Final

Facility-wide Groundwater Monitoring Program Plan
RVAAP-66 Facility-wide Groundwater
Addendum for 2025

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Contract No. W912QR-21-D-0016
Delivery Order No. W912QR22F0186

Prepared for:

U.S. Army Corps of Engineers
Louisville District

Prepared by:

Leidos
8866 Commons Boulevard, Suite 201
Twinsburg, Ohio 44087

September 3, 2025

THIS PAGE INTENTIONALLY LEFT BLANK.

Final

Facility-wide Groundwater Monitoring Program Plan
RVAAP-66 Facility-wide Groundwater
Addendum for 2025

THIS PAGE INTENTIONALLY LEFT BLANK.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
03-09-2025	Technical	Sep 2004- Sep 2025

4. TITLE AND SUBTITLE

Final
Facility-wide Groundwater Monitoring Program Plan
Addendum for 2025
Groundwater Investigation and Reporting Services
Ravenna Army Ammunition Plant Restoration Program
Portage and Trumbull Counties, Ohio

5a. CONTRACT NUMBER
W912QR-21-D-0016, DO W912QR22F0186

5b. GRANT NUMBER
NA

5c. PROGRAM ELEMENT NUMBER
NA

6. AUTHOR(S)
Laurich, Ryan

5d. PROJECT NUMBER
NA

5e. TASK NUMBER
NA

5f. WORK UNIT NUMBER
NA

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Leidos
8866 Commons Boulevard, Suite 201
Twinsburg, Ohio 44087

8. PERFORMING ORGANIZATION REPORT NUMBER
NA

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

USACE - Louisville District
U.S. Army Corps of Engineers
600 Martin Luther King Jr., Place
Louisville, Kentucky 40202-2232

10. SPONSOR/MONITOR'S ACRONYM(S)
USACE

11. SPONSOR/MONITOR'S REPORT NUMBER(S)
NA

12. DISTRIBUTION/AVAILABILITY STATEMENT

Reference distribution page.

13. SUPPLEMENTARY NOTES

None.

14. ABSTRACT

This Addendum provides the sampling and analytical approach to continue the Facility-wide Groundwater Monitoring Program (FWGWMP) in support of the Ravenna Army Ammunition Plant Restoration Program into 2025. This report provides a summary of data collected to date, a matrix to decide if and where additional samples should be collected, and summarizes wells and parameters to be collected for the 2025 FWGWMP activities.

15. SUBJECT TERMS

groundwater, monitoring well, sampling and analysis

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Jay Trumble
U	U	U	U	64	19b. TELEPHONE NUMBER *(Include area code)* 502.315.6349

THIS PAGE INTENTIONALLY LEFT BLANK.

PLACEHOLDER FOR:

Documentation of Ohio EPA Concurrence of Final Document

(Documentation to be provided once concurrence is issued.)

THIS PAGE INTENTIONALLY LEFT BLANK.

CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

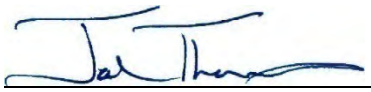
Company Name: Leidos

Contract and Delivery Order Number: Contract No. W912QR-21-D-0016, Delivery Order No. W912QR22F0186

Document Name: Facility-wide Groundwater Monitoring Program Plan, Addendum for 2025, RVAAP-66 Facility-wide Groundwater, Ravenna Army Ammunition Plant Restoration Program, Camp James A. Garfield Joint Military Training Center, Portage and Trumbull Counties, Ohio

Notice is hereby given that an independent technical review, that is appropriate to the level of risk and complexity inherent in the project, has been conducted. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the result, including whether the product meets the customer's needs consistent with law and existing Corps policy. All concerns and comments resulting from these independent technical reviews have been resolved.

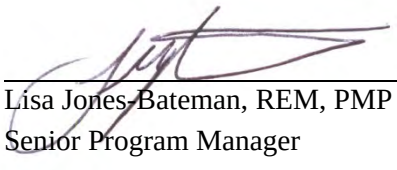
Ryan Laurich, Environmental Scientist — 9/3/2025
Study/Design Team Leader — Date



Jed Thomas, P.E., PMP — 9/3/2025
Independent Technical Review Team Leader — Date

Significant concerns and explanation of the resolutions are documented within the project file.

As noted above, all concerns resulting from the independent technical review of the document have been fully resolved.



Lisa Jones-Bateman, REM, PMP — 9/3/2025
Senior Program Manager — Date

THIS PAGE INTENTIONALLY LEFT BLANK.

Final

Facility-wide Groundwater Monitoring Program Plan
RVAAP-66 Facility-wide Groundwater
Addendum for 2025

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Contract No. W912QR-21-D-0016
Delivery Order No. W912QR22F0186

Prepared for:
U.S. Army Corps of Engineers
600 Martin Luther King, Jr. Place
Louisville, Kentucky 40202

Prepared by:
Leidos
8866 Commons Boulevard, Suite 201
Twinsburg, Ohio 44087

September 3, 2025

THIS PAGE INTENTIONALLY LEFT BLANK.

DOCUMENT DISTRIBUTION
for the
Final
Facility-wide Groundwater Monitoring Program Plan
RVAAP-66 Facility-wide Groundwater
Addendum for 2025
Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Name/Organization	Distribution
Liam McEvoy, Ohio EPA-NEDO, DERR	Electronic submittal via Ohio EPA File Transfer (Powered by LiquidFiles)
Craig Kowalski, Ohio EPA, NEDO	
Megan Oravec, Ohio EPA-NEDO, DERR	
Natalie Oryshkewych, Ohio EPA-NEDO, DERR	
Tom Schneider, Ohio EPA-SWDO	
Carrie Rasik, Ohio EPA-CO, DERR	
Katie Tait, OHARNG	Electronic version submitted via DoD SAFE
Kevin Sedlak, ARNG	
Jay Trumble, USACE – Louisville District	
Jennifer Tierney, Chenega	
Steve Kvaal, USACE – Louisville District	Email transmittal letter only
Jed Thomas, Leidos	
Ryan Laurich, Leidos	

ARNG = Army National Guard
CO = Central Office
DERR = Division of Environmental Response and Revitalization
DoD = U.S. Department of Defense
NEDO = Northeast District Office
OHARNG = Ohio Army National Guard
Ohio EPA = Ohio Environmental Protection Agency
SAFE = Secure Access File Exchange
SWDO = Southwest District Office
USACE = U.S. Army Corps of Engineers

THIS PAGE INTENTIONALLY LEFT BLANK.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

THIS PAGE INTENTIONALLY LEFT BLANK.

ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
Army	U.S. Department of the Army
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CJAG	Camp James A. Garfield
CSM	Conceptual Site Model
DFFO	Director's Final Findings and Orders
DoD	U.S. Department of Defense
FS	Feasibility Study
FWGW	Facility-wide Groundwater
FWGWMP	Facility-wide Groundwater Monitoring Program
Ohio EPA	Ohio Environmental Protection Agency
P.E.	Professional Engineer
PMP	Project Management Professional
PWS	Performance Work Statement
QAPP	Quality Assurance Project Plan
REM	Remedial Environmental Manager
RI	Remedial Investigation
RIWP	Remedial Investigation Work Plan
RVAAP	Ravenna Army Ammunition Plant
SAP	Sampling and Analysis Plan
USACE	U.S. Army Corps of Engineers

THIS PAGE INTENTIONALLY LEFT BLANK.

1.0 INTRODUCTION

Leidos has been contracted by the U.S. Army Corps of Engineers (USACE), Louisville District to execute the performance work statement (PWS) titled "Groundwater Investigation and Reporting Services, Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Camp James A. Garfield (CJAG) Joint Military Training Center, Portage and Trumbull Counties, Ohio." This work is being performed under a firm-fixed price basis in accordance with USACE, Louisville District Contract No. W912QR-21-D-0016, Delivery Order No. W912QR22F0186. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) investigation and cleanup are being conducted under the U.S. Department of Defense (DoD) Installation Restoration Program. Activities include monitoring an extensive network of groundwater monitoring wells to determine nature and extent of groundwater impacts, provide additional information in support of hydrogeologic and fate and transport models, evaluate potential exit pathways, and evaluate vertical contaminant distribution and/or particle inflow/outflow through the facility.

1.1 PURPOSE

The Director's Final Findings and Orders (DFFO) was issued to the U.S. Department of the Army (Army) on June 10, 2004 (Ohio EPA 2004). The purpose of the DFFO is for the Army to develop and implement:

- A Remedial Investigation/Feasibility Study (RI/FS), Proposed Plan, Record of Decision, or other appropriate document and remedy for each area of concern (AOC) or appropriate group of AOCs at the former RVAAP
- A Facility-wide Groundwater (FWGW) investigation, monitoring, and remediation program at the former RVAAP.

Section 15 of the DFFO outlines the requirements of the Facility-wide Groundwater Monitoring Program (FWGWMP). The purpose of this 2025 Addendum is to satisfy the requirements of Section 15d that specify the FWGWMP Plan will "utilize an iterative process, with an annual review and revision cycle to accommodate the addition or deletion of wells from the groundwater monitoring network." This Addendum provides an update to the FWGWMP Plan, including the identification of wells to be sampled as part of the FWGWMP in 2025.

1.2 OBJECTIVES

The primary objectives of the facility-wide monitoring well network in this 2025 Addendum are to assess potential exit pathways, monitor contaminant concentrations related to historical RVAAP activities (e.g., explosives/propellants) at selected source area wells for trend analysis, and sample wells to refine the conceptual site model (CSM) or contaminant distribution associated with the areas recommended for evaluation within the FS.

This 2025 Addendum is a supplement to the FWGWMP Plan and discusses the subset of currently existing monitoring wells at the former RVAAP that will be monitored in 2025, the frequency of samples to be collected, and the chemicals that will be evaluated at each selected well. Contaminant

trend analysis of the 2024 sampling results was conducted by reviewing the well-specific sampling histories and time series graphs provided in the *Facility-wide Groundwater Monitoring Program RVAAP-66 Facility-wide Groundwater Annual Report for 2024* (Leidos 2025). In addition, the recommendations of the *Remedial Investigation Report for RVAAP-66 Facility wide Groundwater* (Leidos 2022) were considered and data collected to support the FS have been incorporated into the 2025 FWGWMP.

Wells were selected for inclusion in the 2025 FWGWMP based on the following criteria:

- **FWGWMP Criterion 1:** Wells representing critical exit pathway monitoring points (generally a carryover from the 2024 program).
- **FWGWMP Criterion 2:** Wells representing primary AOC-specific contaminant source area conditions indicated to be potentially increasing or otherwise potentially unstable plume conditions.
- **FWGWMP Criterion 3:** Colocated wells used to establish the vertical distribution of contaminants within the stratigraphic sequence.
- **FWGWMP Criterion 4:** Wells refining the CSM or contaminant distribution associated with the areas recommended for evaluation within the FS.

1.3 REPORT ORGANIZATION

The remaining sections of this Addendum are organized as follows:

- Section 2.0. Background
- Section 3.0. Scope of Work Under the Addendum
- Section 4.0. Schedule
- Section 5.0. References.

2.0 BACKGROUND

In 2004, the Army and Ohio Environmental Protection Agency (Ohio EPA) finalized the *Facility-wide Groundwater Monitoring Program Plan for the Ravenna Army Ammunition Plant, Ravenna, Ohio* (Portage Environmental 2004) for the former RVAAP, now known as CJAG Joint Military Training Center. Figure 2-1 presents the general location of CJAG.

The FWGWMP was initiated in April 2005 with quarterly sampling of 36 FWGWMP monitoring wells. Fourteen of these wells were identified as "background wells," and the remaining wells were located at various AOCs at CJAG. The FWGWMP monitoring well network currently contains 313 permanent wells. Fifty-nine of these 313 permanent wells were sampled in 2024 (LL1mw-063 was intended to be sampled but was dry in the Spring and Fall of 2024). In addition to these wells, 14 permanent wells at CC RVAAP-69 Building 1048 Fire Station and 3 permanent wells at CC RVAAP-74 Building 1034 Motor Pool Hydraulic Lift are not currently incorporated into the FWGWMP monitoring well network, as they were installed and are sampled to support their current site-specific investigations.

Since 2005, the results have been summarized in an annual report. In 2016, the *Remedial Investigation Work Plan for Groundwater and Environmental Services for RVAAP-66 Facility-Wide Groundwater*, herein referred to as the Remedial Investigation Work Plan (RIWP) (TEC-Weston 2016), was developed. The RIWP served as a supplement to the FWGWMP Plan and specified aspects of the RI with the goal of adequately characterizing pertinent physical and chemical groundwater conditions in the multi-aquifer hydrostratigraphic units variably present across CJAG, so that potential current and future risks to potential human and environmental receptors can be ascertained, effectively managed, and mitigated as needed. The RI Report (Leidos 2022) presents the multi-aquifer hydrostratigraphic units and associated aquifers across CJAG and summarizes current and future risks to potential human and environmental receptors. This RI Report was approved by Ohio EPA in April 2022.

THIS PAGE INTENTIONALLY LEFT BLANK.

3.0 SCOPE OF WORK UNDER THE ADDENDUM

The 2025 Addendum presents information to support the continued monitoring of AOC-specific contaminant concentrations, as indicated by an analysis of results through 2024. Using data and results from the 2024 FWGWMP sampling event and findings of the RI Report (Leidos 2022), the following sections provide an assessment of sampling to be conducted in 2025.

To achieve this objective, 60 wells have been selected for sampling in 2025. Monitoring well sampling and analytical testing will be conducted in accordance with the Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) updates provided with the RIWP (TEC-Weston 2016).

3.1 REVISIONS TO THE 2025 SAMPLING SCHEME

Sixty wells were planned to be sampled in 2024 in accordance with the *Facility-wide Groundwater Monitoring Program Plan, RVAAP-66 Facility-wide Groundwater, Addendum for 2024* (Leidos 2024). Monitoring well LL1mw-063 was dry in Spring and Fall 2024 and could not be sampled. This 2025 Addendum recommends that these 60 wells be sampled in 2025.

3.2 CERCLA WELLS

Selection of wells for the 2025 FWGWMP was made based on consideration of the following criteria:

- **FWGWMP Criterion 1:** Monitoring wells representing critical exit pathway monitoring points (i.e., located along the CJAG boundary or downgradient from AOC concentration areas).
  - ***Unconsolidated Aquifer:*** LL1mw-064, LL1mw-086, LL1mw-087, LL1mw-089, FWGmw-004, FWGmw-007, FWGmw-011, FWGmw-015
  - ***Upper Sharon Aquifer:*** LL2mw-059, FWGmw-012, FWGmw-016, FWGmw-020, FWGmw-021, FWGmw-024
  - ***Basal Sharon Conglomerate Aquifer:*** SCFmw-004, FWGmw-018.
- **FWGWMP Criterion 2:** Monitoring wells representing primary AOC-specific contaminant source area conditions routinely monitored or indicated to be potentially increasing or otherwise potentially unstable plume conditions.
  - ***Unconsolidated Aquifer:*** DETmw-003, DETmw-004, LL1mw-063, LL1mw-089, LL12mw-185, LL12mw-187, WBGmw-006, WBGmw-009
  - ***Homewood Aquifer:*** FBQmw-174, FBQmw-175, LL10mw-003
  - ***Upper Sharon Aquifer:*** LL1mw-080, LL1mw-081, LL1mw-083, LL1mw-084, LL3mw-237, LL3mw-238, LL3mw-239, LL3mw-241
  - ***Basal Sharon Conglomerate Aquifer:*** None currently proposed.
- **FWGWMP Criterion 3:** Colocated monitoring wells used to evaluate the vertical distribution of contaminants within the stratigraphic sequence (includes all wells installed to date).
  - ***East of Ramsdell Quarry Landfill:*** FWGmw-011 (Unconsolidated Aquifer), FWGmw-012 (Upper Sharon Aquifer)
  - ***Southeast of Load Line 1:*** LL1mw-087 (Unconsolidated Aquifer), SCFmw-004 (Basal Sharon Conglomerate Aquifer)

- ***Post Boundary at Load Line 12:*** FWGmw-020 (Upper Sharon Aquifer), FWGmw-018 (Basal Sharon Conglomerate Aquifer)
- ***Winklepeck Burning Grounds:*** WBGmw-009 (Unconsolidated Aquifer), WBGmw-020 (Upper Sharon Aquifer)
- ***Winklepeck Burning Grounds:*** WBGmw-006 (Unconsolidated Aquifer), WBGmw-021 (Upper Sharon Aquifer)
- ***Post Boundary South of the CJAG Main Cantonment Area:*** FWGmw-015 (Unconsolidated Aquifer), FWGmw-016 (Upper Sharon Aquifer).

- **FWGWMP Criterion 4:** Monitoring wells refining the CSM or contaminant distribution associated with the areas recommended for evaluation within the FS.
  - ***Winklepeck Burning Grounds:*** WBGmw-014, WBGmw-016, WBGmw-017, WBGmw-018
  - ***Load Line 1:*** LL1mw-080, LL1mw-082, LL1mw-083, LL1mw-084, LL1mw-086, LL1mw-090, LL1mw-091, LL1mw-092, LL1mw-093, FWGmw-010
  - ***Load Line 2:*** LL2mw-059
  - ***Load Line 3:*** LL3mw-245, LL3mw-247, LL3mw-248
  - ***Load Line 12:*** LL12mw-244, LL12mw-245, LL12mw-246, LL12mw-248, LL12mw-249, FWGmw-018, FWGmw-020
  - ***Fuze and Booster Quarry:*** FBQmw-173, FBQmw-178, FBQmw-179, FBQmw-180, FBQmw-181, FWGmw-023.

The list of analytes for 2025 reflects the potential chemicals of concern within certain areas or immediately downgradient from potential source areas, as appropriate. Table 3-1 provides a comprehensive summary of the proposed wells, 2024 results summary, and rationale for their inclusion in the 2025 FWGWMP sampling scheme. Figure 3-1 show the wells to be sampled during the 2025 FWGWMP.

The refined analyte list is presented in Table 3-2. The analytical methods for these analytes are provided in Table 3-3. Evaluation of data collected in 2025 will be conducted in accordance with the Final FWGW RIWP, including the supporting SAP and QAPP updates (TEC Weston 2016).

Table 3-1. Recommended FWGWMP Wells for 2025

No.	RVAAP-66 Area	Well Name	Aquifer	2024 FWGWMP Sampling Recommendations	2024 Sampling Results	2025 FWGWMP Sampling Recommendations	Rationale for Excluding Previous Year's Analyses	FWGWMP Sampling Criterion (See Section 3.2)
1	RVAAP-04 Open Demolition Area #2	DETmw-003	Unconsolidated	In accordance with the DFFO, continue to monitor for VOCs, phthalates, PAHs, phenols, PCBs, explosives, pesticides, cyanide, and metals.	• Explosives, cyanide, VOCs, PCBs, and pesticides were not detected in the parent or duplicate samples in Spring or Fall 2024. SVOCs were not detected in the parent or duplicate samples in Fall 2024. • Two SVOCs, naphthalene and phenanthrene, were detected in groundwater in Spring 2024. Naphthalene was detected in the duplicate sample at 0.00003 J mg/L and was not detected in the parent sample. Phenanthrene was detected in the parent sample at 0.000063 J mg/L and was not detected in the duplicate sample. Both detections in Spring 2024 were below screening levels. • All detected metals concentrations were below the screening level except for arsenic and manganese. Arsenic was not detected in Spring 2024. The arsenic concentration detected in the Fall 2024 parent sample at 0.013 mg/L and the Fall 2024 duplicate sample at 0.012 mg/L exceeded the screening level of 0.01 mg/L. The manganese concentration detected in the Spring 2024 parent sample at 0.24 J mg/L, the Spring 2024 duplicate sample at 0.24 mg/L, and the Fall 2024 parent and duplicate samples at 0.25 J mg/L exceeded the screening level of 0.075 mg/L. • pH was 7.04 S.U. in Spring 2024 and 7.10 S.U. in Fall 2024.	• In accordance with the DFFO, continue to monitor for VOCs, phthalates, PAHs, phenols, PCBs, explosives, pesticides, cyanide, and metals.	N/A – The same analyses from the previous year are recommended.	2
2	RVAAP-04 Open Demolition Area #2	DETmw-004	Unconsolidated	In accordance with the DFFO, continue to monitor for VOCs, phthalates, PAHs, phenols, PCBs, explosives, pesticides, cyanide, and metals.	• VOCs, SVOCs, pesticides, cyanide, and PCBs were not detected in Spring and Fall 2024. • HMX and RDX were detected in groundwater in 2024. HMX detections in Fall 2024 (0.0009 mg/L) and Spring 2024 (0.0014 J mg/L) did not exceed the screening level of 0.1 mg/L. The RDX concentration detected in Spring 2024 at 0.002 J mg/L exceeded the screening level of 0.00097 mg/L. The RDX concentration detected in Fall 2024 at 0.00015 J mg/L did not exceed the screening level of 0.00097 mg/L. • All metal concentrations were below the screening level except for manganese. Manganese was detected at 0.69 J mg/L in Fall 2024, which exceeds the screening level of 0.075 mg/L. In Spring 2024, manganese was detected at 0.02 mg/L, which is below the screening level of 0.075 mg/L. • pH was 7.00 S.U. in Spring 2024 and 6.41 S.U. in Fall 2024.	• In accordance with the DFFO, continue to monitor for VOCs, phthalates, PAHs, phenols, PCBs, explosives, pesticides, cyanide, and metals.	N/A – The same analyses from the previous year are recommended.	2
3	RVAAP-05 Winklepeck Burning Grounds	WBGmw-006	Unconsolidated	Continue monitoring for explosives to support the FS and future remedial decisions.	• HMX and RDX were detected in groundwater in 2024. HMX detections in Fall 2024 (0.0033 mg/L) and Spring 2024 (0.003 mg/L) did not exceed the screening level of 0.1 mg/L. The RDX concentrations detected in Spring 2024 (0.0074 mg/L) and Fall 2024 (0.0073 mg/L) exceeded the screening level of 0.00097 mg/L. • Data for three explosives (2-nitrotoluene, 3-nitrotoluene, and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 7.38 S.U. in Spring 2024 and 7.29 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	2, 3
4	RVAAP-05 Winklepeck Burning Grounds	WBGmw-009	Unconsolidated	Continue monitoring for explosives to support the FS and future remedial decisions.	• HMX and RDX were detected in groundwater in 2024. HMX detections in Fall 2024 (0.0013 mg/L) and Spring 2024 (0.00074 mg/L) did not exceed the screening level of 0.1 mg/L. The RDX concentrations detected in Spring and Fall 2024 (0.0021 mg/L) exceeded the screening level of 0.00097 mg/L. • Data for three explosives (2-nitrotoluene, 3-nitrotoluene, and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 6.52 S.U. in Spring 2024 and 6.84 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	2, 3

Table 3-1. Recommended FWGWMP Wells for 2025 (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2024 FWGWMP Sampling Recommendations	2024 Sampling Results	2025 FWGWMP Sampling Recommendations	Rationale for Excluding Previous Year's Analyses	FWGWMP Sampling Criterion (See Section 3.2)
5	RVAAP-05 Winklepeck Burning Grounds	WBGmw-014	Unconsolidated	Continue monitoring for explosives to support the FS and future remedial decisions.	• Explosives were not detected in Spring or Fall 2024. • Data for three explosives (2-nitrotoluene, 3-nitrotoluene, and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 7.41 S.U. in Spring 2024 and 7.19 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	4
6	RVAAP-05 Winklepeck Burning Grounds	WBGmw-016	Unconsolidated	Continue monitoring for explosives to support the FS and future remedial decisions.	• Explosives were not detected in Spring or Fall 2024. • Data for three explosives (2-nitrotoluene, 3-nitrotoluene, and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 6.59 S.U. in Spring 2024 and 7.18 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	4
7	RVAAP-05 Winklepeck Burning Grounds	WBGmw-017	Unconsolidated	Continue monitoring for explosives to support the FS and future remedial decisions.	• Explosives were not detected in Spring or Fall 2024. • Data for three explosives (2-nitrotoluene, 3-nitrotoluene, and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 7.41 S.U. in Spring 2024 and 7.38 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	4
8	RVAAP-05 Winklepeck Burning Grounds	WBGmw-018	Unconsolidated	Continue monitoring for explosives to support the FS and future remedial decisions.	• RDX was detected in groundwater in 2024. The RDX concentrations detected in Spring 2024 (0.00022 J mg/L) and Fall 2024 (0.00012 J mg/L) were below the screening level of 0.00097 mg/L. • Data for three explosives (2-nitrotoluene, 3-nitrotoluene, and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 5.69 S.U. in Spring 2024 and 6.09 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	4
9	RVAAP-05 Winklepeck Burning Grounds	WBGmw-020	Upper Sharon	Continue to monitor for explosives.	• Explosives were not detected in Spring or Fall 2024. • Data for three explosives (2-nitrotoluene, 3-nitrotoluene, and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 7.16 S.U. in Spring 2024 and 7.09 S.U. in Fall 2024.	• Continue monitoring for explosives. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	3
10	RVAAP-05 Winklepeck Burning Grounds	WBGmw-021	Upper Sharon	Continue to monitor for explosives.	• Explosives were not detected in Spring or Fall 2024. • Data for three explosives (2-nitrotoluene, 3-nitrotoluene, and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 7.45 S.U. in Spring 2024 and 7.39 S.U. in Fall 2024.	• Continue monitoring for explosives. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	3
11	RVAAP-08 Load Line 1	LL1mw-063	Unconsolidated	Continue monitoring for explosives to support the FS and future remedial decisions.	• LL1mw-063 was dry in Spring and Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	2
12	RVAAP-08 Load Line 1 (east of Load Line 1 fence)	LL1mw-064	Unconsolidated	Continue to monitor for explosives in this exit pathway well.	• Explosives were not detected in Spring or Fall 2024. • pH was 7.70 S.U. in Spring 2024 and 7.68 S.U. in Fall 2024.	• Continue monitoring for explosives in this exit pathway well.	N/A – The same analyses from the previous year are recommended.	1

Table 3-1. Recommended FWGWMP Wells for 2025 (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2024 FWGWMP Sampling Recommendations	2024 Sampling Results	2025 FWGWMP Sampling Recommendations	Rationale for Excluding Previous Year's Analyses	FWGWMP Sampling Criterion (See Section 3.2)
13	RVAAP-08 Load Line 1	LL1mw-080	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• The explosives 2-amino-4,6-DNT, 4-amino-2,6-DNT, HMX, and RDX were detected; however, only 2-amino-4,6-DNT, 4-amino-2,6-DNT, and RDX exceeded screening levels. • The detected concentration of 2-amino-4,6-DNT at 0.0008 mg/L in Spring 2024 exceeded the screening level of 0.000209 mg/L. The detected concentration of 2-amino-4,6-DNT at 0.000137 J mg/L in Fall 2024 was below the screening level. The detected concentration of 4-amino-2,6-DNT at 0.0024 mg/L in Spring 2024 exceeded the screening level of 0.000209 mg/L. 4-amino-2,6-DNT was not detected in Fall 2024. The detected concentration of RDX at 0.012 mg/L in Spring 2024 exceeded the screening level of 0.00097 mg/L. The detected concentration of RDX at 0.000137 J mg/L in Fall 2024 was below the screening level. The detected concentrations of HMX at 0.002 mg/L in Spring 2024 and 0.000137 J mg/L in Fall 2024 were below the screening level of 0.1 mg/L. • Data for two explosives (3-nitrotoluene and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 6.36 S.U. in Spring 2024 and 6.59 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	2,4
14	RVAAP-08 Load Line 1	LL1mw-081	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• 2-amino-4,6-DNT and 4-amino-2,6-DNT were the only explosives detected. 2-amino-4,6-DNT was only detected in Spring 2024 at 0.00022 J mg/L, which exceeded the screening level of 0.000209 mg/L. RDX was only detected in Spring 2024 at 0.00028 J mg/L, which exceeded the screening level of 0.000209 mg/L. • pH was 6.58 S.U. in Spring 2024 and 6.64 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	2
15	RVAAP-08 Load Line 1	LL1mw-082	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• Explosives were not detected in Spring or Fall 2024. • pH was 6.25 S.U. in Spring 2024 and 7.20 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	4
16	RVAAP-08 Load Line 1	LL1mw-083	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• 1,3,5-TNB,1,3-DNB, TNT, 2,4-DNT, 2,6-DNT, 2-amino-4,6-DNT, 4-amino-2,6-DNT, RDX, and nitrobenzene were the only explosives detected. 1,3,5-TNB did not exceed screening levels. • 1,3-DNB was only detected in Spring 2024 at 0.0006 J mg/L, which exceeded the screening level of 0.0002 mg/L. TNT was detected at 0.0019 mg/L in Spring 2024 and 0.0015 J mg/L in Fall 2024; both detections exceeded the screening level of 0.00098 mg/L. 2,4-DNT was detected at 0.0032 mg/L in Spring 2024 and 0.0038 J mg/L in Fall 2024; both detections exceeded the RSL of 0.00024 mg/L. 2,6-DNT was detected at 0.0016 mg/L in Spring 2024 and 0.0019 J mg/L in Fall 2024; both detections exceeded the screening level of 0.000122 mg/L. 2-amino-4,6-DNT was detected at 0.0094 mg/L in Spring 2024 and 0.0097 J mg/L in Fall 2024; both detections exceeded the screening level of 0.000209 mg/L. 4-Amino-2,6-DNT was detected at 0.015 mg/L in Spring 2024 and 0.015 J mg/L in Fall 2024; both detections exceeded the screening level of 0.000209 mg/L. RDX was detected 0.0015 J mg/L in Spring 2024 and was not detected in Fall 2024; the Spring 2024 detection exceeded the screening level of 0.00097 mg/L. Nitrobenzene was detected at 0.00061 J mg/L in Fall 2024 and was not detected in Spring 2024. The Fall 2024 detection exceeded the screening level of 0.000521 mg/L. • pH was 4.47 S.U. in Spring 2024 and 4.90 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	2,4

Table 3-1. Recommended FWGWMP Wells for 2025 (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2024 FWGWMP Sampling Recommendations	2024 Sampling Results	2025 FWGWMP Sampling Recommendations	Rationale for Excluding Previous Year's Analyses	FWGWMP Sampling Criterion (See Section 3.2)
17	RVAAP-08 Load Line 1	LL1mw-084	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• 1,3,5-TNB, 1,3-DNB, TNT, 2,4-DNT, 2-amino-4,6-DNT, 4-amino-2,6-DNT, HMX, RDX, and nitrobenzene were the only explosives detected. Detections of the explosives 1,3,5-TNB and HMX did not exceed screening levels. 1,3-DNB was only detected in the duplicate sample at 0.00099 J mg/L in Spring 2024 and 0.0014 J mg/L in Fall 2024; both detections exceeded the screening level of 0.0002 mg/L. TNT was detected at 0.0019 J mg/L in the Spring 2024 parent sample, 0.002 J mg/L in the Spring 2024 duplicate sample, and 0.0017 mg/L in the Fall 2024 sample. All three TNT detections exceeded the screening level of 0.00098 mg/L. 2,4-DNT was detected at 0.00087 J mg/L in the Spring 2024 parent sample, 0.0009 J mg/L in the Spring 2024 duplicate sample, and 0.0015 mg/L in the Fall 2024 sample. All three 2,4-DNT detections exceeded the screening level of 0.00024 mg/L. 2-Amino-4,6-DNT was detected at 0.0063 J mg/L in both the Spring 2024 parent and duplicate samples and at 0.0055 mg/L in the Fall 2024 sample. All three 2-amino-4,6-DNT detections exceeded the screening level of 0.000209 mg/L. 4-Amino-2,6-DNT was detected at 0.016 J mg/L in the Spring 2024 parent sample, 0.017 J mg/L in the Spring 2024 duplicate sample, and 0.014 mg/L in the Fall 2024 sample. All three 4-amino-2,6-DNT detections exceeded the screening level of 0.000209 mg/L. RDX was detected at 0.0011 J mg/L in the Spring 2024 parent sample and duplicate samples. RDX was not detected in the Fall 2024 sample. RDX detections exceeded the screening level of 0.00097 mg/L. Nitrobenzene was detected at 0.0012 J mg/L in the Fall 2024 sample. Nitrobenzene was not detected in the Spring 2024 parent or duplicate samples. The nitrobenzene detection exceeded the screening level of 0.000521 mg/L. • Data for two explosives (3-nitrotoluene and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 5.64 S.U. in Spring 2024 and 5.57 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	2,4
18	RVAAP-08 Load Line 1	LL1mw-086	Unconsolidated	Continue monitoring for explosives in this exit pathway well.	• Explosives were not detected in Spring or Fall 2024. • Data for two explosives (3-nitrotoluene and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 7.30 S.U. in Spring 2024 and 7.33 S.U. in Fall 2024.	• Continue monitoring for explosives in this exit pathway well. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	1, 4
19	RVAAP-08 Load Line 1 (southeast of Load Line 1 fence)	LL1mw-087	Unconsolidated	Continue to monitor for explosives in this exit pathway well.	• Explosives were not detected in Spring or Fall 2024. • Data for two explosives (3-nitrotoluene and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 7.13 S.U. in Spring 2024 and 6.94 in Fall 2024.	• Continue monitoring for explosives in this exit pathway well. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	1, 3
20	RVAAP-08 Load Line 1 (southeast of Load Line 1 fence)	LL1mw-089	Unconsolidated	Continue to monitor for explosives in this exit pathway well.	• Explosives were not detected in Spring or Fall 2024. • pH was 5.13 S.U. in Spring 2024 and 5.34 S.U. in Fall 2024.	• Continue monitoring for explosives in this exit pathway well.	N/A – The same analyses from the previous year are recommended.	1, 2
21	RVAAP-08 Load Line 1	LL1mw-090	Unconsolidated	Continue monitoring for explosives to support the FS and future remedial decisions.	• Explosives were not detected in Spring or Fall 2024. • pH was 6.24 S.U. in Spring 2024 and 6.75 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	4
22	RVAAP-08 Load Line 1	LL1mw-091	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• 1,3,5-TNB was detected at 0.00011 J mg/L in the Spring 2024 parent sample and 0.00013 J mg/L in the Spring 2024 duplicate sample. 1,3,5-TNB was not detected in Fall 2024. The detected concentrations were below screening levels. • pH was 6.35 S.U. in Spring 2024 and 6.51 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	4

Table 3-1. Recommended FWGWMP Wells for 2025 (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2024 FWGWMP Sampling Recommendations	2024 Sampling Results	2025 FWGWMP Sampling Recommendations	Rationale for Excluding Previous Year's Analyses	FWGWMP Sampling Criterion (See Section 3.2)
23	RVAAP-08 Load Line 1	LL1mw-092	Unconsolidated	Continue monitoring for explosives to support the FS and future remedial decisions.	• HMX was detected in Spring 2024 at 0.0001 J mg/L, which is below the screening level of 0.1 mg/L. • pH was 7.02 S.U. in Spring 2024 and 7.25 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	4
24	RVAAP-08 Load Line 1	LL1mw-093	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• Explosives were not detected in Spring or Fall 2024. • pH was 6.99 S.U. in Spring 2024 and 7.31 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	4
25	RVAAP-09 Load Line 2 South	LL2mw-059	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• 1,3,5-TNB, 2,4-DNT, 2-amino-4,6-DNT, and 4-amino-2,6-DNT were the only explosives detected in 2024. Detected concentrations of 1,3,5-TNB did not exceed screening levels. The detected concentrations of 2,4-DNT in Spring 2024 at 0.00031 J mg/L and Fall 2024 at 0.000311 mg/L exceed the screening level 0.00024 mg/L. The detected concentrations of 2-amino-4,6-DNT in Spring 2024 at 0.00058 J mg/L and Fall 2024 at 0.000644 mg/L exceeded the screening level of 0.000209 mg/L. The detected concentrations of 4-amino-2,6-DNT in Spring 2024 at 0.00057 mg/L and Fall 2024 at 0.000645 J mg/L exceeded the screening level of 0.000209 mg/L. • pH was 5.92 S.U. in Spring 2024 and 6.25 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	1, 4
26	RVAAP-10 Load Line 3	LL3mw-237	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• The explosives TNT, 2-amino-4,6-DNT, 4-amino-2,6-DNT, and RDX were detected; however, only 2-amino-4,6-DNT and 4-amino-2,6-DNT exceeded screening levels. The detected concentrations of 2-amino-4,6-DNT in Spring 2024 at 0.0016 mg/L and Fall 2024 at 0.00021 mg/L exceeded the screening level of 0.000209 mg/L. The detected concentrations of 4-amino-2,6-DNT in Spring 2024 at 0.0042 mg/L and Fall 2024 at 0.00034 mg/L exceeded the screening level of 0.000209 mg/L. • pH was 6.38 S.U. in Spring 2024 and 6.29 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	2
27	RVAAP-10 Load Line 3	LL3mw-238	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• 1,3,5-TNB, TNT, 2,4-DNT, 2,6-DNT, 2-amino-4,6-DNT, 4-amino-2,6-DNT, HMX, and RDX were the only explosives detected. Detected concentrations of 1,3,5-TNB, 2,4-DNT, and HMX did not exceed screening levels. The detected concentrations of TNT in Spring 2024 at 0.0028 J mg/L and Fall 2024 at 0.0020 mg/L exceeded the screening level of 0.00098 mg/L. The detected concentration of 2,6-DNT in Fall 2024 at 0.0005 J mg/L exceeded the screening level of 0.000122 mg/L. 2,6-DNT was not detected in the Spring 2024 sample. The detected concentrations of 2-amino-4,6-DNT in Spring 2024 at 0.0064 J mg/L and Fall 2024 at 0.002 mg/L exceeded the screening level of 0.000209 mg/L. The detected concentrations of 4-amino-2,6-DNT in Spring 2024 at 0.022 J mg/L and Fall 2024 at 0.023 mg/L exceeded the screening level of 0.000209 mg/L. The detected concentration of RDX in Spring 2024 at 0.0033 J mg/L exceeded the screening level of 0.00097 mg/L. RDX was not detected in the Fall 2024 sample. • Data for three explosives (2-nitrotoluene, 3-nitrotoluene, and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 6.52 S.U. in Spring 2024 and 6.68 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	2

Table 3-1. Recommended FWGWMP Wells for 2025 (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2024 FWGWMP Sampling Recommendations	2024 Sampling Results	2025 FWGWMP Sampling Recommendations	Rationale for Excluding Previous Year's Analyses	FWGWMP Sampling Criterion (See Section 3.2)
28	RVAAP-10 Load Line 3	LL3mw-239	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• TNT, 2,4-DNT, 2-amino-4,6-DNT, 4-amino-2,6-DNT, HMX, RDX, and nitrobenzene were the only explosives detected. Detected concentrations of 2,4-DNT, HMX, and nitrobenzene were below screening levels. The detected concentrations of TNT in Spring 2024 at 0.0043 mg/L and Fall 2024 at 0.001 mg/L exceeded the screening level of 0.00098 mg/L. The detected concentrations of 2-amino-4,6-DNT in Spring 2024 at 0.0014 mg/L and Fall 2024 at 0.00078 mg/L exceeded the screening level of 0.000209 mg/L. The detected concentrations of 4-amino-2,6-DNT in Spring 2024 at 0.0027 mg/L and Fall 2024 at 0.0012 mg/L exceeded the screening level of 0.000209 mg/L. The detected concentration of RDX in Spring 2024 at 0.0015 J mg/L exceeded the screening level of 0.00097 mg/L. The detected concentration of RDX in Fall 2024 at 0.00067 mg/L was below the screening level. • pH was 5.82 S.U. in Spring 2024 and 6.04 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	2
29	RVAAP-10 Load Line 3	LL3mw-241	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• 1,3,5-TNB, TNT, 2,4-DNT, 2-amino-4,6-DNT, 4-amino-2,6-DNT, HMX, and RDX were the only explosives detected. The explosives 1,3,5-TNB, 2,4-DNT, HMX, and RDX were detected at concentrations below screening levels. The detected concentration of TNT in Spring 2024 at 0.0025 mg/L exceeded the screening level of 0.00098 mg/L. The detected concentration of TNT in Fall 2024 at 0.00022 mg/L was below the screening level. The detected concentrations of 2-amino-4,6-DNT in Spring 2024 at 0.002 mg/L and Fall 2024 at 0.00089 mg/L exceeded the screening level of 0.000209 mg/L. The detected concentrations of 4-amino-2,6-DNT in Spring 2024 at 0.0023 mg/L and Fall 2024 at 0.00062 J mg/L exceeded the screening level of 0.000209 mg/L. • pH was 5.76 S.U. in Spring 2024 and 6.34 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	2
30	RVAAP-10 Load Line 3	LL3mw-245	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• Explosives were not detected in Spring or Fall 2024. • pH was 7.08 S.U. in Spring 2024 and 6.88 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	4
31	RVAAP-10 Load Line 3	LL3mw-247	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• HMX and RDX were detected in Fall 2024. • HMX was only detected in the Fall 2024 sample at 0.00014 J mg/L, below the screening level of 0.1 mg/L. RDX was only detected in the Fall 2024 sample at 0.0017 mg/L, exceeding the screening level of 0.00097 mg/L. • pH was 6.13 S.U. in Spring 2024 and 6.12 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	4
32	RVAAP-10 Load Line 3	LL3mw-248	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• Explosives were not detected in Spring or Fall 2024. • pH was 6.70 S.U. in Spring 2024 and 6.17 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	4
33	RVAAP-12 Load Line 12	LL12mw-185	Unconsolidated	Continue monitoring for nitrate and ammonia to support the FS and future remedial decisions.	• Nitrate was detected at 57 J mg/L in Spring 2024 and 51 J mg/L in Fall 2024, exceeding the screening level of 10 mg/L. • Ammonia was detected at 0.089 J mg/L in Spring 2024 and 3.3 mg/L in Fall 2024. Ammonia has no screening level. • pH was 6.74 S.U. in Spring 2024 and 6.64 S.U. in Fall 2024.	• Continue monitoring for nitrate and ammonia to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	2
34	RVAAP-12 Load Line 12	LL12mw-187	Unconsolidated	Continue monitoring for nitrate and ammonia to support the FS and future remedial decisions.	• Nitrate was detected at 1,300 J mg/L in Spring 2024, 1,700 J mg/L in the Fall 2024 parent sample, and 1,500 J mg/L in the Fall 2024 duplicate sample. All three detections exceeded the screening level of 10 mg/L. • Ammonia has no screening level but was detected at 580 mg/L in Spring 2024, 800 J mg/L in the Fall 2024 parent sample, and 760 mg/L in the Fall 2024 duplicate sample. • pH was 6.66 S.U. in Spring 2024 and 6.27 S.U. in Fall 2024.	• Continue monitoring for nitrate and ammonia to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	2

Table 3-1. Recommended FWGWMP Wells for 2025 (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2024 FWGWMP Sampling Recommendations	2024 Sampling Results	2025 FWGWMP Sampling Recommendations	Rationale for Excluding Previous Year's Analyses	FWGWMP Sampling Criterion (See Section 3.2)
35	RVAAP-12 Load Line 12	LL12mw-244	Unconsolidated	Continue monitoring for nitrate and ammonia to support the FS and future remedial decisions.	• Nitrate was not detected in 2024. • Ammonia has no screening level but was detected at 0.3 mg/L in Spring 2024 and 0.082 J mg/L in Fall 2024. • pH was 7.36 S.U. in Spring 2024 and 7.28 S.U. in Fall 2024.	• Continue monitoring for nitrate and ammonia to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	4
36	RVAAP-12 Load Line 12	LL12mw-245	Unconsolidated	Continue monitoring for nitrate and ammonia to support the FS and future remedial decisions.	• Nitrate was detected at 0.1 J mg/L in Spring 2024, which is below the screening level of 10 mg/L, and was not detected in Fall 2024. • Ammonia has no screening level but was detected at 0.089 J mg/L in Spring 2024 and 0.87 mg/L in Fall 2024. • pH was 7.14 S.U. in Spring 2024 and 7.00 S.U. in Fall 2024.	• Continue monitoring for nitrate and ammonia to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	4
37	RVAAP-12 Load Line 12	LL12mw-246	Unconsolidated	Continue monitoring for nitrate and ammonia to support the FS and future remedial decisions.	• Nitrate was not detected in 2024. • Ammonia has no screening level but was detected at 0.099 J mg/L in Spring 2024 and 0.17 mg/L in Fall 2024. • pH was 7.15 S.U. in Spring 2024 and 7.06 S.U. in Fall 2024.	• Continue monitoring for nitrate and ammonia to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	4
38	RVAAP-12 Load Line 12	LL12mw-248	Unconsolidated	Continue monitoring for nitrate and ammonia to support the FS and future remedial decisions.	• Nitrate was not detected in Spring 2024. • Ammonia has no screening level but was detected at 0.075 J mg/L in Spring 2024. • LL12mw-248 was dry and could not be sampled in Fall 2024. • pH was 7.53 S.U. in Spring 2024.	• Continue monitoring for nitrate and ammonia to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	4
39	RVAAP-12 Load Line 12	LL12mw-249	Unconsolidated	Continue monitoring for nitrate and ammonia to support the FS and future remedial decisions.	• Nitrate was not detected in 2024. • Ammonia has no screening level but was detected at 0.05 J mg/L in the Spring 2024 parent sample, 0.032 J mg/L in the Spring 2024 duplicate sample, and 0.38 mg/L in Fall 2024. • pH was 7.17 S.U. in Spring 2024 and 7.43 S.U. in Fall 2024.	• Continue monitoring for nitrate and ammonia to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	4
40	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-173	Homewood	Continue monitoring for explosives to support the FS and future remedial decisions.	• TNT, 2-amino-4,6-DNT, and 4-amino-2,6-DNT were the only explosives detected. Detected concentrations of TNT were below screening levels in Spring 2024, and TNT was not detected in Fall 2024. The detected concentrations of 2-amino-4,6-DNT in Spring 2024 (parent sample at 0.00094 mg/L and duplicate sample at 0.00084 mg/L) and Fall 2024 (parent sample at 0.00059 J mg/L and duplicate sample 0.00083 J mg/L) exceeded the screening level of 0.000209 mg/L. The detected concentrations of 4-amino-2,6-DNT in Spring 2024 (parent sample at 0.0012 mg/L and duplicate sample at 0.0011 mg/L) and Fall 2024 (parent sample at 0.00074 J mg/L and duplicate sample 0.0011 J mg/L) exceeded the screening level of 0.000209 mg/L. • Data for three explosives (2-nitrotoluene, 3-nitrotoluene, and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 5.67 S.U. in Spring 2024 and 5.75 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	4

Table 3-1. Recommended FWGWMP Wells for 2025 (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2024 FWGWMP Sampling Recommendations	2024 Sampling Results	2025 FWGWMP Sampling Recommendations	Rationale for Excluding Previous Year's Analyses	FWGWMP Sampling Criterion (See Section 3.2)
41	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-174	Homewood	Continue monitoring for explosives to support the FS and future remedial decisions.	• TNT, 2,4-DNT, 2-amino-4,6-DNT, 4-amino-2,6-DNT, and RDX were the only explosives detected. The detected concentration of 2,4-DNT in Spring 2024 was below the screening level. The detected concentration of TNT in Spring 2024 at 0.0025 mg/L exceeded the screening level of 0.00098 mg/L. The detected concentration of 2-amino-4,6-DNT in Spring 2024 at 0.0051 mg/L exceeded the screening level of 0.000209 mg/L. The detected concentration of 4-amino-2,6-DNT in Spring 2024 at 0.013 mg/L exceeded the screening level of 0.000209 mg/L. The detected concentration of RDX in Spring 2024 at 0.001 J mg/L exceeded the screening level of 0.00097 mg/L. • FBQmw-174 was dry and could not be sampled in Fall 2024. • pH was 5.76 S.U. in Spring 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	2
42	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-175	Homewood	Continue monitoring for explosives to support the FS and future remedial decisions.	• Tetryl was detected in Spring 2024; no other explosives were detected at FBQmw-175. The detected concentration of tetryl in Spring 2024 at 0.00012 J mg/L was below the screening level of 0.0039 mg/L. • pH was 5.89 S.U. in Spring 2024 and 6.29 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	2
43	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-178	Homewood	Continue monitoring for explosives to support the FS and future remedial decisions.	• RDX, 2-nitrotoluene, and 1,3,5-TNB were the only explosives detected. The detected concentration of 1,3,5-TNB in the Fall 2024 duplicate sample was below the screening level. 1,3,5-TNB was not detected in the Spring 2024 parent sample, Spring 2024 duplicate sample, or Fall 2024 parent sample. RDX was detected at 0.002 J mg/L in the Spring 2024 parent sample and 0.0024 J mg/L in the Spring 2024 duplicate sample, exceeding the screening level of 0.00097 mg/L. RDX was not detected in Fall 2024. 2-nitrotoluene was only detected in the Spring 2024 duplicate sample at 0.00047 J mg/L, which exceeded the screening level of 0.00037 mg/L. • Data for two explosives (3-nitrotoluene and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 5.58 S.U. in Spring 2024 and 5.54 in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	4
44	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-179	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• Explosives were not detected in Spring or Fall 2024. • Data for three explosives (2-nitrotoluene, 3-nitrotoluene, and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 7.04 S.U. in Spring 2024 and 7.24 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	4
45	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-180	Homewood	Continue monitoring for explosives to support the FS and future remedial decisions.	• 2-Nitrotoluene was detected at a concentration below the screening level in Spring 2024. No other explosives were detected in Spring or Fall 2024. • Data for two explosives (3-nitrotoluene and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 5.65 S.U. in Spring 2024 and 5.61 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	4
46	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-181	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• Explosives were not detected in Spring or Fall 2024. • Data for three explosives (2-nitrotoluene, 3-nitrotoluene, and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 7.09 S.U. in Spring 2024 and 7.10 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	4

Table 3-1. Recommended FWGWMP Wells for 2025 (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2024 FWGWMP Sampling Recommendations	2024 Sampling Results	2025 FWGWMP Sampling Recommendations	Rationale for Excluding Previous Year's Analyses	FWGWMP Sampling Criterion (See Section 3.2)
47	RVAAP-43 Load Line 10	LL10mw-003	Homewood	Continue to monitor for carbon tetrachloride to verify recent reduced concentrations.	• Carbon tetrachloride was detected at 0.0017 mg/L in Spring 2024 and 0.0027 mg/L in Fall 2024, below the screening level of 0.005 mg/L. • pH was 6.76 S.U. in Spring 2024 and 6.72 S.U. in Fall 2024.	• Continue to monitor for carbon tetrachloride to verify recent reduced concentrations.	N/A – The same analyses from the previous year are recommended.	2
48	RVAAP-66 Facility-wide Groundwater (southern portion of Administration Area)	FWGmw-004	Unconsolidated	Continue to monitor for explosives in this exit pathway well.	• Explosives were not detected in Spring or Fall 2024. • pH was 6.76 S.U. in Spring 2024 and 6.84 S.U. in Fall 2024.	• Continue monitoring for explosives in this exit pathway well.	N/A – The same analyses from the previous year are recommended.	1
49	RVAAP-66 Facility-wide Groundwater (southwestern portion of facility, south of NACA Test Area)	FWGmw-007	Unconsolidated	Continue to monitor for explosives in this exit pathway well.	• Explosives were not detected in Spring or Fall 2024. • pH was 7.19 S.U. in Spring 2024 and 7.16 S.U. in Fall 2024.	• Continue monitoring for explosives in this exit pathway well.	N/A – The same analyses from the previous year are recommended.	1
50	RVAAP-66 Facility-wide Groundwater (in DLA Main Ore Storage Area)	FWGmw-010	Unconsolidated	Continue monitoring for explosives to support the FS and future remedial decisions.	• Explosives were not detected in Spring or Fall 2024. • Data for two explosives (3-nitrotoluene and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 5.77 S.U. in Spring 2024 and 5.76 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	4
51	RVAAP-66 Facility-wide Groundwater (near East Classification Yard)	FWGmw-011	Unconsolidated	Continue to monitor for explosives in this exit pathway well.	• RDX was detected at a 0.00024 J mg/L, below the screening level of 0.00097 mg/L, in Spring 2024. No other explosives were detected in Spring or Fall 2024. • pH was 7.30 S.U. in Spring 2024 and 7.02 S.U. in Fall 2024.	• Continue monitoring for explosives in this exit pathway well.	N/A – The same analyses from the previous year are recommended.	1, 3
52	RVAAP-66 Facility-wide Groundwater (near East Classification Yard)	FWGmw-012	Upper Sharon	Continue to monitor for explosives in this exit pathway well.	• RDX was detected at 0.00071 mg/L in Spring 2024, below the screening level of 0.00097 mg/L. No other explosives were detected in Spring or Fall 2024. • pH was 6.24 S.U. in Spring 2024 and 6.08 S.U. in Fall 2024.	• Continue monitoring for explosives in this exit pathway well.	N/A – The same analyses from the previous year are recommended.	1, 3
53	RVAAP-66 Facility-wide Groundwater (southeast of Administration Area)	FWGmw-015	Unconsolidated	Continue to monitor for explosives in this exit pathway well.	• Explosives were not detected in Spring or Fall 2024. • Data for three explosives (2-nitrotoluene, 3-nitrotoluene, and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 7.12 S.U. in Spring 2024 and 7.01 S.U. in Fall 2024.	• Continue monitoring for explosives in this exit pathway well. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	1, 3
54	RVAAP-66 Facility-wide Groundwater (southeast of Administration Area)	FWGmw-016	Upper Sharon	Continue to monitor for explosives in this exit pathway well.	• Explosives were not detected in Spring or Fall 2024. • pH was 7.28 S.U. in Spring 2024 and 7.13 S.U. in Fall 2024.	• Continue monitoring for explosives in this exit pathway well.	N/A – The same analyses from the previous year are recommended.	1, 3

Table 3-1. Recommended FWGWMP Wells for 2025 (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2024 FWGWMP Sampling Recommendations	2024 Sampling Results	2025 FWGWMP Sampling Recommendations	Rationale for Excluding Previous Year's Analyses	FWGWMP Sampling Criterion (See Section 3.2)
55	RVAAP-66 Facility-wide Groundwater (off-facility, south of State Route 5, south of Load Line 12)	FWGmw-018	Basal Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• Nitrate was not detected in Spring or Fall 2024. • pH was 7.09 S.U. in Spring 2024 and 7.24 S.U. in Fall 2024.	• Continue monitoring for nitrates to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	1, 3, 4
56	RVAAP-66 Facility-wide Groundwater (off-facility, south of State Route 5, south of Load Line 12)	FWGmw-020	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• Nitrate was detected in Spring 2024 at 0.093 J mg/L, below the screening level of 10 mg/L. Nitrate was not detected in Fall 2024. • pH was 7.27 S.U. in Spring 2024 and 7.06 S.U. in Fall 2024.	• Continue monitoring for nitrates to support the FS and future remedial decisions.	N/A – The same analyses from the previous year are recommended.	1, 3, 4
57	RVAAP-66 Facility-wide Groundwater (off-facility, south of State Route 5, south of Load Line 3)	FWGmw-021	Upper Sharon	Continue to monitor for explosives in this exit pathway well.	• 2-Amino-4,6-DNT was detected in Spring and Fall 2024, and 1,3-DNB was only detected in Fall 2024. Detected concentrations of 2-amino-4,6-DNT in Spring 2024 at 0.00013 J and 0.000099 J mg/L were below the screening level of 0.000209 mg/L. No other explosives were detected in Spring or Fall 2024. The detected concentration of 1,3-DNB in Fall 2024 at 0.00039 J mg/L exceeded the screening level of 0.0002 mg/L. • pH was 5.99 S.U. in Spring and Fall 2024.	• Continue monitoring for explosives in this exit pathway well.	N/A – The same analyses from the previous year are recommended.	1
58	RVAAP-66 Facility-wide Groundwater (downgradient from Fuze and Booster Quarry Landfill/Ponds)	FWGmw-023	Upper Sharon	Continue monitoring for explosives to support the FS and future remedial decisions.	• Explosives were not detected in Spring or Fall 2024 • Data for three explosives (2-nitrotoluene, 3-nitrotoluene, and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 7.42 S.U. in Spring 2024 and 7.19 S.U. in Fall 2024.	• Continue monitoring for explosives to support the FS and future remedial decisions. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	4
59	RVAAP-66 Facility-wide Groundwater (off-facility, south of State Route 5, south of Load Line 2)	FWGmw-024	Upper Sharon	Continue to monitor for explosives in this exit pathway well.	• Explosives were not detected in Spring or Fall 2024. • pH was 7.11 S.U. in Spring 2024 and 7.07 in Fall 2024.	• Continue monitoring for explosives in this exit pathway well.	N/A – The same analyses from the previous year are recommended.	1
60	RVAAP-66 Facility-wide Groundwater (southeastern portion of facility)	SCFmw-004	Basal Sharon	Continue to monitor for explosives in this exit pathway well.	• Explosives were not detected in Spring or Fall 2024. • Data for two explosives (3-nitrotoluene and 4-nitrotoluene) were rejected from the Spring 2024 data set. No data were rejected from the Fall 2024 data set. • pH was 7.08 S.U. in Spring 2024 and 7.10 S.U. in Fall 2024.	• Continue monitoring for explosives in this exit pathway well. Recollect explosives that were rejected in Spring 2024.	N/A – The same analyses from the previous year are recommended.	1, 3

Notes:
This table does not include a discussion of essential nutrients (calcium, chloride, iodine, iron, magnesium, potassium, phosphorus, and sodium).
FWGWMP groundwater screening levels are presented in Appendix A.

DFFO = Director's Final Findings and Orders
DNB = Dinitrobenzene
DNT = Dinitrotoluene
FS = Feasibility Study
FWGWMP = Facility-wide Groundwater Monitoring Plan
HMX = Octahydro-1,3,5,7-Tetranitro-1,3,5,7-Tetrazocine
J = Estimated Quantity
mg/L = Milligrams per Liter
N/A = Not Applicable
NACA = National Advisory Committee on Aeronautics
PAH = Polycyclic Aromatic Hydrocarbon
PCB = Polychlorinated Biphenyl
RDX = Hexahydro-1,3,5-Trinitro-1,3,5-Triazine
RVAAP = Ravenna Army Ammunition Plant
S.U. = Standard Unit
SVOC = Semivolatile Organic Compound
TNB = Trinitrobenzene
TNT = 2,4,6-Trinitrotoluene
U = Not Detected
VOC = Volatile Organic Compound

Table 3-2. FWGWMP Wells with Analytical Testing Suite

No.	RVAAP-66 Area	Well Name	Aquifer	Explosives	Nitrate	Metals	VOCs	SVOCs*	PCBs	Pesticides	Cyanide	Other
1	RVAAP-04 Open Demolition Area #2	DETmw-003	Unconsolidated	X		X	X	X	X	X	X	
2	RVAAP-04 Open Demolition Area #2	DETmw-004	Unconsolidated	X		X	X	X	X	X	X	
3	RVAAP-05 Winklepeck Burning Grounds	WBGmw-006	Unconsolidated	X								
4	RVAAP-05 Winklepeck Burning Grounds	WBGmw-009	Unconsolidated	X								
5	RVAAP-05 Winklepeck Burning Grounds	WBGmw-014	Unconsolidated	X								
6	RVAAP-05 Winklepeck Burning Grounds	WBGmw-016	Unconsolidated	X								
7	RVAAP-05 Winklepeck Burning Grounds	WBGmw-017	Unconsolidated	X								
8	RVAAP-05 Winklepeck Burning Grounds	WBGmw-018	Unconsolidated	X								
9	RVAAP-05 Winklepeck Burning Grounds	WBGmw-020	Upper Sharon	X								
10	RVAAP-05 Winklepeck Burning Grounds	WBGmw-021	Upper Sharon	X								
11	RVAAP-08 Load Line 1	LL1mw-063	Unconsolidated	X								
12	RVAAP-08 Load Line 1	LL1mw-064	Unconsolidated	X								
13	RVAAP-08 Load Line 1	LL1mw-080	Upper Sharon	X								
14	RVAAP-08 Load Line 1	LL1mw-081	Upper Sharon	X								
15	RVAAP-08 Load Line 1	LL1mw-082	Upper Sharon	X								
16	RVAAP-08 Load Line 1	LL1mw-083	Upper Sharon	X								
17	RVAAP-08 Load Line 1	LL1mw-084	Upper Sharon	X								
18	RVAAP-08 Load Line 1	LL1mw-086	Unconsolidated	X								
19	RVAAP-08 Load Line 1	LL1mw-087	Unconsolidated	X								
20	RVAAP-08 Load Line 1	LL1mw-089	Unconsolidated	X								
21	RVAAP-08 Load Line 1	LL1mw-090	Unconsolidated	X								
22	RVAAP-08 Load Line 1	LL1mw-091	Upper Sharon	X								
23	RVAAP-08 Load Line 1	LL1mw-092	Unconsolidated	X								
24	RVAAP-08 Load Line 1	LL1mw-093	Upper Sharon	X								
25	RVAAP-09 Load Line 2	LL2mw-059	Upper Sharon	X								
26	RVAAP-10 Load Line 3	LL3mw-237	Upper Sharon	X								
27	RVAAP-10 Load Line 3	LL3mw-238	Upper Sharon	X								
28	RVAAP-10 Load Line 3	LL3mw-239	Upper Sharon	X								
29	RVAAP-10 Load Line 3	LL3mw-241	Upper Sharon	X								
30	RVAAP-10 Load Line 3	LL3mw-245	Upper Sharon	X								
31	RVAAP-10 Load Line 3	LL3mw-247	Upper Sharon	X								
32	RVAAP-10 Load Line 3	LL3mw-248	Upper Sharon	X								
33	RVAAP-12 Load Line 12	LL12mw-185	Unconsolidated		X							Ammonia
34	RVAAP-12 Load Line 12	LL12mw-187	Unconsolidated		X							Ammonia
35	RVAAP-12 Load Line 12	LL12mw-244	Unconsolidated		X							Ammonia
36	RVAAP-12 Load Line 12	LL12mw-245	Unconsolidated		X							Ammonia
37	RVAAP-12 Load Line 12	LL12mw-246	Unconsolidated		X							Ammonia
38	RVAAP-12 Load Line 12	LL12mw-248	Unconsolidated		X							Ammonia
39	RVAAP-12 Load Line 12	LL12mw-249	Unconsolidated		X							Ammonia
40	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-173	Homewood	X								

Table 3-2. FWGWMP Wells with Analytical Testing Suite (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	Explosives	Nitrate	Metals	VOCs	SVOCs*	PCBs	Pesticides	Cyanide	Other
41	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-174	Homewood	X								
42	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-175	Homewood	X								
43	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-178	Homewood	X								
44	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-179	Upper Sharon	X								
45	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-180	Homewood	X								
46	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-181	Upper Sharon	X								
47	RVAAP-43 Load Line 10	LL10mw-003	Homewood									Carbon Tetrachloride
48	RVAAP-66 Facility-wide Groundwater	FWGmw-004	Unconsolidated	X								
49	RVAAP-66 Facility-wide Groundwater	FWGmw-007	Unconsolidated	X								
50	RVAAP-66 Facility-wide Groundwater	FWGmw-010	Unconsolidated	X								
51	RVAAP-66 Facility-wide Groundwater	FWGmw-011	Unconsolidated	X								
52	RVAAP-66 Facility-wide Groundwater	FWGmw-012	Upper Sharon	X								
53	RVAAP-66 Facility-wide Groundwater	FWGmw-015	Unconsolidated	X								
54	RVAAP-66 Facility-wide Groundwater	FWGmw-016	Upper Sharon	X								
55	RVAAP-66 Facility-wide Groundwater	FWGmw-018	Basal Sharon		X							
56	RVAAP-66 Facility-wide Groundwater	FWGmw-020	Upper Sharon		X							
57	RVAAP-66 Facility-wide Groundwater	FWGmw-021	Upper Sharon	X								
58	RVAAP-66 Facility-wide Groundwater	FWGmw-023	Upper Sharon	X								
59	RVAAP-66 Facility-wide Groundwater	FWGmw-024	Upper Sharon	X								
60	RVAAP-66 Facility-wide Groundwater	SCFmw-004	Basal Sharon	X								

X = Indicates well or constituent to be sampled as part of the 2025 FWGWMP. Wells and constituents will be sampled semi-annually.

*SVOCs include phthalates, nitroaromatics, polycyclic aromatic hydrocarbons, and phenols.

FWGWMP = Facility-wide Groundwater Monitoring Program
PCB = Polychlorinated Biphenyl
RVAAP = Ravenna Army Ammunition Plant
SVOC = Semivolatile Organic Compound
VOC = Volatile Organic Compound

Table 3-3. Analytical Laboratory Test Methods

Constituents	Method*
Nitroaromatics and Nitramines (Explosives)	Explosives by HPLC (8330B)
Nitrate	General Chemistry (9056)
Metals (Aluminum, Iron, Magnesium, Potassium, Sodium, Phosphorus, Calcium)	Inductively Coupled Plasma (6010D)
Metals (Antimony, Beryllium, Thallium, Zinc, Cadmium, Manganese, Barium, Nickel, Silver, Vanadium, Chromium, Cobalt, Copper, Arsenic, Lead, Selenium)	Inductively Coupled Plasma/Mass Spectrometry (6020B)
Mercury	Liquid Waste Cold Vapor Technique (7470A)
VOCs	GC/MS Volatile Organics (8260D)
SVOCs, including Phthalates, Phenols, or Nitroaromatics	GC/MS Semivolatile Organics (8270E)
PCBs	GC – SVOCs (8082A)
Pesticides	GC Semivolatile Organics (8081B)
Cyanide (Total)	General Chemistry (9012B)

*USEPA SW846

GC = Gas Chromatography
HPLC = High-Performance Liquid Chromatography
MS = Mass Spectrometry
PCB = Polychlorinated Biphenyl
SVOC = Semivolatile Organic Compound
USEPA = U.S. Environmental Protection Agency
VOC = Volatile Organic Compound

THIS PAGE INTENTIONALLY LEFT BLANK.

4.0 SCHEDULE

Groundwater Investigation and Reporting Services, Former RVAAP/Camp James A. Garfield Restoration Program
2025 FWGWMP Schedule

ID	Task Name	Duration	Start	Finish	Predecessors
1	**2025 Facility-wide Groundwater Monitoring Program**	**421 days**	**Mon 4/21/25**	**Mon 6/15/26**	
2	**2025 FWGWMP Addendum**	**46 days**	**Mon 4/21/25**	**Thu 6/5/25**	
3	Prepare and Submit Final to Army/Ohio EPA	1 day	Mon 4/21/25	Mon 4/21/25	
4	Army/Ohio EPA Review and Approval	45 days	Tue 4/22/25	Thu 6/5/25	3
5	**Spring 2025 Semi-Annual Sampling**	**68 days**	**Mon 4/21/25**	**Fri 6/27/25**	
6	Well Gauging	4 days	Mon 4/21/25	Thu 4/24/25	
7	Well Sampling	11 days	Mon 4/28/25	Thu 5/8/25	6FS+3 days
8	Laboratory Sampling and Analysis	30 days	Fri 5/9/25	Sat 6/7/25	7
9	Data Validation	20 days	Sun 6/8/25	Fri 6/27/25	8
10	**Spring 2025 Semi-Annual Report**	**210 days**	**Sat 6/28/25**	**Fri 1/23/26**	
11	Prepare and Submit Draft to Army/Ohio EPA	90 days	Sat 6/28/25	Thu 9/25/25	9
12	Army/Ohio EPA Review	45 days	Fri 9/26/25	Sun 11/9/25	11
13	Comment Resolution	15 days	Mon 11/10/25	Mon 11/24/25	12
14	Prepare and Submit Final to Army/Ohio EPA	15 days	Tue 11/25/25	Tue 12/9/25	13
15	Army/Ohio EPA Review and Approval	45 days	Wed 12/10/25	Fri 1/23/26	14
16	**Fall 2025 Semi-Annual Sampling**	**60 days**	**Mon 9/29/25**	**Thu 11/27/25**	
17	Well Sampling	10 days	Mon 9/29/25	Wed 10/8/25	
18	Laboratory Sampling and Analysis	30 days	Thu 10/9/25	Fri 11/7/25	17
19	Data Validation	20 days	Sat 11/8/25	Thu 11/27/25	18
20	**2025 Annual Report and 2026 FWGWMP Addendum**	**210 days**	**Tue 11/18/25**	**Mon 6/15/26**	
21	Prepare and Submit Draft to Army/Ohio EPA	90 days	Tue 11/18/25	Sun 2/15/26	
22	Army/Ohio EPA Review	45 days	Mon 2/16/26	Wed 4/1/26	21
23	Comment Resolution	15 days	Thu 4/2/26	Thu 4/16/26	22
24	Prepare and Submit Final to Army/Ohio EPA	15 days	Fri 4/17/26	Fri 5/1/26	23
25	Army/Ohio EPA Review and Approval	45 days	Sat 5/2/26	Mon 6/15/26	24

THIS PAGE INTENTIONALLY LEFT BLANK.

5.0 REFERENCES

Leidos. 2022. *Remedial Investigation Report for RVAAP-66 Facility-wide Groundwater*. February.

Leidos. 2024. *Facility-wide Groundwater Monitoring Program Plan, RVAAP-66 Facility-wide Groundwater, Addendum for 2024*. August.

Leidos. 2025. *Annual Report for 2024 for RVAAP-66 Facility-wide Groundwater.* September.

Ohio EPA (Ohio Environmental Protection Agency). 2004. *Director's Final Findings and Orders for the Ravenna Army Ammunition Plant*. June.

Portage Environmental. 2004. *Facility-wide Groundwater Monitoring Program Plan for the Ravenna Army Ammunition Plant, Ravenna, Ohio*. September.

TEC-Weston. 2016. *Remedial Investigation Work Plan for Groundwater and Environmental Investigation Services for RVAAP-66 Facility-Wide Groundwater*. December.

THIS PAGE INTENTIONALLY LEFT BLANK.

FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK.

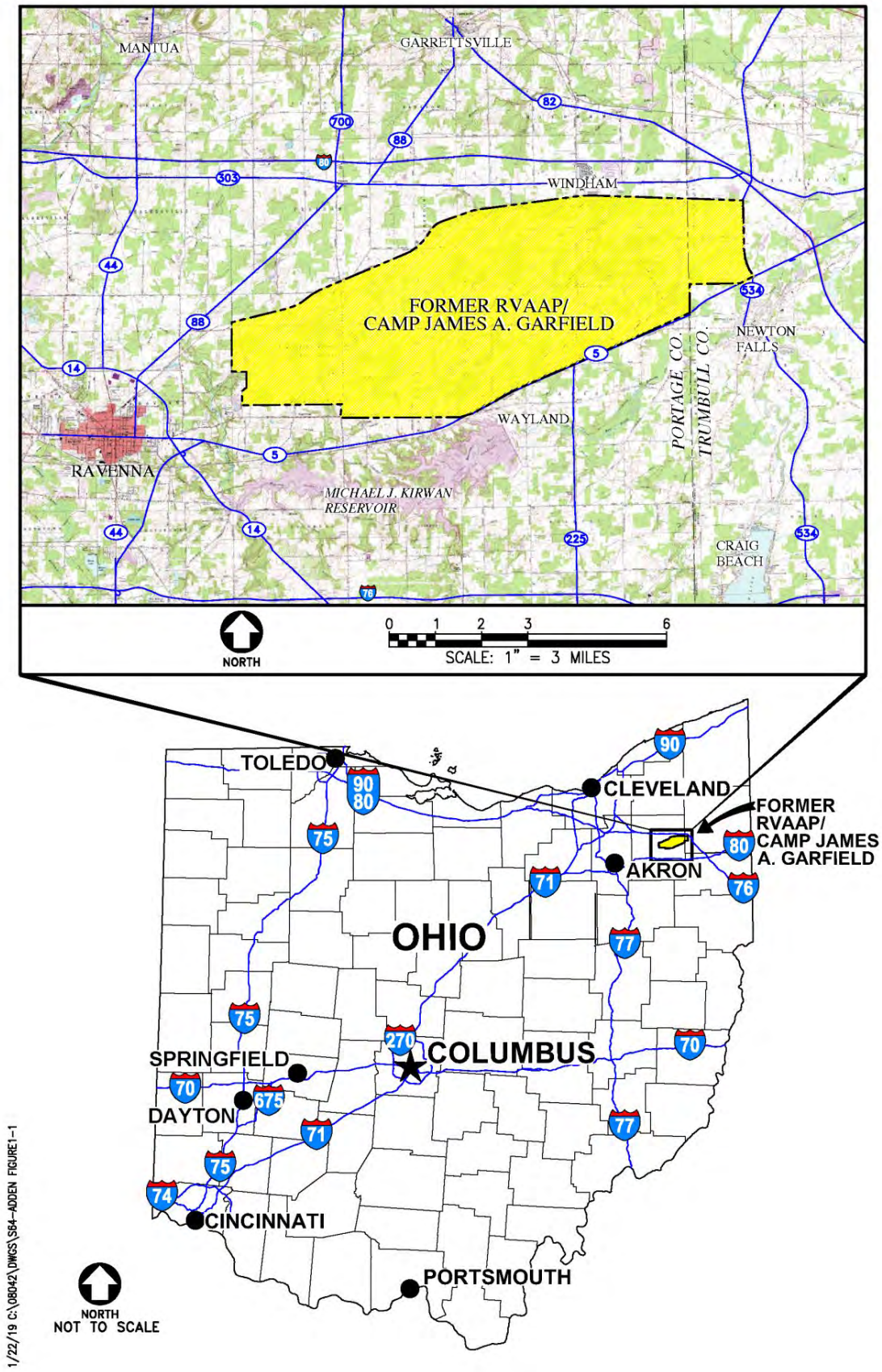


Figure 2-1. General Location and Orientation of the Former RVAAP/CJAG

THIS PAGE INTENTIONALLY LEFT BLANK.

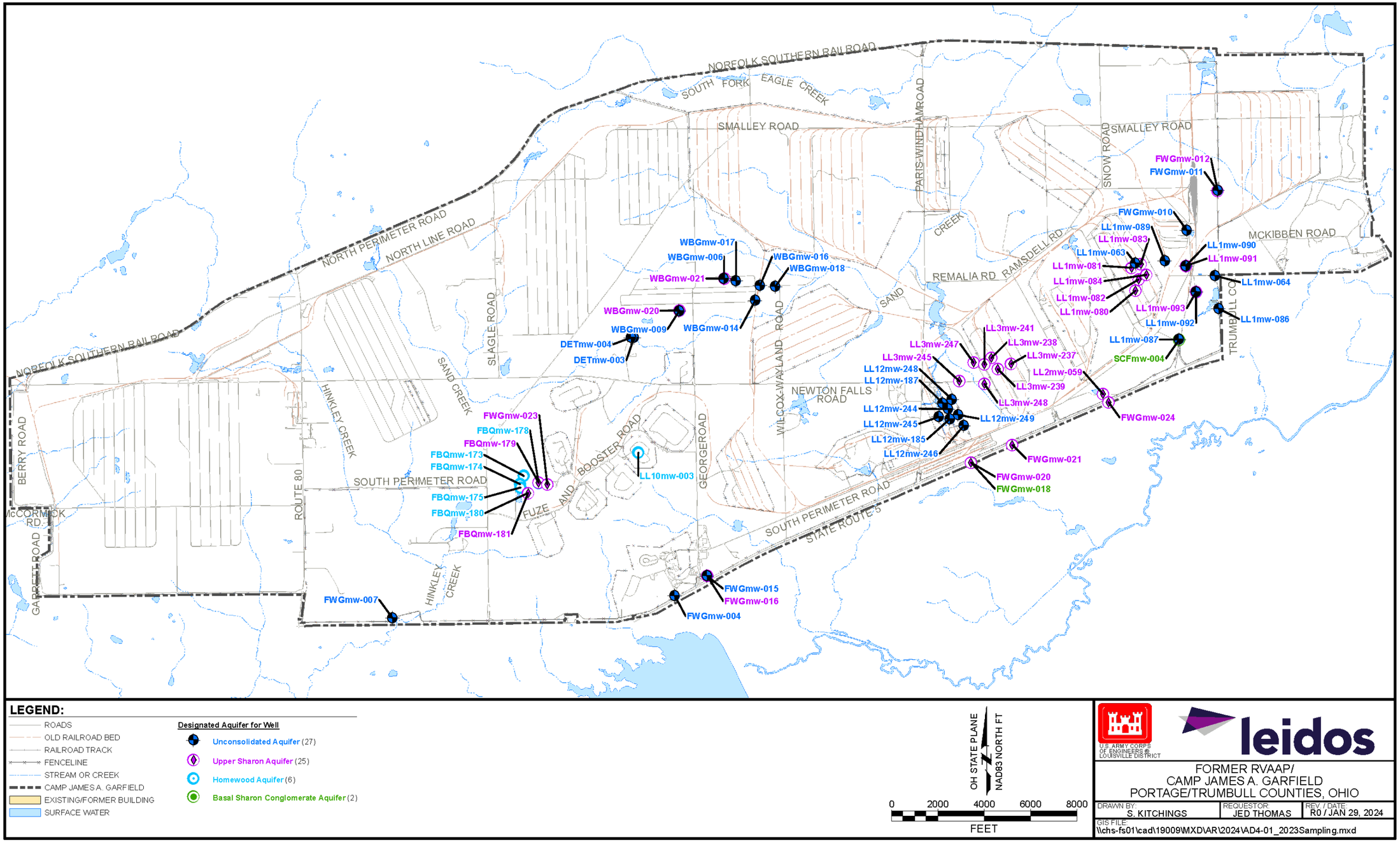


Figure 3-1. 2025 FWGWMP Wells

THIS PAGE INTENTIONALLY LEFT BLANK.

APPENDIX A

FWGWMP GROUNDWATER SCREENING LEVELS

THIS PAGE INTENTIONALLY LEFT BLANK.

FWGWMP Groundwater Screening Levels

Zone	Analysis Type	Chemical	Units	CASRN	NGT CUG	Resident CUG	MCL	Tap Water RSL*	Background	Groundwater Screening Level	Groundwater Screening Level Source
Same for all zones	Anions	Nitrate	mg/L	14797-55-8	52.283	1.666	10	3.2	N/A	10	MCL
Same for all zones	Anions	Nitrite	mg/L	14797-65-0			1	0.2	N/A	1	MCL
Same for all zones	Anions	Sulfate	mg/L	14808-79-8					N/A		
Same for all zones	Anions	Sulfide	mg/L	18496-25-8					N/A		
Same for all zones	Explosives/Propellants	1,3,5-Trinitrobenzene	µg/L	99-35-4				59	N/A	59	RSL
Same for all zones	Explosives/Propellants	1,3-DNB	µg/L	99-65-0	3.28	0.104		0.2	N/A	0.2	RSL
Same for all zones	Explosives/Propellants	TNT	µg/L	118-96-7	16.4	0.521		0.98	N/A	0.98	RSL
Same for all zones	Explosives/Propellants	2,4-Diamino-6-nitrotoluene	µg/L	6629-29-4					N/A		
Same for all zones	Explosives/Propellants	2,4-DNT	µg/L	121-14-2	1.29	0.12		0.24	N/A	0.24	RSL
Same for all zones	Explosives/Propellants	2,6-Diamino-4-nitrotoluene	µg/L	59229-75-3					N/A		
Same for all zones	Explosives/Propellants	2,6-DNT	µg/L	606-20-2	1.31	0.122		0.049	N/A	0.122	RA
Same for all zones	Explosives/Propellants	2-Amino-4,6-DNT	µg/L	35572-78-2	6.55	0.209		0.19	N/A	0.209	RA
Same for all zones	Explosives/Propellants	2-Nitrotoluene	µg/L	88-72-2	3.99	0.37		0.31	N/A	0.37	RA
Same for all zones	Explosives/Propellants	3,5-Dinitroaniline	µg/L	618-87-1				0.77	N/A	0.77	RSL
Same for all zones	Explosives/Propellants	3-Nitrotoluene	µg/L	99-08-1				0.17	N/A	0.17	RSL
Same for all zones	Explosives/Propellants	4-Amino-2,6-DNT	µg/L	19406-51-0	6.55	0.209		0.19	N/A	0.209	RA
Same for all zones	Explosives/Propellants	4-Nitrotoluene	µg/L	99-99-0	54	5.01		4.3	N/A	5.01	RA
Same for all zones	Explosives/Propellants	DNX	µg/L	80251-29-2					N/A		
Same for all zones	Explosives/Propellants	HMX	µg/L	2691-41-0				100	N/A	100	RSL
Same for all zones	Explosives/Propellants	MNX	µg/L	5755-27-1					N/A		
Same for all zones	Explosives/Propellants	Nitrobenzene	µg/L	98-95-3	16.4	0.521		0.14	N/A	0.521	RC
Same for all zones	Explosives/Propellants	Nitroglycerin	µg/L	55-63-0	54	5.01		0.2	N/A	5.01	RA
Same for all zones	Explosives/Propellants	PETN	µg/L	78-11-5				17	N/A	17	RSL
Same for all zones	Explosives/Propellants	RDX	µg/L	121-82-4	8.34	0.774		0.97	N/A	0.97	RSL
Same for all zones	Explosives/Propellants	TNX	µg/L	13980-04-6					N/A		
Same for all zones	Explosives/Propellants	Tetryl	µg/L	479-45-8				3.9	N/A	3.9	RSL
Same for all zones	Miscellaneous	Alkalinity	mg/L	N33					N/A		
Same for all zones	Miscellaneous	Ammonia	mg/L	7664-41-7					N/A		
Same for all zones	Miscellaneous	Cyanide	mg/L	57-12-5			0.2	0.00015	N/A	0.2	MCL
Same for all zones	Miscellaneous	TOC	mg/L	N997					N/A		
Same for all zones	PCBs	PCB-1016	µg/L	12674-11-2				0.14	N/A	0.14	RSL
Same for all zones	PCBs	PCB-1221	µg/L	11104-28-2				0.0047	N/A	0.0047	RSL
Same for all zones	PCBs	PCB-1232	µg/L	11141-16-5				0.0047	N/A	0.0047	RSL
Same for all zones	PCBs	PCB-1242	µg/L	53469-21-9	2.29	0.213		0.0078	N/A	0.213	RA
Same for all zones	PCBs	PCB-1248	µg/L	12672-29-6				0.0078	N/A	0.0078	RSL
Same for all zones	PCBs	PCB-1254	µg/L	11097-69-1	0.655	0.021		0.0078	N/A	0.021	RC
Same for all zones	PCBs	PCB-1260	µg/L	11096-82-5	2.29	0.213		0.0078	N/A	0.213	RA
Same for all zones	Pesticides	4,4'-DDD	µg/L	72-54-8	0.639	0.059		0.032	N/A	0.059	RA
Same for all zones	Pesticides	4,4'-DDE	µg/L	72-55-9	0.503	0.047		0.046	N/A	0.047	RA
Same for all zones	Pesticides	4,4'-DDT	µg/L	50-29-3	0.294	0.027		0.23	N/A	0.23	RSL
Same for all zones	Pesticides	Aldrin	µg/L	309-00-2	0.051	0.005		0.00092	N/A	0.005	RA
Same for all zones	Pesticides	Dieldrin	µg/L	60-57-1	0.038	0.004		0.0018	N/A	0.004	RA
Same for all zones	Pesticides	Endosulfan I	µg/L	959-98-8				10	N/A	10	RSL
Same for all zones	Pesticides	Endosulfan II	µg/L	33213-65-9				10	N/A	10	RSL
Same for all zones	Pesticides	Endosulfan sulfate	µg/L	1031-07-8				11	N/A	11	RSL
Same for all zones	Pesticides	Endrin	µg/L	72-20-8			2	0.23	N/A	2	MCL
Same for all zones	Pesticides	Endrin aldehyde	µg/L	7421-93-4				0.23	N/A	0.23	RSL
Same for all zones	Pesticides	Endrin ketone	µg/L	53494-70-5				0.23	N/A	0.23	RSL
Same for all zones	Pesticides	Heptachlor	µg/L	76-44-8	0.153	0.014	0.4	0.0014	N/A	0.4	MCL
Same for all zones	Pesticides	Heptachlor epoxide	µg/L	1024-57-3	0.101	0.009	0.2	0.0014	N/A	0.2	MCL
Same for all zones	Pesticides	Lindane	µg/L	58-89-9	0.55	0.051	0.2	0.042	N/A	0.2	MCL
Same for all zones	Pesticides	Methoxychlor	µg/L	72-43-5			40	3.7	N/A	40	MCL

FWGWMP Groundwater Screening Levels (Continued)

Zone	Analysis Type	Chemical	Units	CASRNo	NGT CUG	Resident CUG	MCL	Tap Water RSL*	Background	Groundwater Screening Level	Groundwater Screening Level Source
Same for all zones	Pesticides	Toxaphene	µg/L	8001-35-2	0.518	0.048	3	0.071	N/A	3	MCL
Same for all zones	Pesticides	alpha-BHC	µg/L	319-84-6	0.146	0.014		0.0072	N/A	0.014	RA
Same for all zones	Pesticides	alpha-Chlordane	µg/L	5103-71-9				0.36	N/A	0.36	RSL
Same for all zones	Pesticides	beta-BHC	µg/L	319-85-7	0.51	0.047		0.025	N/A	0.047	RA
Same for all zones	Pesticides	delta-BHC	µg/L	319-86-8					N/A		
Same for all zones	Pesticides	gamma-Chlordane	µg/L	5103-74-2				1	N/A	1	RSL
Same for all zones	SVOCs	1-Methylnaphthalene	µg/L	90-12-0				0.00063	N/A	0.00063	RSL
Same for all zones	SVOCs	2,4,5-Trichlorophenol	µg/L	95-95-4				120	N/A	120	RSL
Same for all zones	SVOCs	2,4,6-Trichlorophenol	µg/L	88-06-2				1.2	N/A	1.2	RSL
Same for all zones	SVOCs	2,4-Dichlorophenol	µg/L	120-83-2				4.6	N/A	4.6	RSL
Same for all zones	SVOCs	2,4-Dimethylphenol	µg/L	105-67-9				36	N/A	36	RSL
Same for all zones	SVOCs	2,4-Dinitrophenol	µg/L	51-28-5				3.9	N/A	3.9	RSL
Same for all zones	SVOCs	2,4-DNT	µg/L	121-14-2	1.29	0.12		0.24	N/A	0.24	RSL
Same for all zones	SVOCs	2,6-DNT	µg/L	606-20-2	1.31	0.122		0.049	N/A	0.122	RA
Same for all zones	SVOCs	2-Chlorophenol	µg/L	95-57-8				9.1	N/A	9.1	RSL
Same for all zones	SVOCs	2-Methyl-4,6-dinitrophenol	µg/L	534-52-1				0.15	N/A	0.15	RSL
Same for all zones	SVOCs	2-Methylnaphthalene	µg/L	91-57-6				3.6	N/A	3.6	RSL
Same for all zones	SVOCs	2-Methylphenol	µg/L	95-48-7				93	N/A	93	RSL
Same for all zones	SVOCs	2-Nitrophenol	µg/L	88-75-5					N/A		
Same for all zones	SVOCs	4-Chloro-3-methylphenol	µg/L	59-50-7				140	N/A	140	RSL
Same for all zones	SVOCs	4-Nitrophenol	µg/L	100-02-7					N/A		
Same for all zones	SVOCs	Acenaphthene	µg/L	83-32-9				53	N/A	53	RSL
Same for all zones	SVOCs	Acenaphthylene	µg/L	208-96-8				12	N/A	12	RSL
Same for all zones	SVOCs	Anthracene	µg/L	120-12-7				180	N/A	180	RSL
Same for all zones	SVOCs	Benz(a)anthracene	µg/L	56-55-3	0.042	0.004		0.03	N/A	0.03	RSL
Same for all zones	SVOCs	Benzo(a)pyrene	µg/L	50-32-8	0.002	0.00023	0.2	0.025	N/A	0.2	MCL
Same for all zones	SVOCs	Benzo(b)fluoranthene	µg/L	205-99-2	0.024	0.002		0.25	N/A	0.25	RSL
Same for all zones	SVOCs	Benzo(ghi)perylene	µg/L	191-24-2				12	N/A	12	RSL
Same for all zones	SVOCs	Benzo(k)fluoranthene	µg/L	207-08-9				2.5	N/A	2.5	RSL
Same for all zones	SVOCs	Bis(2-ethylhexyl)phthalate	µg/L	117-81-7	9.7	0.9	6	5.6	N/A	6	MCL
Same for all zones	SVOCs	Butyl benzyl phthalate	µg/L	85-68-7				16	N/A	16	RSL
Same for all zones	SVOCs	Chrysene	µg/L	218-01-9				25	N/A	25	RSL
Same for all zones	SVOCs	Di-n-butyl phthalate	µg/L	84-74-2				90	N/A	90	RSL
Same for all zones	SVOCs	Di-n-octylphthalate	µg/L	117-84-0				20	N/A	20	RSL
Same for all zones	SVOCs	Dibenz(a,h)anthracene	µg/L	53-70-3	0.002	0.00015		0.025	N/A	0.025	RSL
Same for all zones	SVOCs	Diethyl phthalate	µg/L	84-66-2				1500	N/A	1500	RSL
Same for all zones	SVOCs	Dimethyl phthalate	µg/L	131-11-3					N/A		
Same for all zones	SVOCs	Fluoranthene	µg/L	206-44-0				80	N/A	80	RSL
Same for all zones	SVOCs	Fluorene	µg/L	86-73-7				29	N/A	29	RSL
Same for all zones	SVOCs	Indeno(1,2,3-cd)pyrene	µg/L	193-39-5	0.024	0.002		0.25	N/A	0.25	RSL
Same for all zones	SVOCs	Naphthalene	µg/L	91-20-3				0.12	N/A	0.12	RSL
Same for all zones	SVOCs	Nitrobenzene	µg/L	98-95-3	16.4	0.521		0.14	N/A	0.521	RC
Same for all zones	SVOCs	Pentachlorophenol	µg/L	87-86-5	0.797	0.074	1	0.041	N/A	1	MCL
Same for all zones	SVOCs	Phenanthrene	µg/L	85-01-8				12	N/A	12	RSL
Same for all zones	SVOCs	Phenol	µg/L	108-95-2				580	N/A	580	RSL
Same for all zones	SVOCs	Pyrene	µg/L	129-00-0				12	N/A	12	RSL
Same for all zones	SVOCs	Total Cresols	µg/L	1319-77-3				150	N/A	150	RSL
Same for all zones	VOCs	1,1,1-Trichloroethane	µg/L	71-55-6			200	800	N/A	800	RSL
Same for all zones	VOCs	1,1,2,2-Tetrachloroethane	µg/L	79-34-5	0.744	0.069		0.076	N/A	0.076	RSL
Same for all zones	VOCs	1,1,2-Trichloroethane	µg/L	79-00-5			5	0.041	N/A	5	MCL
Same for all zones	VOCs	1,1-Dichloroethane	µg/L	75-34-3				2.8	N/A	2.8	RSL
Same for all zones	VOCs	1,1-Dichloroethene	µg/L	75-35-4			7	28	N/A	28	RSL

FWGWMP Groundwater Screening Levels (Continued)

Zone	Analysis Type	Chemical	Units	CASRN	NGT CUG	Resident CUG	MCL	Tap Water RSL*	Background	Groundwater Screening Level	Groundwater Screening Level Source
Same for all zones	VOCs	1,2-Dibromoethane	µg/L	106-93-4			0.05	0.0075	N/A	0.05	MCL
Same for all zones	VOCs	1,2-Dichloroethane	µg/L	107-06-2	1.67	0.155	5	0.17	N/A	5	MCL
Same for all zones	VOCs	1,2-Dichloroethene	µg/L	540-59-0			70	3.6	N/A	70	MCL
Same for all zones	VOCs	1,2-Dichloropropane	µg/L	78-87-5			5	0.82	N/A	5	MCL
Same for all zones	VOCs	2-Butanone	µg/L	78-93-3				560	N/A	560	RSL
Same for all zones	VOCs	2-Hexanone	µg/L	591-78-6				3.8	N/A	3.8	RSL
Same for all zones	VOCs	4-Methyl-2-pentanone	µg/L	108-10-1				630	N/A	630	RSL
Same for all zones	VOCs	Acetone	µg/L	67-64-1				1800	N/A	1800	RSL
Same for all zones	VOCs	Benzene	µg/L	71-43-2	4.64	0.431	5	0.46	N/A	5	MCL
Same for all zones	VOCs	Bromobenzene	µg/L	108-86-1				6.2	N/A	6.2	RSL
Same for all zones	VOCs	Bromochloromethane	µg/L	74-97-5				8.3	N/A	8.3	RSL
Same for all zones	VOCs	Bromodichloromethane	µg/L	75-27-4			80	0.13	N/A	80	MCL
Same for all zones	VOCs	Bromoform	µg/L	75-25-2			80	3.3	N/A	80	MCL
Same for all zones	VOCs	Bromomethane	µg/L	74-83-9				0.75	N/A	0.75	RSL
Same for all zones	VOCs	Carbon disulfide	µg/L	75-15-0				81	N/A	81	RSL
Same for all zones	VOCs	Carbon tetrachloride	µg/L	56-23-5	2.2	0.204	5	0.46	N/A	5	MCL
Same for all zones	VOCs	Chlorobenzene	µg/L	108-90-7			100	7.8	N/A	100	MCL
Same for all zones	VOCs	Chloroethane	µg/L	75-00-3				830	N/A	830	RSL
Same for all zones	VOCs	Chloroform	µg/L	67-66-3	2.23	0.207	80	0.22	N/A	80	MCL
Same for all zones	VOCs	Chloromethane	µg/L	74-87-3				19	N/A	19	RSL
Same for all zones	VOCs	Dibromochloromethane	µg/L	124-48-1			80	0.87	N/A	80	MCL
Same for all zones	VOCs	Ethylbenzene	µg/L	100-41-4			700	1.5	N/A	700	MCL
Same for all zones	VOCs	Methylene chloride	µg/L	75-09-2	57.5	5.34	5	11	N/A	11	RSL
Same for all zones	VOCs	Styrene	µg/L	100-42-5			100	120	N/A	120	RSL
Same for all zones	VOCs	Tetrachloroethene	µg/L	127-18-4	1.05	0.098	5	4.1	N/A	5	MCL
Same for all zones	VOCs	Toluene	µg/L	108-88-3			1000	110	N/A	1000	MCL
Same for all zones	VOCs	Trichloroethene	µg/L	79-01-6	0.336	0.031	5	0.28	N/A	5	MCL
Same for all zones	VOCs	Vinyl chloride	µg/L	75-01-4			2	0.019	N/A	2	MCL
Same for all zones	VOCs	Xylenes, total	µg/L	1330-20-7			10000	19	N/A	10000	MCL
Same for all zones	VOCs	cis-1,3-Dichloropropene	µg/L	10061-01-5				0.47	N/A	0.47	RSL
Same for all zones	VOCs	trans-1,3-Dichloropropene	µg/L	10061-02-6				0.47	N/A	0.47	RSL
Unconsolidated	Metals, Total/Filtered	Aluminum	mg/L	7429-90-5	31.981	1.028		2	0.386	2	RSL
Unconsolidated	Metals, Total/Filtered	Antimony	mg/L	7440-36-0	0.0117	0.00039	0.006	0.00078	N/A	0.006	MCL
Unconsolidated	Metals, Total/Filtered	Arsenic	mg/L	7440-38-2	0.000608	5.60E-05	0.01	5.20E-05	0.003	0.01	MCL
Unconsolidated	Metals, Total/Filtered	Barium	mg/L	7440-39-3	6.332	0.204	2	0.38	0.034	2	MCL
Unconsolidated	Metals, Total/Filtered	Beryllium	mg/L	7440-41-7			0.004	0.0025	N/A	0.004	MCL
Unconsolidated	Metals, Total/Filtered	Cadmium	mg/L	7440-43-9	0.0132	0.00046	0.005	0.00018	N/A	0.005	MCL
Unconsolidated	Metals, Total/Filtered	Calcium	mg/L	7440-70-2					107	0.107	BKG
Unconsolidated	Metals, Total/Filtered	Chromium	mg/L	7440-47-3	33.087	1.214	0.1	2.2	0.002	2.2	RSL
Unconsolidated	Metals, Total/Filtered	Cobalt	mg/L	7440-48-4	0.654	0.0208		0.0006	0.00083	0.0208	RC
Unconsolidated	Metals, Total/Filtered	Copper	mg/L	7440-50-8			1.3	0.08	0.005	1.3	MCL
Unconsolidated	Metals, Total/Filtered	Iron	mg/L	7439-89-6	9.671	0.31		1.4	1.91	1.91	BKG
Unconsolidated	Metals, Total/Filtered	Lead	mg/L	7439-92-1			0.015	0.015	0.00099	0.015	MCL
Unconsolidated	Metals, Total/Filtered	Magnesium	mg/L	7439-95-4					55.3	55.3	BKG
Unconsolidated	Metals, Total/Filtered	Manganese	mg/L	7439-96-5	1.421	0.0463		0.043	0.075	0.075	BKG
Unconsolidated	Metals, Total/Filtered	Mercury	mg/L	7439-97-6			0.002	6.30E-05	N/A	0.002	MCL
Unconsolidated	Metals, Total/Filtered	Nickel	mg/L	7440-02-0	0.654	0.0208		0.039	0.002	0.039	RSL
Unconsolidated	Metals, Total/Filtered	Potassium	mg/L	9/7/7440					4.84	4.84	BKG
Unconsolidated	Metals, Total/Filtered	Selenium	mg/L	7782-49-2			0.05	0.01	0.00099	0.05	MCL
Unconsolidated	Metals, Total/Filtered	Silver	mg/L	7440-22-4				0.0094	0	0.0094	RSL
Unconsolidated	Metals, Total/Filtered	Sodium	mg/L	7440-23-5					18.2	18.2	BKG
Unconsolidated	Metals, Total/Filtered	Thallium	mg/L	7440-28-0	0.00261	8.30E-05	0.002	2.00E-05	N/A	0.002	MCL

FWGWMP Groundwater Screening Levels (Continued)

Zone	Analysis Type	Chemical	Units	CASRN	NGT CUG	Resident CUG	MCL	Tap Water RSL*	Background	Groundwater Screening Level	Groundwater Screening Level Source
Unconsolidated	Metals, Total/Filtered	Vanadium	mg/L	7440-62-2	0.185	0.00638		0.0086	0.0005	0.0086	RSL
Unconsolidated	Metals, Total/Filtered	Zinc	mg/L	7440-66-6	9.756	0.312		0.6	0.005	0.6	RSL

*Tap Water RSL (May 2024)

µg/L = Micrograms per Liter
BHC = Hexachlorocyclohexane
BKG = Background
CASRN = Chemical Abstracts Service Registry Number
CUG = Cleanup Goal
DDD = Dichlorodiphenyldichloroethane
DDE = Dichlorodiphenyldichloroethylene
DDT = Dichlorodiphenyltrichloroethane
DNB = Dinitrobenzene
DNT = Dinitrotoluene
DNX = Hexahydro-1,3-Dinitroso-5-Dinitro-1,3,5-Triazine
FWGWMP = Facility-wide Groundwater Monitoring Plan
HMX = Octahydro-1,3,5,7-Tetranitro-1,3,5,7-Tetrazocine
MCL = Maximum Contaminant Level
mg/L = Milligrams per Liter
MNX = Hexahydro-1-Nitroso-3,5-Dinitro-1,3,5-Triazine
N/A = Not Applicable
NGT = National Guard Trainee
PCB = Polychlorinated Biphenyl
PETN = Pentaerythritol Tetranitrate
RA = Resident Adult Facility-wide Cleanup Goal
RC = Resident Child Facility-wide Cleanup Goal
RDX = Hexahydro-1,3,5-Trinitro-1,3,5-Triazine
RSL = Regional Screening Level
SVOC = Semivolatile Organic Compound
TNT = Trinitrotoluene
TNX = Hexahydro-1,3,5-Trinitroso-1,3,5-Triazine
TOC = Total Organic Carbon
VOC = Volatile Organic Compound

APPENDIX B

OHIO EPA CORRESPONDENCE

THIS PAGE INTENTIONALLY LEFT BLANK.

Received August 28, 2025

August 27, 2025

TRANSMITTED ELECTRONICALLY

Ms. Kathryn Tait
Environmental Specialist 3
Ohio Adjutant General's Department
Camp James A Garfield JMTC
Attn: Environmental Office (Bldg 1071)
8451 State Route 5
Ravenna, OH 44266

RE: US Army Ammunition Plt RVAAP
Remediation Response
Approval
Project Records
Remedial Response
Portage County
ID#267000859036

Sent via email to: kathryn.s.tait.nfg@army.mil

Subject: Former Ravenna Army Ammunition Plant
Responses to Comments on the *Draft RVAAP-66 Facility-wide Groundwater Addendum for 2025*, dated June 9, 2025
Ohio EPA – Request for Final Report

Dear Ms. Tait:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the *RVAAP-66 Facility-Wide Groundwater, Responses to Comments on the Draft RVAAP-66 Facility-wide Groundwater Addendum for 2025 (Responses to Comments Draft FWGWMP Addendum for 2025)*[1] for the Former Ravenna Army Ammunition Plant (RVAAP), Portage and Trumbull Counties, Ohio dated June 9, 2025. This document was received via email by Ohio EPA's Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) on June 9, 2025. The response letter was prepared on behalf of the Army National Guard Bureau by Ohio Army National Guard/Leidos.

Based on our review of the Army National Guard's Response to Ohio EPA comments provided in your letter dated June 9, 2025, we find the responses generally acceptable, and the document can be finalized. Please be sure that all agreed-upon changes, additions, and clarifications are provided in the final document.

[1] http://edocpub.epa.ohio.gov/publicportal/ViewDocument.aspx?docid=3757805

This letter is an official response from Ohio EPA that will be maintained as a public record. If you have questions or would like to set up a meeting to discuss these comments, you can contact me at liam.mcevoy@epa.ohio.gov or call me at (330) 963-1181.

Sincerely,

Liam P. McEvoy, PG
Geologist III
Division of Environmental Response and Revitalization

LPM/cm

ec: Kevin Sedlak, Army National Guard Directorate
Natalie Oryshkewych, Ohio EPA, NEDO DERR
Megan Oravec, Ohio EPA, NEDO DERR
Craig Kowalski, Ohio EPA, NEDO DERR
Thomas Schneider, Ohio EPA, SWDO DERR
Carrie Rasik, Ohio EPA, CO DERR
Doug Switzer, Ohio EPA, CO DERR

Ohio Army National Guard
Camp James A. Garfield Joint Military Training Center
8451 State Route 5, Building 1071
Ravenna, Ohio 44266

June 9, 2025

Ohio Environmental Protection Agency
DERR-NEDO
Attn: Mr. Liam McEvoy, Site Coordinator
2110 East Aurora Road
Twinsburg, OH 44087-1924

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, RVAAP-66 Facility-Wide Groundwater, Responses to Comments on the Draft RVAAP-66 Facility-wide Groundwater Addendum for 2025 (Work Activity No. 267-000-859-036)

Dear Mr. McEvoy:

The Army appreciates your comments on the Draft Facility-wide Groundwater Monitoring Program Plan, RVAAP-66 Facility-wide Groundwater, Addendum for 2025. Enclosed for your review are responses to your comments. Upon final resolution of the comments, the Army will provide a Final version of the addendum for Ohio EPA concurrence.

These comment responses were prepared for the Army National Guard in support of the RVAAP Restoration Program. Please contact the undersigned at (614) 336-6136 or kathryn.s.tait.nfg@army.mil or Kevin Sedlak, ARNG Restoration Project Manager, at (330) 235-2153 or kevin.m.sedlak.ctr@army.mil if there are issues or concerns with this submission.

Sincerely,

TAIT.KATHRYN.SERENA.1289508275 Digitally signed by TAIT.KATHRYN.SERENA.1289508275 Date: 2025.06.09 10:25:11 -04'00'

Kathryn S. Tait
Environmental Specialist 3
Ohio Army National Guard

cc:
Megan Oravec, Ohio EPA
Tom Schneider, Ohio EPA
Kevin Sedlak, ARNG (Plateau GRP)
Steve Kvaal, USACE Louisville
Jay Trumble, USACE Louisville
Jed Thomas, Leidos
Ryan Laurich, Leidos
Jennifer Tierney, Chenega (Admin Record)

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, RVAAP-66 Facility-Wide Groundwater, Responses to Comments on the Draft RVAAP-66 Facility-wide Groundwater Addendum for 2025 (Work Activity No. 267-000-859-036)

COMMENTS

Ohio EPA Comment 1 Conditional Concurrence with the 2025 Sampling Scheme:

The Draft FWGWMP Addendum for 2025, within Section 3.0 Scope of Work, references that a total of 60 wells have been selected for sampling during 2025. These consist of the same 60 wells that had been selected for 2024 sampling.

Data for some explosives were rejected from the Spring 2024 data due to lab quality parameters. These affected wells will be resampled to recollect explosives that were rejected in Spring 2024. The proposed analytical testing suites as well as the analytical testing methods proposed for 2025 remained the same as the 2024 sampling. No additional wells or sampling is being recommended, and Ohio EPA conditionally concurs with this *Draft FWGWMP Addendum for 2025* pending response from Comment 2 below.

Army Response: Comment noted and agree.

Ohio EPA Comment 2 Sampling Analysis Clarifications:

In 2024, numerous analytical testing suites were discontinued from previous 2023 and earlier sampling, either cut back from previous well analytical or analyses were eliminated altogether. Analytical suites that appear to be missing include, but are not limited to, cyanide, nitrate, nitrite, sulfate, sulfide, alkalinity, TPH (GRO and DRO), and total organic carbon.

It does not appear rationale was provided within the text from the 2023 Annual Report or in the 2024 Addendum regarding removal of these analyses.

The *2024 Addendum* states in Table 3-1: Recommended FWGWMP Wells for 2024 for example for well FBQmw-173 “Continue to monitor for explosives and assess effectiveness of MNA (anions, TOC, alkalinity, pH, and expanded explosives, which include explosive daughter products) as a remedial option” from 2023 sampling recommendations and “Continue monitoring for explosives to support the FS and future remedial decisions” for 2024 sampling. These recommendations appear similar since they do not specifically say that certain analyses will be eliminated nor the rationale for doing so. The results are presented in the addendum Table 3-1, but it doesn’t state that certain analyses will be omitted based on these results as has been the case in previous year’s iterations of this table.

Please provide rationale for removing certain analyses and make that rationale more clear in the text and tables of the annual addendums and the text and tables of the annual reports.

Army Response: Clarification and agree. Table 3-1 of the annual addendums have been modified to add a column that specifies "Rationale for Excluding Previous Year's Analyses". This will ensure the 2025 Addendum and future year addendums address this request. Please note the following:

1) There are no changes in the proposed analytical suite from 2024 to 2025.
2) Cyanide was not removed as an analytical suite, and that a summary is provided to document it remains a part of the analytical suite for monitoring wells DETmw-003 and DETmw-004.
3) The MNA parameters (anions, TOC, alkalinity, pH, and expanded explosives, which include explosive daughter products) were not analyzed for in 2024. The data collected in 2023 was adequate for supporting the FS. As these were not collected in 2024, the 2025 Addendum does not address these chemicals.
4) TPH (GRO and DRO) were not analyzed in 2024. They were analyzed from groundwater collected in 2023 from temporary well 071tw-001 that has since been abandoned. As these were not collected in 2024, the 2025 Addendum does not address these chemicals.

April 18, 2025

Received April 21, 2025

TRANSMITTED ELECTRONICALLY

Ms. Kathryn Tait
Camp James A Garfield JMTC
Environmental Office, Bldg. 1071
8451 State Route 5
Ravenna, OH 44266

RE: US Army Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
ID#267000859036

Sent via email to: kathryn.s.tait.nfg@army.mil

Subject: **Former Ravenna Army Ammunition Plant**
Draft Facility-wide Groundwater Monitoring Program Plan RVAAP-66 Facility-wide Groundwater Addendum for 2025
Ohio EPA – Comments and Request for Additional Information

Dear Ms. Tait:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the *Draft Facility-Wide Ground Water Monitoring Program (FWGWMP) RVAAP-66 Facility-wide Groundwater Addendum for 2025 (Draft FWGWMP Addendum for 2025*)[1] for the Former Ravenna Army Ammunition Plant (RVAAP), Portage and Trumbull Counties, Ohio dated February 13, 2025. This document was received via email by Ohio EPA's Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) on February 13, 2025. Comments on the document based on Ohio EPA review are provided below. Please provide responses to the enclosed comments in accordance with the Directors Findings and Orders.

COMMENTS

1. **Conditional Concurrence with the 2025 Sampling Scheme:**

   The *Draft FWGWMP Addendum for 2025*, within Section 3.0 Scope of Work, references that a total of 60 wells have been selected for sampling during 2025. These consist of the same 60 wells that had been selected for 2024 sampling.

   Data for some explosives were rejected from the Spring 2024 data due to lab quality parameters. These affected wells will be resampled to recollect explosives that were rejected in Spring 2024. The proposed analytical testing suites as well as the analytical testing methods proposed for 2025 remained the same

[1] http://edocpub.epa.ohio.gov/publicportal/ViewDocument.aspx?docid=3431247 - Draft FWGWMP RVAAP-66 Facility-wide Groundwater Addendum for 2025

as the 2024 sampling. No additional wells or sampling is being recommended, and Ohio EPA conditionally concurs with this *Draft FWGWMP Addendum for 2025* pending response from Comment 2 below.

2. **Sampling Analysis Clarifications:**

   In 2024, numerous analytical testing suites were discontinued from previous 2023 and earlier sampling, either cut back from previous well analytical or analyses were eliminated altogether. Analytical suites that appear to be missing include, but are not limited to, cyanide, nitrate, nitrite, sulfate, sulfide, alkalinity, TPH (GRO and DRO), and total organic carbon.

   It does not appear rationale was provided within the text from the *2023 Annual Report* or in the *2024 Addendum* regarding removal of these analyses.

   The *2024 Addendum* states in *Table 3-1: Recommended FWGWMP Wells for 2024* for example for well FBQmw-173 "Continue to monitor for explosives and assess effectiveness of MNA (anions, TOC, alkalinity, pH, and expanded explosives, which include explosive daughter products) as a remedial option" from 2023 sampling recommendations and "Continue monitoring for explosives to support the FS and future remedial decisions" for 2024 sampling. These recommendations appear similar since they do not specifically say that certain analyses will be eliminated nor the rationale for doing so. The results are presented in the addendum Table 3-1, but it doesn't state that certain analyses will be omitted based on these results as has been the case in previous year's iterations of this table.

   Please provide rationale for removing certain analyses and make that rationale more clear in the text and tables of the annual addendums and the text and tables of the annual reports.

This *Draft Facility-Wide Ground Water Monitoring Program (FWGWMP) RVAAP-66 Facility-wide Groundwater Addendum for 2025* was reviewed by personnel from Ohio EPA. Additional information is necessary to approve the document.

If you have questions or would like to set up a meeting to discuss these comments, you can contact me at liam.mcevoy@epa.ohio.gov or call me at (330) 963-1181.

Sincerely,

Liam P. McEvoy, PG
Geologist III
Division of Environmental Response and Revitalization

ec: Kevin Sedlak, Army National Guard Directorate
Natalie Oryshkewych, Ohio EPA, NEDO DERR
Megan Oravec, Ohio EPA, NEDO DERR
Craig Kowalski, Ohio EPA, NEDO DERR
Thomas Schneider, Ohio EPA, SWDO DERR
Carrie Rasik, Ohio EPA, CO DERR
Doug Switzer, Ohio EPA, CO DERR

LPM/cm

THIS PAGE INTENTIONALLY LEFT BLANK.