

Final

**Facility-wide Groundwater Monitoring Program Plan
RVAAP-66 Facility-wide Groundwater
Addendum for 2023**

**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:



**8866 Commons Boulevard, Suite 201
Twinsburg, Ohio 44087**

May 3, 2023

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**Facility-wide Groundwater Monitoring Program Plan
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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 2023. 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 2023 FWGWMP activities.

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May 30, 2023

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Subject: Approval of the “Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, Final Facility-wide Groundwater 2023 Addendum” dated May 3, 2023

Dear Mr. Sedlak:

The Ohio Environmental Protection Agency (Ohio EPA) has received the “Final Facility-wide Groundwater Monitoring Program Plan 2023 Addendum” for the Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio dated May 3, 2023. This document was received via email by Ohio EPA’s Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) on May 3, 2023. The document was prepared for the U.S Army Corps of Engineers on behalf of the Army National Guard Directorate by Leidos.

The final document was reviewed by personnel from Ohio EPA’s DERR. Pursuant to the Director’s Findings and Orders paragraph 39 (b), Ohio EPA considers the document final and approved.

If you have any questions, please contact me at kevin.palombo@epa.ohio.gov or (330) 963-1292.

Sincerely,

A handwritten signature in black ink, appearing to read "Kevin M. Palombo".

Kevin M. Palombo, Environmental Specialist
Division of Environmental Response and Revitalization

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Received 31 May 2023

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CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

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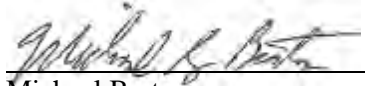
Notice is hereby given that an independent technical review, that is appropriate to the level of risk and complexity inherent in the project, has been conducted. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, 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.



Jed Thomas, P.E., PMP
Study/Design Team Leader

May 3, 2023

Date




Michael Barta
Independent Technical Review Team Leader

May 3, 2023

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
Senior Program Manager

May 3, 2023

Date

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Final

**Facility-wide Groundwater Monitoring Program Plan
RVAAP-66 Facility-wide Groundwater
Addendum for 2023**

**Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio**

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

Prepared for:

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May 3, 2023

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ARNG = Army National Guard
CO = Central Office
NEDO = Northeast District Office
OHARNG = Ohio Army National Guard
Ohio EPA = Ohio Environmental Protection Agency
SWDO = Southwest District Office
USACE = U.S. Army Corps of Engineers

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Appendix A. Ohio EPA Correspondence

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
COC	Chemical of Concern
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
IRP	Installation Restoration Program
Ohio EPA	Ohio Environmental Protection Agency
P.E.	Professional Engineer
PMP	Project Management Professional
PP	Proposed Plan
PWS	Performance Work Statement
QAPP	Quality Assurance Project Plan
REM	Remedial Environmental Manager
RI	Remedial Investigation
RIWP	Remedial Investigation Work Plan
ROD	Record of Decision
RVAAP	Ravenna Army Ammunition Plant
SAP	Sampling and Analysis Plan
USACE	U.S. Army Corps of Engineers

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 (IRP). 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 (PP), Record of Decision (ROD), 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 2023 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 2023.

1.2 OBJECTIVES

The primary objectives of the facility-wide monitoring well network in this 2023 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 2023 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 2023, the frequency of samples to be collected, and the chemicals that will be evaluated at each selected well. Contaminant

trend analysis of the 2022 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 2022 (2022 Annual Report)* (Leidos 2023). 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 2023 FWGWMP.

Wells were selected for inclusion in the 2023 FWGWMP based on the following criteria:

- **FWGWMP Criterion 1:** Wells representing critical exit pathway monitoring points (generally a carryover from the 2022 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:** Co-located 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 301 permanent wells, 48 of which were sampled in 2022. 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 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. This 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.

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3.0 SCOPE OF WORK UNDER THE ADDENDUM

The 2023 Addendum presents information to support the continued monitoring of AOC-specific contaminant concentrations, as indicated by an analysis of results through 2022. Using data and results from the 2022 FWGWMP sampling event and findings of the RI Report (Leidos 2022), the following sections provide an assessment of sampling to be conducted in 2023.

To achieve this objective, 48 wells have been selected for sampling in 2023. 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 2023 SAMPLING SCHEME

There are no revisions to the 2023 sampling scheme. The same forty-eight wells sampled in 2022 will be sampled in 2023. under the FWGWMP.

3.2 CERCLA WELLS

Selection of wells for the 2023 FWGWMP was made based on consideration of the following criteria:

- **FWGWMP Criterion 1:** Sixteen 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:** Eighteen 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:** Eleven co-located 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:** Nineteen 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, FWGmw-010
 - *Load Line 2:* LL2mw-059
 - *Load Line 3:* LL3mw-245
 - *Load Line 12:* LL12mw-244, LL12mw-245, LL12mw-246, FWGmw-018, FWGmw-020
 - *Fuze and Booster Quarry:* FBQmw-173, FWGmw-023.

The list of analytes for 2023 reflects the potential COCs within certain areas or immediately downgradient from potential source areas, as appropriate. Table 3-1 provides a comprehensive summary of the proposed wells, 2022 results summary, and rationale for their inclusion in the 2023 FWGWMP sampling scheme. This table also presents results from wells sampled in 2022 that do not require additional analysis in 2023 (highlighted in gray). Figure 3-1 show the wells to be sampled during the 2023 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 during 2023 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 2023

No.	RVAAP-66 Area	Well Name	Aquifer	2022 FWGWMP Sampling Recommendations	2022 Sampling Results	2023 FWGWMP Sampling Recommendations	FWGWMP Sampling Criterion (See Section 3.2)
1	RVAAP-04 Open Demolition Area #2	DEtmw-003	Unconsolidated	<ul style="list-style-type: none"> In accordance with the DFFO, analytical parameters for this well in 2022 include VOCs, phthalates, PAHs, phenols, PCBs, explosives, pesticides, cyanide, and metals. 	<ul style="list-style-type: none"> Phthalates, phenol, cyanide, nitroaromatics, VOCs, SVOCs, PCBs, or pesticides were not detected in the primary or duplicate samples in Spring or Fall 2022. Explosives were not detected in the primary sample or duplicate samples collected in 2022. All metal concentrations were below the screening level or background concentration, with the exceptions of arsenic, barium, beryllium, thallium, silver, and manganese. Arsenic was detected in the primary and duplicate samples at 0.0095 and 0.0092 mg/L in Spring 2022, respectively, exceeding the background concentration of 0.003 mg/L. Arsenic was detected in the primary and duplicate samples at 0.012 and 0.011 mg/L, respectively, in Fall 2022, exceeding the background concentration of 0.003 mg/L. Barium was detected at 0.045 mg/L in both the primary and duplicate samples in Spring 2022, exceeding the background concentration of 0.034 mg/L. Barium was detected in the primary and duplicate samples at 0.049 and 0.05 mg/L, respectively, in Fall 2022, exceeding the background concentration of 0.034 mg/L. Manganese was detected at a concentration of 0.23 mg/L in both the primary and duplicate samples in Spring 2022, exceeding the background concentration of 0.075 mg/L. Manganese was detected in the primary and duplicate sample at 0.25 mg/L in Fall 2022, exceeding the background concentration of 0.075 mg/L. Beryllium was detected in the duplicate sample at 0.0003J mg/L in Fall 2022. Thallium was detected in the primary and duplicate sample at 0.00011 and 0.003J mg/L, respectively, and silver was detected in the duplicate sample at 0.000033J mg/L in Fall 2022. pH was 6.64 S.U. in Spring 2022 and 7.1 S.U. in Fall 2022. 	<ul style="list-style-type: none"> In accordance with the DFFO, continue to monitor for VOCs, phthalates, PAHs, phenols, PCBs, explosives, pesticides, cyanide, and metals. 	2
2	RVAAP-04 Open Demolition Area #2	DEtmw-004	Unconsolidated	<ul style="list-style-type: none"> In accordance with the DFFO, analytical parameters for this well in 2022 include VOCs, phthalates, PAHs, phenols, PCBs, explosives, pesticides, cyanide, and metals. 	<ul style="list-style-type: none"> VOCs, SVOCs, pesticides, phthalates, phenol nitroaromatics, cyanide, PAHs, and PCBs were not detected in Spring and Fall 2022. All metal and explosive concentrations were below the screening level or background concentration with the exceptions of barium cadmium, manganese, calcium, thallium, and zinc. Barium was detected at 0.057 mg/L in Spring 2022 and 0.066 mg/L in Fall 2022; both concentrations exceed the background concentration of 0.034 mg/L. Calcium was detected at 130 mg/L in Spring and Fall 2022, which exceeds the background concentration of 107 mg/L. Cadmium was detected at 0.00045J in Spring 2022. Manganese was detected at 0.2 mg/L in Fall 2022, which exceeds the background concentration of 0.075 mg/L. Thallium was detected in Fall 2022 at 0.00011J mg/L. Zinc was detected at 0.012 mg/L in Spring 2022 and 0.032 mg/L in Fall 2022, which exceeds the background concentration of 0.005 mg/L. pH was 6.87 S.U. in Spring 2022 and 6.61 S.U. in Fall 2022. 	<ul style="list-style-type: none"> In accordance with the DFFO, continue to monitor for VOCs, phthalates, PAHs, phenols, PCBs, explosives, pesticides, cyanide, and metals. 	2
3	RVAAP-05 Winklepeck Burning Grounds	WBGmw-006	Unconsolidated	<ul style="list-style-type: none"> Continue to monitor for explosives and MNA parameters. 	<ul style="list-style-type: none"> HMX, MNX, and RDX were the only explosives detected. RDX was detected at 0.0069 mg/L in Spring 2022, which exceeds the RSL of 0.00097 mg/L. HMX was detected at 3.3 µg/L in Fall 2022. RDX was detected at 0.0069 mg/L in Spring 2022 and 0.0072 mg/L in Fall 2022; both concentrations exceed the RSL of 0.00097 mg/L. MNX was detected at 0.0003 mg/L in Spring 2022. Sulfide, nitrate, and nitrite were not detected in Spring or Fall 2022. Sulfate was detected at 28 mg/L in Spring 2022 and 27 mg/L in Fall 2022. Alkalinity was detected at 270 mg/L in Spring 2022 and 280 mg/L in Fall 2022. TOC was detected at 1.4 mg/L in Spring 2022 and 0.79 mg/L in Fall 2022. pH was 6.87 S.U. in Spring 2022 and 7.35 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives and MNA parameters. 	2, 3

Table 3-1. Recommended FWGWMP Wells for 2023 (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2022 FWGWMP Sampling Recommendations	2022 Sampling Results	2023 FWGWMP Sampling Recommendations	FWGWMP Sampling Criterion (See Section 3.2)
4	RVAAP-05 Winklepeck Burning Grounds	WBGmw-009	Unconsolidated	<ul style="list-style-type: none"> Continue to monitor for explosives and add MNA parameters. 	<ul style="list-style-type: none"> HMX and RDX were the only explosives detected. RDX was detected at 0.0013 mg/L in Spring 2022 and 0.0035 mg/L in Fall 2022; both concentrations exceed the RSL of 0.00097 mg/L. HMX was detected at 0.00075 mg/L in Spring 2022 and 0.002 mg/L in Fall 2022. Nitrate, nitrite, and sulfide were not detected. Sulfate was detected at 16 mg/L in Spring 2022 and 19 mg/L in Fall 2022. Alkalinity was detected at 110 mg/L in Spring 2022 and 320 mg/L in Fall 2022. TOC was detected at 1.2 mg/L in Spring 2022 and 1.3 mg/L in Fall 2022. pH was 5.61 S.U. in Spring 2022 and 7.02 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives and MNA parameters. 	2, 3
5	RVAAP-05 Winklepeck Burning Grounds	WBGmw-014	Unconsolidated	<ul style="list-style-type: none"> Monitor for explosives to support the FS. 	<ul style="list-style-type: none"> Explosives were not detected in Spring or Fall 2022. pH was 7.24 S.U. in Spring 2022 and 7.18 in Fall 2022. 	<ul style="list-style-type: none"> Monitor for explosives to support the FS. 	4
6	RVAAP-05 Winklepeck Burning Grounds	WBGmw-016	Unconsolidated	<ul style="list-style-type: none"> Monitor for explosives to support the FS. 	<ul style="list-style-type: none"> Explosives were not detected in Spring or Fall 2022. pH was 6.96 S.U. in Spring 2022 and 7.23 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Monitor for explosives to support the FS. 	4
7	RVAAP-05 Winklepeck Burning Grounds	WBGmw-017	Unconsolidated	<ul style="list-style-type: none"> Monitor for explosives to support the FS. 	<ul style="list-style-type: none"> Explosives were not detected in Spring or Fall 2022. pH was 7.27 S.U. in Spring 2022 and 7.1 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Monitor for explosives to support the FS. 	4
8	RVAAP-05 Winklepeck Burning Grounds	WBGmw-018	Unconsolidated	<ul style="list-style-type: none"> Monitor for explosives and MNA parameters to support the FS. 	<ul style="list-style-type: none"> RDX was the only explosive detected. RDX was detected at 0.2J mg/L in Spring 2022 and 0.25J ug/L in Fall 2022. No detection exceeded screening criteria in Spring or Fall 2022. Nitrite and sulfide were not detected in Spring or Fall 2022. Nitrate with detected at an estimated concentration of 0.23J mg/L in Spring 2022 and was not detected in Fall 2022. Sulfate was detected at 9.9 mg/L in Spring 2022 and 10J mg/L in Fall 2022. Alkalinity was detected at 46 mg/L in Spring and Fall 2022. TOC was detected at 1.8 mg/L in Spring 2022 and 1.1 mg/L in Fall 2022. pH was 5.50 S.U. in Spring 2022 and 5.71 in Fall 2022. 	<ul style="list-style-type: none"> Monitor for explosives and MNA parameters to support the FS. 	4
9	RVAAP-05 Winklepeck Burning Grounds	WBGmw-020	Upper Sharon	<ul style="list-style-type: none"> Continue to monitor for explosives. 	<ul style="list-style-type: none"> Explosives were not detected in Spring 2022. 2-Nitrotoluene was the only explosive detected in Fall 2022. 2-Nitrotoluene was detected at an estimated concentration of 0.2J ug/L but did not exceed the screening level of 0.37 ug/L. pH was 6.28 S.U. in Spring 2022 and 7.01 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives. 	3
10	RVAAP-05 Winklepeck Burning Grounds	WBGmw-021	Upper Sharon	<ul style="list-style-type: none"> Continue to monitor for explosives. 	<ul style="list-style-type: none"> Explosives were not detected in Spring or Fall 2022. pH was 6.73 S.U. in Spring 2022 and 7.29 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives. 	3
11	RVAAP-08 Load Line 1	LL1mw-063	Unconsolidated	<ul style="list-style-type: none"> Continue to monitor for explosives. 	<ul style="list-style-type: none"> HMX and 2-amino-4,6-DNT were the only explosives detected. 2-Amino-4,6-DNT was detected in Fall 2022 at 0.29 ug/L. HMX was detected at 2.4 ug/L in Spring 2022 and 1.3 ug/L in Fall 2022. No detection exceeded screening criteria. 	<ul style="list-style-type: none"> Continue to monitor for explosives. 	2
12	RVAAP-08 Load Line 1 (east of Load Line 1 fence)	LL1mw-064	Unconsolidated	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	<ul style="list-style-type: none"> Explosives were not detected in Spring or Fall 2022. pH was 7.71 S.U. in Spring 2022 and 7.7 in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	1

Table 3-1. Recommended FWGWMP Wells for 2023 (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2022 FWGWMP Sampling Recommendations	2022 Sampling Results	2023 FWGWMP Sampling Recommendations	FWGWMP Sampling Criterion (See Section 3.2)
13	RVAAP-08 Load Line 1	LL1mw-080	Upper Sharon	<ul style="list-style-type: none"> Continue to monitor for explosives and add MNA. 	<ul style="list-style-type: none"> The explosives TNT, 2-amino-4,6-DNT, 3,5-dinitroaniline, 4-amino-2,6-DNT, HMX, MNX, and RDX were detected; however, only 4-amino-2,6-DNT and RDX exceeded screening criteria. RDX exceeded the RSL of 0.00097 mg/L at a concentration of 0.026 mg/L and 4-amino-2,6-DNT exceeded the RSL of 0.0039 mg/L at a concentration of 0.0049 mg/L. Nitrite and sulfide were not detected in Spring or Fall 2022. Nitrate was detected at an estimated concentration of 0.098J mg/L in Spring 2022 and was not detected in Fall 2022. Sulfate was detected at 35 mg/L in Spring 2022 and 25 mg/L in Fall 2022. Alkalinity was detected at 100 mg/L in Spring 2022 and 140 mg/L in Fall 2022. TOC was detected at 1.2 mg/L in Spring 2022 and an estimated concentration of 0.96J mg/L in Fall 2022. pH was 6.61 S.U. in Spring 2022 and 6.41 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives and MNA parameters. 	2,4
14	RVAAP-08 Load Line 1	LL1mw-081	Upper Sharon	<ul style="list-style-type: none"> Continue to monitor for explosives. 	<ul style="list-style-type: none"> RDX was the only explosive detected RDX exceeded the RSL of 0.00097 mg/L at an estimated concentration of 0.001 mg/L in Spring 2022. pH was 5.99 S.U. in Spring 2022 and 6.68 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives. 	2
15	RVAAP-08 Load Line 1	LL1mw-082	Upper Sharon	<ul style="list-style-type: none"> Monitor for explosives to support the FS. 	<ul style="list-style-type: none"> TNT, 2-amino-4,6-DNT, 3,5-dinitroaniline, and 4-amino-2,6-DNT were the only explosives detected. These explosives were detected in Spring 2022. No concentration exceeded screening criteria. pH was 6.15 S.U. in Spring 2022 and 6.67 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Monitor for explosives to support the FS. 	4
16	RVAAP-08 Load Line 1	LL1mw-083	Upper Sharon	<ul style="list-style-type: none"> Continue to monitor for explosives and add MNA parameters. 	<ul style="list-style-type: none"> The explosives TNT, 2,4-DNT, 2,6-DNT, 2-amino-4,6-DNT, and 4-amino-2,6-DNT were detected at concentrations above screening criteria. TNT exceeded the RSL of 0.00098 mg/L at a concentration of 0.0019 mg/L in Spring 2022 and 0.0024 mg/L in Fall 2022. 2,4-DNT exceeded the RSL of 0.00024 mg/L at a concentration of 0.0025 mg/L in Spring 2022 and 0.0029 in Fall 2022. 2,6-DNT exceeded the residential cleanup goal of 0.000122 mg/L at a concentration of 0.001 mg/L in Spring 2022 and 0.0017 mg/L in Fall 2022. 2 Amino-4,6-DNT exceeded the RSL of 0.0039 mg/L at a concentration of 0.0085 mg/L in Spring 2022 and 0.0096 mg/L in Fall 2022. 4-Amino-2,6-DNT exceeded the RSL of 0.0039 mg/L at a concentration of 0.016 mg/L in Spring 2022 and 0.014 mg/L in Fall 2022. All other explosives were detected at concentrations below screening criteria. Alkalinity, nitrite, and sulfide were not detected. Nitrate was detected at an estimated concentration of 0.25J mg/L in Spring 2022 and 0.15J mg/L in Fall 2022. Sulfate was detected at 120 mg/L in Spring 2022 and 130 mg/L in Fall 2022. TOC was detected at 1.2 mg/L in Spring 2022 and an estimated concentration of 0.57J mg/L in Fall 2022. pH was 4.17 S.U. in Spring 2022 and 4.41 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives and MNA parameters. 	2,4

Table 3-1. Recommended FWGWMP Wells for 2023 (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2022 FWGWMP Sampling Recommendations	2022 Sampling Results	2023 FWGWMP Sampling Recommendations	FWGWMP Sampling Criterion (See Section 3.2)
17	RVAAP-08 Load Line 1	LL1mw-084	Upper Sharon	<ul style="list-style-type: none"> Continue to monitor for explosives and MNA parameters. 	<ul style="list-style-type: none"> The explosives TNT, 2,4-DNT, 2-amino-4,6-DNT, and 4-amino-2,6-DNT were detected at concentrations above screening criteria. TNT exceeded the RSL of 0.00098 mg/L in the primary and duplicate samples at concentrations of 0.0027 and 0.0029 mg/L in Spring and 0.0025 and 0.0029 mg/L in Fall, respectively. 2,4-DNT exceeded the RSL of 0.00024 mg/L in primary and duplicate samples at concentrations of 0.0016 and 0.002 mg/L in Fall 2022. 2-Amino-4,6-DNT exceeded the RSL of 0.0039 mg/L in the primary and duplicate samples at concentrations of 0.0077 and 0.0078 mg/L in Spring and 0.0061 and 0.0073 mg/L in Fall, respectively. 4-Amino-2,6-DNT exceeded the RSL of 0.0039 mg/L in the primary and field duplicate samples at concentrations of 0.023 and 0.024 mg/L in Spring and 0.015 and 0.018 mg/L in Fall, respectively. All other explosives were detected at concentrations below screening criteria. Nitrite and sulfide were not detected in the primary or duplicate sample in Spring or Fall 2022. Nitrate was detected at 0.59 and 0.61 mg/L in the primary and duplicate samples, respectively, in Spring 2022. Nitrate was detected at estimated concentrations of 0.35J and 0.36J mg/L in the primary and duplicate samples, respectively, in Fall 2022. Sulfate was detected at 110 mg/L in the primary and duplicate samples in Spring 2022 and 120 mg/L in the primary and duplicate samples in Fall 2022. Alkalinity was detected at 63 and 69 mg/L in the primary and duplicate samples, respectively, in Spring 2022. Alkalinity was detected at 34 and 37 mg/L in the primary and duplicate samples, respectively, in Fall 2022. TOC was detected at 1.8 mg/L in Spring 2022. TOC was detected at 1.1 mg/L in the primary sample and an estimated concentration of 0.94J mg/L in the duplicate sample in Fall 2022. pH was 5.58 S.U. in Spring 2022 and 5.69 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives and MNA parameters. 	2,4
18	RVAAP-08 Load Line 1 (southeast of Load Line 1 fence)	LL1mw-086	Unconsolidated	<ul style="list-style-type: none"> Monitor for explosives in this exit pathway well. Although no historical exceedances of screening levels have been detected, ongoing sampling for explosives is recommended in support of the FS. 	<ul style="list-style-type: none"> The explosives 1,3,5-TNB, TNT, 2-amino-4,6-DNT, 3,5-dinitroaniline, 4-amino-2,6-DNT, and RDX were detected; however, only TNT and RDX exceeded screening criteria. TNT exceeded the RSL of 0.00098 mg/L at a concentration of 0.0013 mg/L in Spring 2022. RDX exceeded the RSL of 0.00097 mg/L at a concentration of 0.0011 mg/L in Spring 2022. No explosives were detected in Fall 2022. pH was 7.15 S.U. in Spring 2022 and 7.54 in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	1, 4
19	RVAAP-08 Load Line 1 (southeast of Load Line 1 fence)	LL1mw-087	Unconsolidated	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	<ul style="list-style-type: none"> Explosives were not detected in the primary or duplicate samples in Spring or Fall 2022. pH was 6.68 S.U. in Spring 2022 and 6.78 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	1, 3
20	RVAAP-08 Load Line 1	LL1mw-089	Unconsolidated	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	<ul style="list-style-type: none"> Explosives were not detected in Spring or Fall 2022. pH was 4.55 S.U. in Spring 2022 and 5.1 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	1, 2
21	RVAAP-09 Load Line 2 South	LL2mw-059	Upper Sharon	<ul style="list-style-type: none"> Continue to monitor for explosives and add MNA parameters. 	<ul style="list-style-type: none"> 1,3,5-TNB, 2,4-DNT, 2-amino-4,6-DNT, 3,5-dinitroaniline, and 4-amino-2,6-DNT were the only explosives detected; however, no concentrations exceeded screening criteria in Spring 2022. 2,4-DNT exceeded the RSL of 0.00024 mg/L at a concentration of 0.00035 mg/L in Fall 2022. Nitrite and sulfide were not detected in Spring or Fall 2022. Nitrate was detected at 0.81 mg/L in Spring 2022 and 0.027J mg/L in Fall 2022. Sulfate was detected at 320 mg/L in Spring 2022 and 19 mg/L in Fall 2022. Alkalinity was detected at 160 mg/L in Spring 2022 and 110 mg/L in Fall 2022. TOC was detected at 2.9 mg/L in Spring 2022 and 0.94J mg/L in Fall 2022. pH was 6.42 S.U. in Spring 2022 and 6.11 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives and add MNA parameters. 	1, 4

Table 3-1. Recommended FWGWMP Wells for 2023 (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2022 FWGWMP Sampling Recommendations	2022 Sampling Results	2023 FWGWMP Sampling Recommendations	FWGWMP Sampling Criterion (See Section 3.2)
22	RVAAP-10 Load Line 3	LL3mw-237	Upper Sharon	<ul style="list-style-type: none"> Continue to monitor for explosives. 	<ul style="list-style-type: none"> The explosives 1,3,5-TNB, TNT, 2-amino-4,6-DNT, 3,5-dinitroaniline, 4-amino-2,6-DNT, HMX, and RDX were detected; however, only TNT, 2-amino-4,6-DNT, 4-amino-2,6-DNT, and RDX exceeded screening criteria in Spring 2022. TNT exceeded the RSL of 0.00098 mg/L at an estimated concentration of 0.042J mg/L. 2-Amino-4,6-DNT exceeded the RSL of 0.0039 mg/L at a concentration of 0.0069. 4-Amino-2,6-DNT exceeded the RSL of 0.0039 mg/L at an estimated concentration of 0.027. RDX exceeded screening criteria. RDX exceeded the RSL of 0.00097 mg/L at a concentration of 0.0067 mg/L. The explosive 2-amino-4,6-DNT was detected at an estimated concentration of 0.00035 mg/L in Fall 2022 but did not exceed the RSL. pH was 7.02 S.U. in Spring 2022 and 6.27 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives. 	2
23	RVAAP-10 Load Line 3	LL3mw-238	Upper Sharon	<ul style="list-style-type: none"> Continue to monitor for explosives and MNA parameters. 	<ul style="list-style-type: none"> Explosives were not detected in Spring 2022. The explosives 1,3,5-TNB, TNT, 3,5-dinitroaniline, 4-amino-2,6-DNT, HMX, and RDX were detected in Fall 2022. However, only TNT, 4-amino-2,6-DNT, and RDX exceeded screening limits. TNT exceeded the RSL of 0.00098 mg/L at an estimated concentration of 0.028J mg/L, 4-Amino-2,6-DNT exceeded the RSL of 0.0039 mg/L at a concentration of 0.028 mg/L, and RDX exceeded the RSL of 0.00097 mg/L at a concentration of 0.0034 mg/L. Nitrite and sulfide were not detected in Spring or Fall 2022. Nitrate was detected 0.51 mg/L in Spring 2022 and an estimated concentration of 0.43J mg/L in Fall 2022. Sulfate was detected at 60 mg/L in Spring 2022 and 53 mg/L in Fall 2022. Alkalinity was detected at 160 mg/L in Spring 2022 and 140 mg/L in Fall 2022. TOC was detected at 2.9 mg/L in Spring 2022 and 1.8 mg/L in Fall 2022. pH was 6.10 S.U. in Spring 2022 and 6.73 in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives and MNA parameters. 	2
24	RVAAP-10 Load Line 3	LL3mw-239	Upper Sharon	<ul style="list-style-type: none"> Continue to monitor for explosives and MNA parameters. 	<ul style="list-style-type: none"> Explosives were not detected in Spring 2022 The explosives TNT, 3,5-dinitroaniline, 4-amino-2,6-DNT, and 2-amino-2,6-DNT were detected in Fall 2022. However, none of these explosives exceeded screening limits. Nitrite and sulfide were not detected in Spring or Fall 2022. Nitrate was detected at 0.65 mg/L in Spring 2022 and an estimated concentration of 0.43J mg/L in Fall 2022. Sulfate was detected at 39 mg/L in Spring 2022 and 38 mg/L in Fall 2022. Alkalinity was detected at 59 mg/L in Spring 2022 and 60 mg/L in Fall 2022. TOC was detected at 1 mg/L in Spring 2022 and 0.59 mg/L in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives and MNA parameters. 	2
25	RVAAP-10 Load Line 3	LL3mw-241	Upper Sharon	<ul style="list-style-type: none"> Continue to monitor for explosives. 	<ul style="list-style-type: none"> Explosives were not detected in Spring 2022. The explosives 1,3,5-TNB, TNT, 3,5-dinitroaniline, 4-amino-2,6-DNT, 2-amino-4,6-DNT, and RDX were detected in Fall 2022. However, none of these explosives exceeded the screening limits. pH was 5.76 S.U. in Spring 2022 and 6.19 in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives. 	2
26	RVAAP-10 Load Line 3	LL3mw-245	Upper Sharon	<ul style="list-style-type: none"> Monitor for explosives to support the FS. 	<ul style="list-style-type: none"> Explosives were not detected in Spring or Fall 2022. pH was 7.02 S.U. in Spring 2022 and 6.19 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Monitor for explosives to support the FS. 	4
27	RVAAP-12 Load Line 12	LL12mw-185	Unconsolidated	<ul style="list-style-type: none"> Continue to monitor for nitrate and ammonia. 	<ul style="list-style-type: none"> Nitrate was detected at 71 and 74 mg/L in Spring 2022 and 61 and 62 mg/L in Fall 2022 in the primary and duplicate samples, exceeding the MCL of 10 mg/L. Ammonia was not detected in the primary sample; however, it was detected at an estimated concentration of 0.039 mg/L in the duplicate sample in Spring 2022. Ammonia was detected in the primary and duplicate samples at concentrations of 0.16 and 0.21 mg/L, respectively, in Fall 2022. pH was 6.61 S.U. in Spring 2022 and 6.68 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for nitrate and ammonia. 	2

Table 3-1. Recommended FWGWMP Wells for 2023 (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2022 FWGWMP Sampling Recommendations	2022 Sampling Results	2023 FWGWMP Sampling Recommendations	FWGWMP Sampling Criterion (See Section 3.2)
28	RVAAP-12 Load Line 12	LL12mw-187	Unconsolidated	<ul style="list-style-type: none"> Continue to monitor for nitrate and ammonia. 	<ul style="list-style-type: none"> Nitrate was not detected in Spring 2022. Nitrate was detected at 1,600 mg/L in Fall 2022, exceeding the MCL of 10 mg/L and the RSL of 3.2 mg/L. Ammonia has no screening level but was detected at 660 mg/L in Spring 2022 and 640 mg/L in Fall 2022. pH was 6.20 S.U. in Spring 2022 and 6.37 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for nitrate and ammonia. 	2
29	RVAAP-12 Load Line 12	LL12mw-244	Unconsolidated	<ul style="list-style-type: none"> Monitor for nitrate and ammonia to support the FS. 	<ul style="list-style-type: none"> Nitrate was not detected in 2022. Ammonia has no screening level but was detected at 0.026 mg/L in Spring 2022 and 0.61 in Fall 2022. pH was 7.38 S.U. in Spring 2022 and 7.15 in Fall 2022. 	<ul style="list-style-type: none"> Monitor for nitrate and ammonia to support the FS. 	4
30	RVAAP-12 Load Line 12	LL12mw-245	Unconsolidated	<ul style="list-style-type: none"> Monitor for nitrate and ammonia to support the FS. 	<ul style="list-style-type: none"> Nitrate was not detected in 2022. Ammonia has no screening level but was detected at an estimated concentration of 0.049J mg/L in Spring 2022 and 0.18 mg/L in Fall 2022. pH was 6.93 S.U. in Spring 2022 and 6.88 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Monitor for nitrate and ammonia to support the FS. 	4
31	RVAAP-12 Load Line 12	LL12mw-246	Unconsolidated	<ul style="list-style-type: none"> Monitor for nitrate and ammonia to support the FS. 	<ul style="list-style-type: none"> Nitrate was not detected in 2022. Ammonia has no screening level but was detected at 0.15 mg/L in Spring 2022 and 0.11 mg/L in Fall 2022. pH was 6.80 S.U. in Spring 2022 and 7.08 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Monitor for nitrate and ammonia to support the FS. 	4
32	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-173	Homewood	<ul style="list-style-type: none"> Monitor for explosives to support the FS and MNA parameters. 	<ul style="list-style-type: none"> 2-Nitrotoluene was the only explosive detected. 2-Nitrotoluene was detected at an estimated concentration of 0.00049J mg/L in Fall 2022 and exceeding the RA of 0.00037 mg/L. Nitrate, nitrite, and sulfide were not detected in Spring or Fall 2022. Sulfate was detected at 36 mg/L in the parent sample and 35 mg/L in the duplicate sample in Spring 2022 and 33 mg/L in the primary and duplicate samples in Fall 2022. Alkalinity was detected at 22 mg/L in the parent sample and 23 mg/L in the duplicate sample in Spring 2022 and 34 mg/L in the primary and duplicate samples in Fall 2022. TOC was detected at an estimated concentration of 0.86J mg/L in Spring 2022 and 0.44J mg/L in Fall 2022. pH was 5.02 S.U. 	<ul style="list-style-type: none"> Monitor for explosives to support the FS and MNA parameters. 	4
33	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-174	Homewood	<ul style="list-style-type: none"> Continue to monitor for explosives and MNA parameters. 	<ul style="list-style-type: none"> The explosives TNT, 2,4-DNT, 2-amino-4,6-DNT, and 4-amino-2,6-DNT were detected at concentrations above screening criteria in Spring 2022. TNT exceeded the RSL of 0.00098 mg/L at a concentration of 0.0056 mg/L. 2,4-DNT exceeded the RSL of 0.00024 mg/L at a concentration of 0.00037 mg/L. 2-Amino-4,6-DNT exceeded the RSL of 0.0039 mg/L at a concentration of 0.0087 mg/L. 4-Amino-2,6-DNT exceeded the RSL of 0.0039 mg/L at a concentration of 0.017 mg/L. All other concentrations were below screening criteria. Sulfide was not detected. Nitrate was detected at 0.94 mg/L in Spring 2022. Nitrite was detected at an estimated concentration of 0.007J mg/L in Spring 2022. Sulfate was detected at 55 mg/L in Spring 2022. Alkalinity was detected at 10 mg/L in Spring 2022. TOC was detected at 1.7 mg/L in Spring 2022. pH was 4.88 S.U. in Spring 2022 and 5.62 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives and MNA parameters. 	2
34	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-175	Homewood	<ul style="list-style-type: none"> Continue to monitor for explosives. 	<ul style="list-style-type: none"> Explosives were not detected. pH was 5.68 S.U. in Spring 2022 and 5.59 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives. 	2

Table 3-1. Recommended FWGWMP Wells for 2023 (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2022 FWGWMP Sampling Recommendations	2022 Sampling Results	2023 FWGWMP Sampling Recommendations	FWGWMP Sampling Criterion (See Section 3.2)
35	RVAAP-43 Load Line 10	LL10mw-003	Homewood	<ul style="list-style-type: none"> Continue to monitor for carbon tetrachloride to verify recent reduced concentrations. 	<ul style="list-style-type: none"> Carbon tetrachloride was detected at 4 µg/L in Spring 2022 and 2.9 µg/L in Fall 2022, below the MCL of 5 µg/L. pH was 6.64 S.U. in Fall 2022 	<ul style="list-style-type: none"> Continue to monitor for carbon tetrachloride. 	2
36	RVAAP-66 Facility-wide Groundwater (southern portion of Administration Area)	FWGmw-004	Unconsolidated	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	<ul style="list-style-type: none"> Explosives were not detected in the primary or duplicate sample. pH was 6.83 S.U. 	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	1
37	RVAAP-66 Facility-wide Groundwater (southwestern portion of facility, south of NACA Test Area)	FWGmw-007	Unconsolidated	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	<ul style="list-style-type: none"> Explosives were not detected in Spring 2022 or Fall 2022. pH was 7.25 S.U. in Spring 2022 and 7.12 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	1
38	RVAAP-66 Facility-wide Groundwater (in DLA Main Ore Storage Area)	FWGmw-010	Unconsolidated	<ul style="list-style-type: none"> Monitor for explosives to support the FS. 	<ul style="list-style-type: none"> No explosives were detected except for 3-nitrotoluene in Spring 2022, which was below screening criteria. No explosives were detected in Fall 2022. pH was 4.50 S.U. in Spring 2022 and 5.08 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Monitor for explosives to support the FS. 	4
39	RVAAP-66 Facility-wide Groundwater (near East Classification Yard)	FWGmw-011	Unconsolidated	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	<ul style="list-style-type: none"> Explosives were not detected in Spring 2022 or Fall 2022. pH was 7.13 S.U. in Spring 2022 and 17.26 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	1, 3
40	RVAAP-66 Facility-wide Groundwater (near East Classification Yard)	FWGmw-012	Upper Sharon	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	<ul style="list-style-type: none"> Explosives were not detected in Spring 2022 or Fall 2022. pH was 5.22 S.U. in Spring 2022 and 6 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	1, 3
41	RVAAP-66 Facility-wide Groundwater (southeast of Administration Area)	FWGmw-015	Unconsolidated	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	<ul style="list-style-type: none"> No explosives were detected in Spring 2022 except for 3-nitrotoluene, which was below screening criteria. No explosives were detected in Fall 2022. pH was 6.71 S.U. in Spring 2022 and 6.79 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	1, 3
42	RVAAP-66 Facility-wide Groundwater (southeast of Administration Area)	FWGmw-016	Upper Sharon	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	<ul style="list-style-type: none"> No explosives were detected in Spring 2022 except for 3-nitrotoluene, which was below screening criteria. No explosives were detected in Fall 2022. pH was 6.65 S.U. in Spring 2022 and 7.01 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	1, 3
43	RVAAP-66 Facility-wide Groundwater (off-facility, south of State Route 5, south of Load Line 12)	FWGmw-018	Basal Sharon	<ul style="list-style-type: none"> Continue to monitor for nitrates to support the FS. Discontinue sampling for VOCs, as VOCs have not been detected in well since 2018. 	<ul style="list-style-type: none"> Nitrate was not detected in Spring 2022 or Fall 2022. pH was 6.76 S.U. in Spring 2022 and 7.44 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for nitrates to support the FS. 	1, 3, 4
44	RVAAP-66 Facility-wide Groundwater (off-facility, south of State Route 5, south of Load Line 12)	FWGmw-020	Upper Sharon	<ul style="list-style-type: none"> Continue to monitor for nitrates to support the FS. Discontinue sampling for VOCs, as VOCs have not been detected in well since 2018. 	<ul style="list-style-type: none"> Nitrate was detected in Spring 2022 at an estimated concentration of 0.011J mg/L. Nitrate was not detected in Fall 2022. pH was 6.79 S.U. in Spring 2022 and 7.2 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for nitrates to support the FS. 	1, 3, 4

Table 3-1. Recommended FWGWMP Wells for 2023 (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2022 FWGWMP Sampling Recommendations	2022 Sampling Results	2023 FWGWMP Sampling Recommendations	FWGWMP Sampling Criterion (See Section 3.2)
45	RVAAP-66 Facility-wide Groundwater (off-facility, south of State Route 5, south of Load Line 3)	FWGmw-021	Upper Sharon	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	<ul style="list-style-type: none"> No explosives were detected except for 2-nitrotoluene in Spring and Fall 2022 and 3-nitrotoluene in Spring 2022. Concentrations were below screening criteria pH was 5.86 S.U. in Spring 2022 and 6.32 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	1
46	RVAAP-66 Facility-wide Groundwater (downgradient from Fuze and Booster Quarry Landfill/Ponds)	FWGmw-023	Upper Sharon	<ul style="list-style-type: none"> Monitor for explosives to support the FS. 	<ul style="list-style-type: none"> Explosives were not detected in Spring or Fall 2022. pH was 6.94 S.U. in Spring 2022 and 7.28 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Monitor for explosives to support the FS. 	4
47	RVAAP-66 Facility-wide Groundwater (off-facility, south of State Route 5, south of Load Line 2)	FWGmw-024	Upper Sharon	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	<ul style="list-style-type: none"> No explosives were detected except for 3-nitrotoluene in Spring 2022, which was below screening criteria. No explosions were detected in Fall 2022. pH was 6.78 S.U. in Spring 2022 and 7.42 in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	1
48	RVAAP-66 Facility-wide Groundwater (southeastern portion of facility)	SCFmw-004	Basal Sharon	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	<ul style="list-style-type: none"> Explosives were not detected in Spring 2022 or Fall 2022. pH was 7.63 S.U. in Spring 2022 and 7 S.U. in Fall 2022. 	<ul style="list-style-type: none"> Continue to monitor for explosives in this exit pathway well. 	1, 3

Table does not include a discussion of essential nutrients (calcium, chloride, iodine, iron, magnesium, potassium, phosphorus, and sodium).

- µg/L = Micrograms per Liter
- DFFO = Director's Final Findings and Orders
- DLA = Defense Logistics Agency
- DNT = Dinitrotoluene
- FS = Feasibility Study
- FWGWMP = Facility-wide Groundwater Monitoring Plan
- HMX = Cyclotetramethylene-tetranitramine
- MCL = Maximum Contaminant Level
- mg/L = Milligrams per Liter
- MNA = Monitored Natural Attenuation
- MNX = Hexahydro-1-nitroso-3,5-dinitro-1,3,5-triazine
- NACA = National Advisory Committee on Aeronautics
- PAH = Polycyclic Aromatic Hydrocarbon
- PCB = Polychlorinated Biphenyl
- RA = Resident Adult Facility-wide Cleanup Goal
- RDX = Hexahydro-1,3,5-Trinitro-1,3,5-Triazine
- RSL = Regional Screening Level
- RVAAP = Ravenna Army Ammunition Plant
- S.U. = Standard Unit
- SVOC = Semivolatile Organic Compound
- TNB = Tinitrobenzene
- TNT = 2,4,6-Trinitrotoluene
- TOC = Total Organic Carbon
- VOC = Volatile Organic Compound

Table 3-2. FWGWMP Wells with Analytical Testing Suite

No.	RVAAP-66 Area	Well Name	Aquifer	Metals	Explosives	Expanded Explosives (1)	VOCs	SVOCs (2)	PCBs	Pesticides	Cyanide	Nitrate	MNA Suite (3)	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	X							X	
4	RVAAP-05 Winklepeck Burning Grounds	WBGmw-009	Unconsolidated		X	X							X	
5	RVAAP-05 Winklepeck Burning Grounds	WBGmw-014	Unconsolidated		X	X								
6	RVAAP-05 Winklepeck Burning Grounds	WBGmw-016	Unconsolidated		X	X								
7	RVAAP-05 Winklepeck Burning Grounds	WBGmw-017	Unconsolidated		X	X								
8	RVAAP-05 Winklepeck Burning Grounds	WBGmw-018	Unconsolidated		X	X							X	
9	RVAAP-05 Winklepeck Burning Grounds	WBGmw-020	Upper Sharon		X	X								
10	RVAAP-05 Winklepeck Burning Grounds	WBGmw-021	Upper Sharon		X	X								
11	RVAAP-08 Load Line 1	LL1mw-063	Unconsolidated		X	X								
12	RVAAP-08 Load Line 1	LL1mw-064	Unconsolidated		X	X								
13	RVAAP-08 Load Line 1	LL1mw-080	Upper Sharon		X	X							X	
14	RVAAP-08 Load Line 1	LL1mw-081	Upper Sharon		X									
15	RVAAP-08 Load Line 1	LL1mw-082	Upper Sharon		X	X								
16	RVAAP-08 Load Line 1	LL1mw-083	Upper Sharon		X	X							X	
17	RVAAP-08 Load Line 1	LL1mw-084	Upper Sharon		X	X							X	
18	RVAAP-08 Load Line 1	LL1mw-086	Unconsolidated		X	X								
19	RVAAP-08 Load Line 1	LL1mw-087	Unconsolidated		X	X								
20	RVAAP-08 Load Line 1	LL1mw-089	Unconsolidated		X	X								
21	RVAAP-09 Load Line 2	LL2mw-059	Upper Sharon		X	X							X	
22	RVAAP-10 Load Line 3	LL3mw-237	Upper Sharon		X	X								
23	RVAAP-10 Load Line 3	LL3mw-238	Upper Sharon		X	X							X	
24	RVAAP-10 Load Line 3	LL3mw-239	Upper Sharon		X	X							X	
25	RVAAP-10 Load Line 3	LL3mw-241	Upper Sharon		X	X								
26	RVAAP-10 Load Line 3	LL3mw-245	Upper Sharon		X	X								
27	RVAAP-12 Load Line 12	LL12mw-185	Unconsolidated									X		Ammonia
28	RVAAP-12 Load Line 12	LL12mw-187	Unconsolidated									X		Ammonia
29	RVAAP-12 Load Line 12	LL12mw-244	Unconsolidated									X		Ammonia
30	RVAAP-12 Load Line 12	LL12mw-245	Unconsolidated									X		Ammonia
31	RVAAP-12 Load Line 12	LL12mw-246	Unconsolidated									X		Ammonia
32	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-173	Homewood		X	X							X	
33	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-174	Homewood		X	X							X	
34	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-175	Homewood		X	X								
35	RVAAP-43 Load Line 10	LL10mw-003	Homewood											Carbon Tetrachloride
36	RVAAP-66 Facility-wide Groundwater	FWGmw-004	Unconsolidated		X									
37	RVAAP-66 Facility-wide Groundwater	FWGmw-007	Unconsolidated		X									
38	RVAAP-66 Facility-wide Groundwater	FWGmw-010	Unconsolidated		X	X								
39	RVAAP-66 Facility-wide Groundwater	FWGmw-011	Unconsolidated		X									
40	RVAAP-66 Facility-wide Groundwater	FWGmw-012	Upper Sharon		X									
41	RVAAP-66 Facility-wide Groundwater	FWGmw-015	Unconsolidated		X									

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

No.	RVAAP-66 Area	Well Name	Aquifer	Metals	Explosives	Expanded Explosives (1)	VOCs	SVOCs (2)	PCBs	Pesticides	Cyanide	Nitrate	MNA Suite (3)	Other
42	RVAAP-66 Facility-wide Groundwater	FWGmw-016	Upper Sharon		X									
43	RVAAP-66 Facility-wide Groundwater	FWGmw-018	Basal Sharon									X		
44	RVAAP-66 Facility-wide Groundwater	FWGmw-020	Upper Sharon									X		
45	RVAAP-66 Facility-wide Groundwater	FWGmw-021	Upper Sharon		X									
46	RVAAP-66 Facility-wide Groundwater	FWGmw-023	Upper Sharon		X	X								
47	RVAAP-66 Facility-wide Groundwater	FWGmw-024	Upper Sharon		X									
48	RVAAP-66 Facility-wide Groundwater	SCFmw-004	Basal Sharon		X									

X = Indicates well or constituent to be sampled as part of the 2023 FWGWMP. Wells and constituents will be sampled semi-annually unless indicated by footnotes described below.

(1) Expanded Explosives list include 3,5-dinitroaniline (3,5-DNA); hexahydro-1,3,5-trinitroso-1,3,5-triazine (TNX); hexahydro-1,3-dinitroso-5-dinitro-1,3,5-triazine (DNX); hexahydro-1-nitroso-3,5-dinitro-1,3,5-triazine (MNX); 2,4-diamino-6-nitrotoluene (2,4-DANT); and 2,6-diamino-4-nitrotoluene (2,6-DANT).

(2) SVOCs include phthalates, nitroaromatics, polycyclic aromatic hydrocarbons, and phenols.

(3) MNA suite includes anions, total organic carbon, alkalinity, pH, and water quality parameters.

FWGWMP = Facility-wide Groundwater Monitoring Program

MNA = Monitored Natural Attenuation

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^a
PCBs	GC – SVOCs (8082A)
Pesticides	GC Semivolatile Organics (8081B)
SVOCs Including Phthalates, Phenols, or Nitroaromatics	GC/MS Semivolatile Organics (8270D)
PAHs	GC/MS 8270D SIM
VOCs	GC/MS Volatile Organics (8260C)
Nitroaromatics and Nitramines (Explosives)	Explosives by HPLC (8330B)
Nitrate/Nitrites	General Chemistry (9056)
Sulfate	General Chemistry (9056A)
Sulfide	General Chemistry (9034)
Total Organic Compound	General Chemistry (9060)
Total Alkalinity	General Chemistry (SM2320B) ^b
Cyanide (Total)	General Chemistry (9012B)
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)
Hexavalent Chromium	General Chemistry (7196A)
Mercury	Liquid Waste Cold Vapor Technique (7470A)
Ammonia	Colorimetric (350.1)

^a USEPA SW846

^b Standard Methods for the Examination of Water and Wastewater

GC = Gas Chromatography

HPLC = High-Performance Liquid Chromatography

MS = Mass Spectrometry

PAH = Polycyclic Aromatic Hydrocarbon

PCB = Polychlorinated Biphenyl

SIM = Selective Ion Monitoring

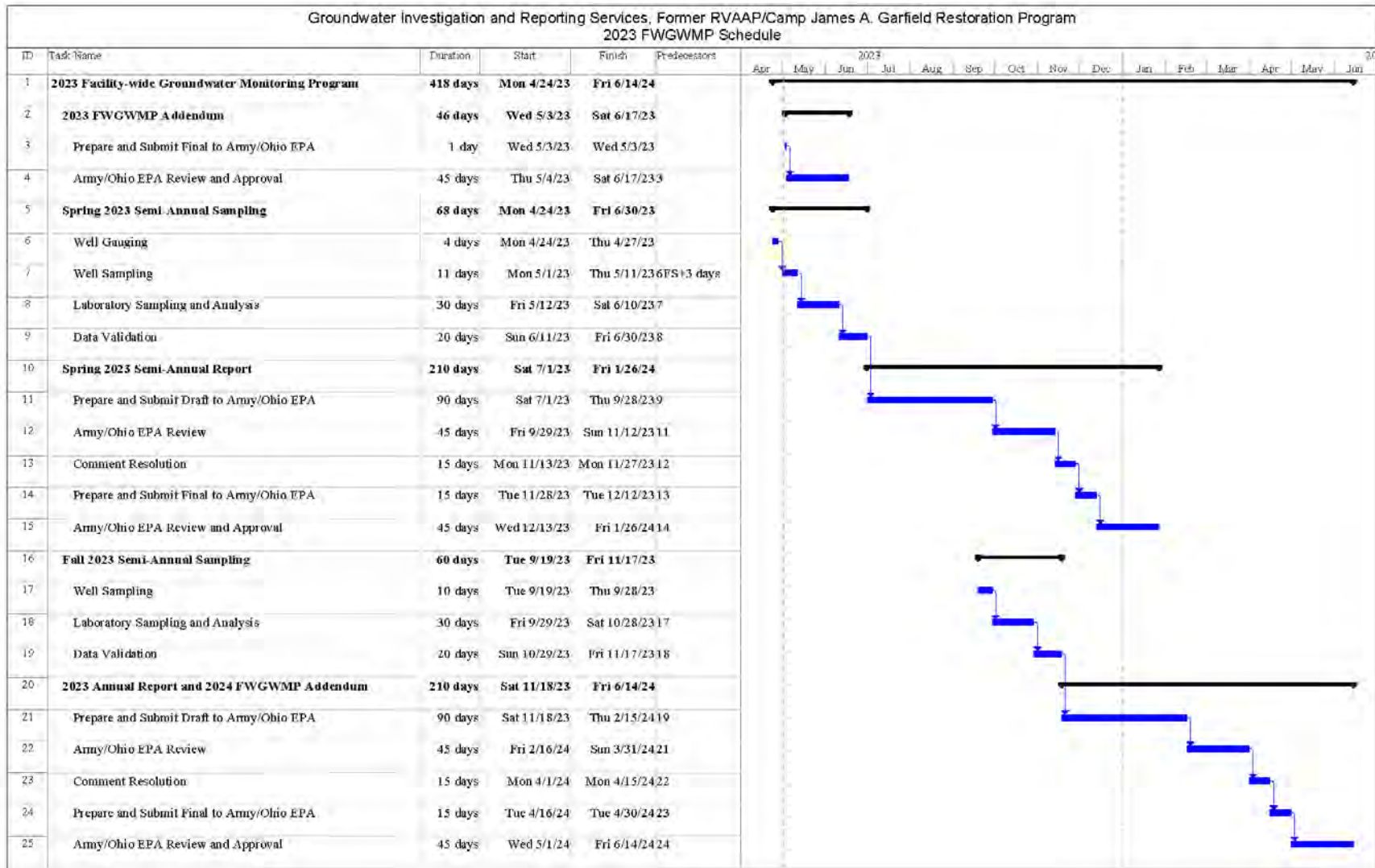
SVOC = Semivolatile Organic Compound

USEPA = U.S. Environmental Protection Agency

VOC = Volatile Organic Compound

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4.0 SCHEDULE



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5.0 REFERENCES

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

Leidos. 2023. *Annual Report for 2022 for RVAAP-66 Facility-wide Groundwater*. May.

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

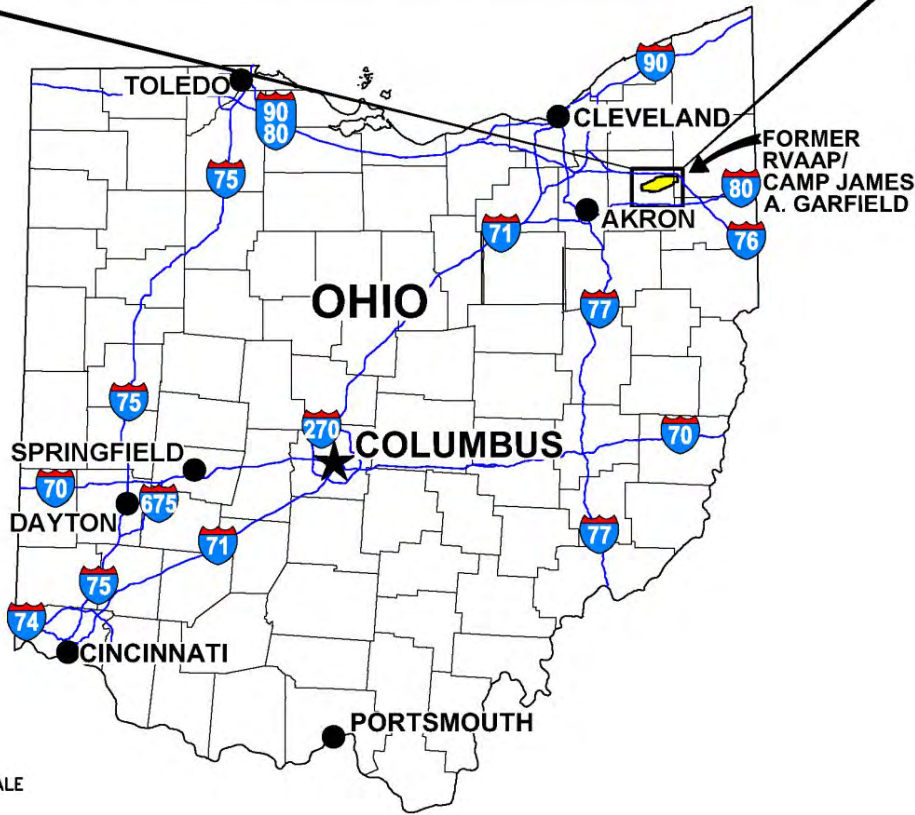
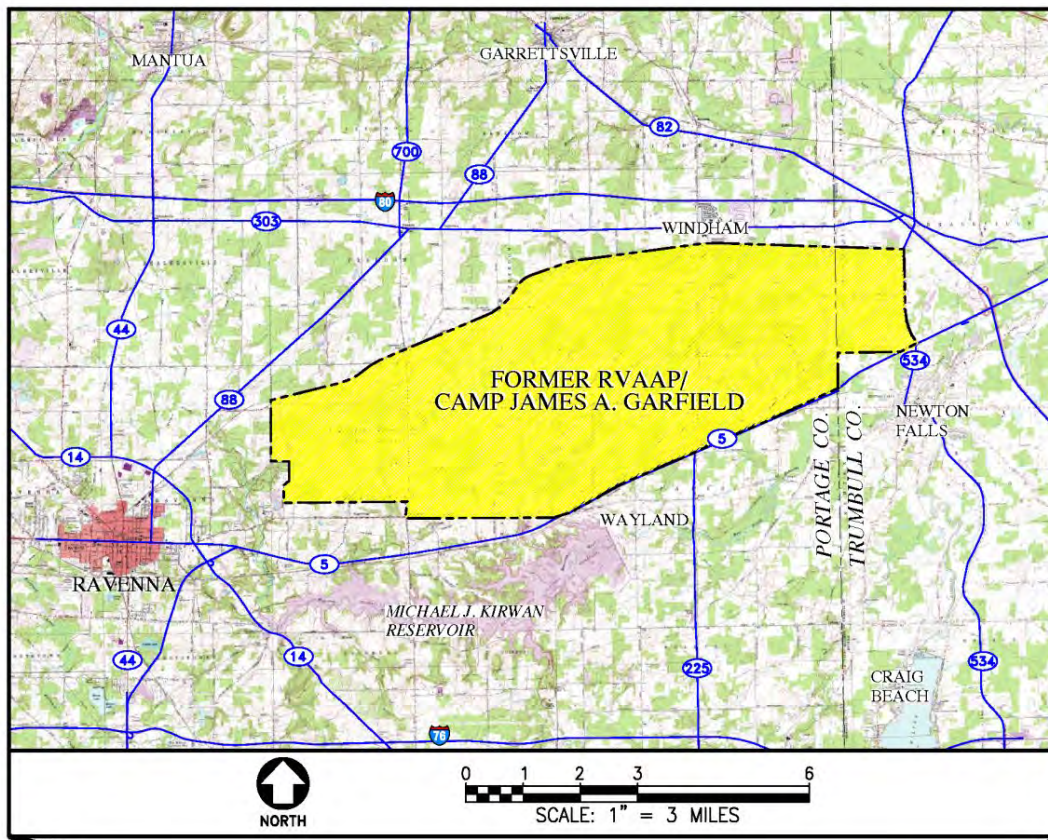
Portage Environmental. 2004. *Facility-wide Groundwater Monitoring Program Plan for the Ravenna Army Ammunition Plant, Ravenna, Ohio*. September.

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

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FIGURES

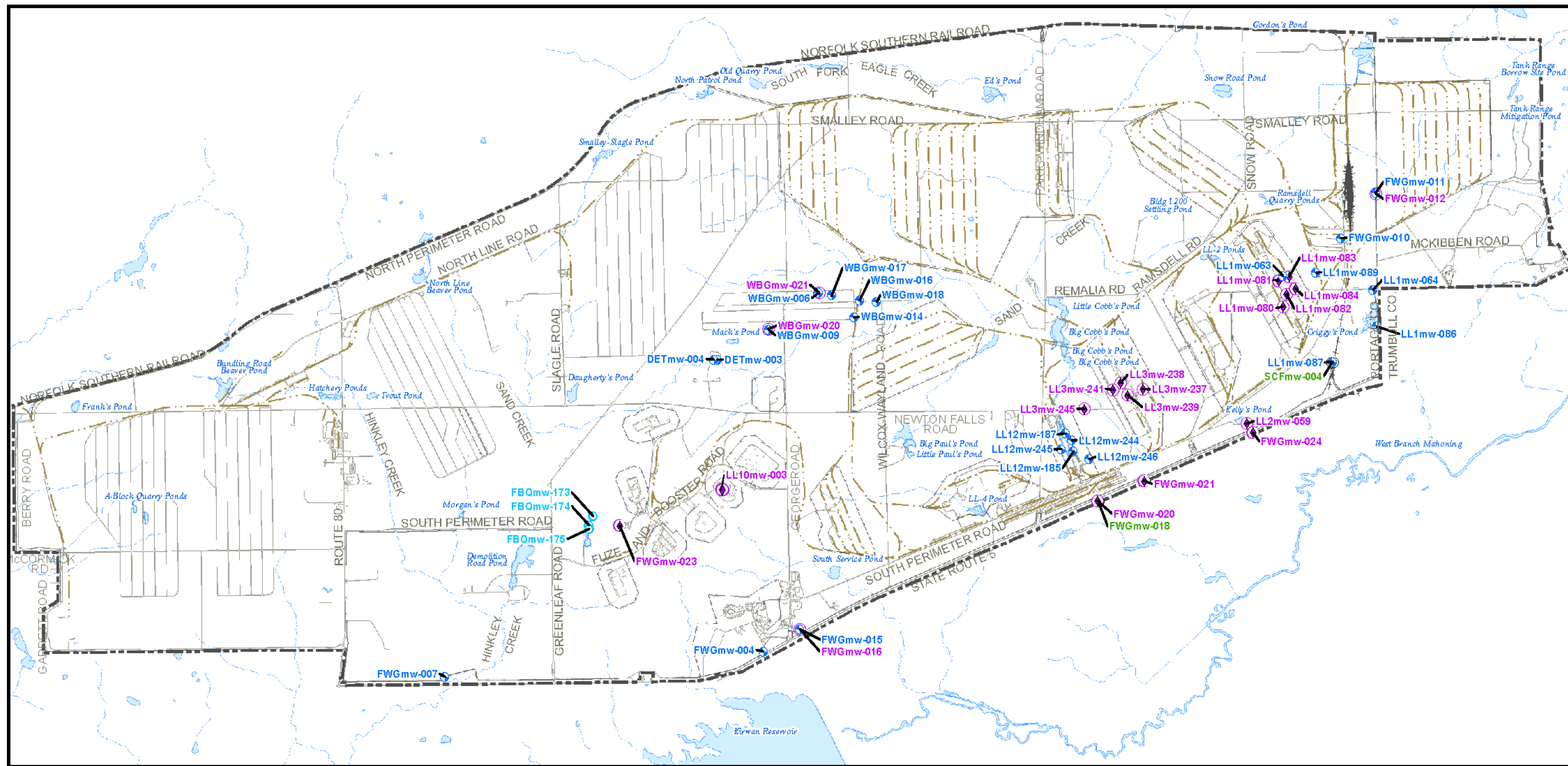
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1/22/19 c:\06042\DWGS\54-ADDEN FIGURE1-1

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

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Legend ROADS FORMER BUILDING OLD RAILROAD BED RAILROAD TRACK FENCELINE STREAM OR CREEK CAMP JAMES A. GARFIELD SURFACE WATER		Designated Aquifer for Well <ul style="list-style-type: none"> Unconsolidated Aquifer (23) Upper Sharon Aquifer (19) Homewood Aquifer (3) Basal Sharon Conglomerate Aquifer (2) 	 	 U.S. ARMY CORPS OF ENGINEERS OF ENGINEERS © LOUISVILLE DISTRICT FORMER RVAAP/ CAMP JAMES A. GARFIELD PORTAGE/TRUMBULL COUNTIES, OHIO DRAWN BY: R. BEELER REQUESTOR: JED THOMAS REV/DATE: R0 3/14/2023 GIS FILE: \\chs-fs01\cad\19009\MXDUJ31_2023_FWGWMP_WELLS.mxd
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Figure 3-1. 2023 FWGWMP Wells

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APPENDIX A
OHIO EPA CORRESPONDENCE

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Mike DeWine, Governor
Jon Husted, Lt. Governor
Anne M. Vogel, Director

April 28, 2023

TRANSMITTED ELECTRONICALLY

Mr. Kevin Sedlak
Restoration Program Manager
ARNG-ILE Clean Up
Camp James A Garfield JTC
1438 State Route 534 SW
Newton Falls, OH 44444

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

Sent via email to: Kevin.m.sedlak.ctr@army.mil

Subject: Response to Ohio EPA Comments on the "Draft RVAAP-66 Facility-wide Groundwater Addendum for 2023" dated March 14, 2023

Dear Mr. Sedlak:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the "Response to Ohio EPA Comments on the "Draft RVAAP-66 Facility-wide Groundwater Addendum for 2023" at the Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio (Camp James A. Garfield). This document was received at Ohio EPA's Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) via email on March 14, 2023. The response was prepared for the United States Army Corps of Engineers (USACE) on behalf of the National Guard Bureau by Leidos.

Based on our review of the Army National Guard's Response to Ohio EPA comments provided in your letter dated March 14, 2023, 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.

If you have questions, you can reach me at kevin.palombo@epa.ohio.gov or at (330) 963-1292.

Sincerely,

Kevin M. Palombo
Environmental Specialist
Division of Environmental Response and Revitalization

KP/cm

ec: Jennifer Tierney, Chenega
Katie Tait, OHARNG RTLS
Steven Kvaal, USACE Louisville
Nat Peters, USACE Louisville
Megan Oravec, Ohio EPA, NEDO, DERR Natalie
Oryshkewych, Ohio EPA, NEDO, DERR Liam
McEvoy, Ohio EPA, NEDO DERR Thomas
Schneider, Ohio EPA, SWDO DERR Carrie
Rasik, Ohio EPA, CO DERR
Allan Brillinger, Chenega (Info Only)

RECEIVED 1 MAY 2023



NATIONAL GUARD BUREAU
111 SOUTH GEORGE MASON DRIVE
ARLINGTON VA 22204-1373

March 14, 2023

Ohio Environmental Protection Agency
DERR-NEDO
Attn: Mr. Kevin Palombo
2110 East Aurora Road
Twinsburg, OH 44087-1924

Subject: Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties, Ohio, RVAAP-66 Facility-Wide Groundwater, Responses to Comments on the Draft RVAAP-66 Facility-wide Groundwater Addendum for 2023 (Work Activity No. 267-000-859-036)

Dear Mr. Palombo:

The Army appreciates your comments on the Draft Facility-wide Groundwater Monitoring Program Plan, RVAAP-66 Facility-wide Groundwater, Addendum for 2023. 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 614-336-6000, ext 2053 or kevin.m.sedlak.ctr@army.mil if there are issues or concerns with this submission.

Sincerely,

TAIT.KATHRYN.SE
RENA.1289508275

Digitally signed by
TAIT.KATHRYN.SERENA.12895082
Date: 2023.03.14 10:04:56 -04'00'

FOR Kevin M. Sedlak
RVAAP Restoration Program Manager
Army National Guard Directorate

ec: Natalie Oryshkewych, Ohio EPA, NEDO, DERR
Liam McEvoy, Ohio EPA, NEDO, DERR
Thomas Schneider, Ohio EPA, SWDO, DERR
Carrie Rasik, Ohio EPA, CO, DERR
Megan Oravec, Ohio EPA, NEDO, DERR
Katie Tait, OHARNG
Steve Kvaal, USACE Louisville
Jay Trumble, USACE Louisville
Jed Thomas, Leidos
Ryan Laurich, Leidos
Jennifer Tierney, Chenega Reliable Services

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 2023 (Work Activity No. 267-000-859-036)

COMMENTS

Ohio EPA Comment 1 Revisions to the 2023 Sampling Scheme:

The Draft Facility-wide Groundwater Monitoring Program (FWGWMP) Addendum for 2023 proposed a total of 47 wells for sampling during 2023, down from 48 wells sampled in 2022) one well, LL10mw-003, was proposed to be deleted from 2023 sampling since the carbon tetrachloride results for this well had been below the maximum contaminant level (MCL) of 5.0 ug/L for the last eight sampling events, and carbon tetrachloride had not been identified as a Chemical of Concern (COC) for Load Line 10 (2022 RI Report, Leidos).

Ohio EPA agrees that the last eight sampling events for LL10mw-003 indicated carbon tetrachloride levels below the MCL of 5.0 ug/L (results ranging from 0.63 ug/L to 4.0 ug/L). Analysis of these nine results (eight sampling events plus one duplicate sample) using Sanitas statistical software indicated that Sen's Slope/Mann-Kendal trend test of these results show a visual upward sloping trend (slope = 0.68 units per year) but no significant trend in the data. However, a linear regression analysis indicated a similar visual upward sloping trend line (slope = 0.66 units per year) which was found to be a significantly increasing trend.

While Ohio EPA concurs that carbon tetrachloride levels are below the MCL, some statistical analyses indicate that levels may be slightly increasing over time. Ohio EPA would suggest that some sampling continues to be conducted at LL10mw-003 for carbon tetrachloride (and other volatile organic compounds (VOCs) to demonstrate daughter products indicating degradation), perhaps at a reduced frequency than the other FWGWMP wells.

Army Response: Agree. Although the carbon tetrachloride concentrations have been below the MCL for 4 years (8 sampling events) and was not identified as a COC in the Facility-wide Groundwater RI Report, the Army agrees to analyze for carbon tetrachloride in LL10mw-003 in spring and fall 2023. The Army will not be analyzing daughter products and assessing degradation of carbon tetrachloride at this time. If results indicate that carbon tetrachloride is above the MCL in the future, a sampling and analysis of daughter products may be considered.

Ohio EPA Comment 2 Revisions to the 2023 Sampling Scheme:

Leidos recommends sampling for carbon tetrachloride be discontinued at ground water monitoring well LL10mw-003 at Load Line 10 because eight consecutive sampling events since 2019 have been below the MCL of 5 µg/l and the remedial investigation (RI) report (Leidos 2022) did not identify carbon tetrachloride as a chemical of concern at Load Line 10. Ohio EPA risk recommends sampling for carbon tetrachloride be continued; while the detections are below the MCL, the detections are on an upward trend and the current sampling in winter and fall is not the season in which the highest concentration was detected, which was summer.

Army Response: Please refer to response to Ohio EPA Comment 1.



Mike DeWine, Governor
Jon Husted, Lt. Governor
Anne M. Vogel, Director

March 6, 2023

TRANSMITTED ELECTRONICALLY

Mr. Kevin Sedlak
Restoration Program Manager
ARNG-ILE Clean Up
Camp James A Garfield JTC
1438 State Route 534 SW
Newton Falls, OH 44444

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

Sent via email to:

Kevin.m.sedlak.ctr@army.mil

Subject: Ohio EPA Comments on the Draft Facility-wide Groundwater Monitoring Program Plan RVAAP-66 Facility-wide Groundwater Addendum for 2023, dated January 23, 2023

Dear Mr. Sedlak:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the Draft Facility-wide Groundwater Monitoring Program Plan RVAAP-66 Facility-wide Groundwater Addendum for 2023 for the Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio (Camp James A. Garfield). This document was received via email at Ohio EPA's Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) on January 23, 2023. The report was prepared for the United States Army Corps of Engineers on behalf of the National Guard Bureau by Leidos under Contract Number W912QR-21-D-0016. 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.

GROUNDWATER COMMENTS

1. Revisions to the 2023 Sampling Scheme:

The Draft Facility-wide Groundwater Monitoring Program (FWGWMP) Addendum for 2023 proposed a total of 47 wells for sampling during 2023, down from 48 wells sampled in 2022) one well, LL10mw-003, was proposed to be deleted from 2023 sampling since the carbon tetrachloride results for this well had been below the maximum contaminant level (MCL) of 5.0 ug/L for the last eight sampling events, and carbon tetrachloride had not been identified as a Chemical of Concern (COC) for Load Line 10 (2022 RI Report, Leidos).

Received 07 MAR 23

Northeast District Office • 2110 East Aurora Road • Twinsburg, OH 44087-1924
epa.ohio.gov • (330) 963-1200 • (330) 487-0769 (fax)

Ohio EPA agrees that the last eight sampling events for LL10mw-003 indicated carbon tetrachloride levels below the MCL of 5.0 ug/L (results ranging from 0.63 ug/L to 4.0 ug/L). Analysis of these nine results (eight sampling events plus one duplicate sample) using Sanitas statistical software indicated that Sen’s Slope/Mann-Kendal trend test of these results show a visual upward sloping trend (slope = 0.68 units per year) but no significant trend in the data. However, a linear regression analysis indicated a similar visual upward sloping trend line (slope = 0.66 units per year) which was found to be a significantly increasing trend.

While Ohio EPA concurs that carbon tetrachloride levels are below the MCL, some statistical analyses indicate that levels may be slightly increasing over time. Ohio EPA would suggest that some sampling continues to be conducted at LL10mw-003 for carbon tetrachloride (and other volatile organic compounds (VOCs) to demonstrate daughter products indicating degradation), perhaps at a reduced frequency than the other FWGWMP wells.

RISK COMMENTS

2. Section 3.1: Revisions to the 2023 Sampling Scheme

Leidos recommends sampling for carbon tetrachloride be discontinued at ground water monitoring well LL10mw-003 at Load Line 10 because eight consecutive sampling events since 2019 have been below the MCL of 5 µg/l and the remedial investigation (RI) report (Leidos 2022) did not identify carbon tetrachloride as a chemical of concern at Load Line 10. Ohio EPA risk recommends sampling for carbon tetrachloride be continued; while the detections are below the MCL, the detections are on an upward trend and the current sampling in winter and fall is not the season in which the highest concentration was detected, which was summer.

2022	2021	2020	2019	2018
Fall: 2.9 µg/l	Winter: 2021: 3.5 µg/l	Fall: 2.6 µg/l	Fall: below MCL	June: 7.5J µg/l
Spring: 4 µg/l	Spring: 2.4 µg/l	Spring: 1.3J µg/l	Spring: below MCL	October: 6.7J µg/l

This Draft Facility-wide Groundwater Monitoring Program Plan RVAAP-66 Facility-wide Groundwater Addendum for 2023 was reviewed by personnel from Ohio EPA. Additional information is necessary to approve the document.

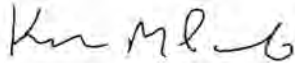
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February 28, 2023

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If you have questions or would like to set up a meeting to discuss these comments, please contact me at kevin.palombo@epa.ohio.gov or at (330) 963-1292.

Sincerely,



Kevin M. Palombo

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