

5.1 FIELD CHAIN-OF-CUSTODY (COC) 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 (COC) PROCEDURES

Laboratory COC will follow handling and custody procedures identified in the contracted laboratory Quality Management Plan.

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.

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 the contracted laboratory QMP, corporate, and facility-specific operating procedures.

7.0 ANALYTICAL PROCEDURES

7.1 Laboratory Analysis

Analytical methods, parameters and quantitation or detection limits are those listed in Tables 3-3 through 3-9 of the Facility-wide QAPP.

The contracted laboratory QMP to be followed during the analysis of samples collected during implementation of the FWGWMP will implement the required EPA methods.

Contracted laboratory facilities will at all times maintain a safe and contaminant-free environment for the analysis of samples. The laboratory 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.

Contracted laboratory 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. When samples require dilution, both the minimum dilution and quantified dilution must be reported. The contracted laboratory will screen all samples to determine optimum dilution ranges. Dilution runs will be performed to quantitate high target analyte concentrations within the upper half of the calibration range, thus reducing the degree of dilution as much as possible. In addition, a five times less diluted run will then be performed to report other target analyte reporting levels as low as possible without destroying analytical detectors and instrumentation. If there are matrix interferences, non-target analyte, or high target analyte concentrations that preclude analysis of an undiluted sample, the laboratory project manager will contact the USACE (Louisville District), forward analytical and chromatographic information from diluted runs, and obtain direction on how to proceed.

7.2 Field Screening Analytical Protocols

Procedures for field analysis are identified in Section 6.0 of the Facility-wide SAP and in Section 4.0 of the FWGWMP SAP Addendum. Only screening of samples for organic vapors using a 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 Section 4.0 of the FWGWMP SAP Addendum. In general, field duplicates and QA samples will be collected at a frequency of 10 percent. MS/MSD samples will be collected at a frequency of 10 percent of the total number of field samples collected. Field equipment rinsates will be collected at a frequency of 10 percent for water samples. This will constitute a process check for the effectiveness of the decontamination procedure. Two site source water samples (one potable water source and one deionized water source) will be collected for the field effort. Volatile organic trip blanks will accompany all coolers and all shipments containing volatile organic samples.

8.2 Field Measurement

Refer to Section 4.0 of the FWGWMP SAP Addendum 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, LCS, MS, MSD, laboratory duplicate analysis, calibration standards, internal standards, surrogate standards, and calibration check standards. The contracted laboratory facilities will conform to their QMP, 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.

Analyses will also be consistent with direction provided by the USACE Shell Document for Analytical Chemistry Requirements (USACE 1998) and the USACE Louisville District Chemistry Guideline (USACE 2001b). The following are clarifications to this guidance relative to this project.

- The Corps Quality Control/Method Detection Limit (QC/MDL) check will be performed quarterly until criteria can be established.

- Analytical method blanks will be considered clean as long as analyte concentrations are below reporting levels. Corrective actions will be performed for any analyte detected above the established method reporting level. Any analytes detected between the method detection limit and the method reporting level will be flagged appropriately.

- Laboratory Control Standards will contain all project target compounds, however, for organic methods only the SW-846 subset of system monitoring compounds will be used to monitor method performance and to initiate analytical method corrective actions.

- For methods that have multi-responders (i.e., Aroclors and pesticides) within the same analytical process, the laboratory will not include all analytes within the matrix spiking mixture. A representative analyte will be employed for the MS evaluation.

- Inductively coupled plasma (ICP) method initial calibration curves will be confirmed through the analysis of a blank and three standards, and this documentation will be reported as part of the analytical data package.

- ICP serial dilution will be performed on a per batch basis. If the serial dilution falls outside acceptance criteria, a post-digestion spike analyses will be performed.

- When analyzing nitroglycerine by Method 8330, Nitroglycerin must be spiked in the associated LCS and MS/MSDs.

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 SAP, and the FWGWMP SAP Addendum. Laboratory data reduction will follow the contracted laboratory's QMP guidance and conform to general direction provided by the Facility-wide QAPP, the USACE Shell Document (USACE 1998), and the USACE Louisville District Chemistry Guideline (USACE 2001b).

9.2 Data Verification/Validation

Project data verification and validation will follow direction provided in the Facility-wide QAPP, Section 9.2 and diagrammed in Figure 9-1.

All data will be reviewed and verified by the FWGWMP contractor according to requirements specified in Section 9.2 of the Facility-wide QAPP.

Validation of 10 percent of the data will follow the direction provided in the Facility-wide QAPP and the USACE Louisville District Chemistry Guideline (USACE 2001b). Independent third party data validation will be performed through the USACE Louisville District.

9.3 Data Reporting

Analytical data reports will follow the direction provided in Section 9.3 of the Facility-wide QAPP.

10.0 PERFORMANCE AND SYSTEM AUDITS

10.1 FIELD AUDITS

A minimum of one field surveillance for the investigation will be performed by the FWGWMP Contractor QA Officer (or designee) and/or the FWGWMP Contractor Field Operations Manager. USACE, EPA Region 5, or Ohio EPA audits may be conducted at the discretion of the respective agency.

10.2 LABORATORY AUDITS

Routine USACE HTRW CX on-site laboratory audits may be conducted by the USACE, EPA Region 5, or Ohio EPA at the discretion of the respective agency. Internal performance and systems audits will be conducted by the contracted laboratory QA staff as defined in the contractor laboratory Quality Management Plan (QMP).

11.0 PREVENTIVE MAINTENANCE PROCEDURES

11.1 FIELD INSTRUMENTS AND EQUIPMENT

Maintenance of all field analytical and sampling equipment will follow direction 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 the contracted laboratory QMP.

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.

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, the contracted laboratory's QMP and the Louisville Chemistry Guideline (USACE 2001b).

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 the contracted laboratory's QMP.

15.0 REFERENCES

USACE (U.S. Army Corps of Engineers) 1998. *Shell Document for Analytical Chemistry Requirements,* Version 1.0, November.

USACE 2001a. *Facility-wide Sampling and Analysis Plan for Environmental Investigations at the Ravenna Army Ammunition Plant, Ravenna, Ohio*, DACA62-00-D-0001, Delivery Order CY02, Final, March.

USACE 2001b. *Louisville Chemistry Guideline,* Samir A. Mansy, Environmental Chemistry Branch, Rev. 1, January.