FINAL
FACILITY-WIDE GROUNDWATER MONITORING PROGRAM PLAN
RVAAP-66 FACILITY-WIDE GROUNDWATER
ADDITIONAL WELL INSTALLATION ADDENDUM

RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

September 4, 2013

GSA Contract Number GS-10F-0293K
Delivery Order W912QR-11-F-0266

Prepared for

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

Prepared by

Environmental Quality Management, Inc.
1800 Carillon Boulevard
Cincinnati, Ohio 45240

REPORT DOCUMENTATION PAGE

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RVAAP-66 Facility-Wide Groundwater Additional Well Installation Addendum
Ravenna Army Ammunition Plant, Ravenna, Ohio

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8. PERFORMING ORGANIZATION REPORT NUMBER
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United States Army Corps of Engineers, Louisville District
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None

14. ABSTRACT

This document presents a preliminary assessment of the analytical data for the RVAAP wells dating from October 2006 through October 2012. The objective of the evaluation was to determine if any additional RI wells are warranted at the site. This nature and extent evaluation focused on the constituents that can be strictly tied to historical activities conducted at RVAAP.

15. SUBJECT TERMS

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a. REPORT	b. ABSTRACT	c. THIS PAGE			John M. Miller
UU	UU	UU	SAR	22	19b. TELEPHONE NUMBER *(Include area code)* (513) 825-7500

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ADDITIONAL WELL INSTALLATION ADDENDUM
FACILITY-WIDE GROUNDWATER MONITORING PROGRAM PLAN
RVAAP-66 FACILITY-WIDE GROUNDWATER
RAVENNA ARMY AMMUNITION PLANT
September 4, 2013

Background

The United States Army Corps of Engineers (USACE), Louisville District, is performing Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) closure at the former Ravenna Army Ammunition Plant (RVAAP) located near Ravenna, Ohio. CERCLA closure is occurring under the Installation Restoration Program (IRP). Activities include the monitoring of an extensive network of groundwater monitoring wells. During the time period of 2005 through 2007, the USACE developed a database of groundwater quality information based on the sampling of approximately 36 monitoring wells. Beginning in fiscal year 2008, the USACE expanded the Facility-Wide Groundwater Monitoring Program (FWGWMP) to include the characterization of groundwater from 243 existing monitoring wells at the facility, which includes those wells monitored prior to 2005.

The USACE, under a Government Services Administration (GSA) Performance Based Acquisition (PBA) contract, retained Environmental Quality Management, Inc. (EQM) (Contract No. GS-10F-0293K – Delivery Order W912QR-11-F-0266) to obtain a signed Record of Decision (ROD) for the Facility-Wide groundwater (RVAAP-66) at the former RVAAP. To initiate the Remedial Investigation/Feasibility Study (RI/FS) necessary to support the ROD, EQM reviewed the currently available groundwater data. Based on this review, EQM determined that additional monitoring wells were needed at the facility to complete the RI/FS and eventual ROD. EQM believed that additional wells were necessary to complete hydrogeologic system modeling and to conduct contaminant fate-and-transport modeling for a Facility-Wide groundwater approach. The approach for installing these wells was described in the approved *Final Facility-Wide Groundwater Monitoring Program Plan RVAAP-66 Facility-Wide Groundwater Addendum* dated January 6, 2012. EQM installed 38 groundwater monitoring wells to provide additional information in support of hydrogeologic and fate-and-transport models, evaluate potential exit pathways, evaluate vertical contaminant distribution and/or particle inflow/outflow through the central portion of the facility, and assess potential groundwater impacts from Compliance Restoration (CR) sites. The 38 RI wells were installed during two mobilizations: 31 wells were installed between February 27 and April 17, 2012, and seven wells located within three Munitions Response (MR) areas [Demolition Area 2 (DA2), Winkelpeck Burning Grounds (WBG), and Erie Burning Grounds (EBG)] were installed between May 29 and June 27, 2012. A description of these wells is presented in the approved *Final Facility-Wide Groundwater Monitoring Program RVAAP-66 Facility-Wide Groundwater Monitoring Well Installation Report* dated December 18, 2012.

Purpose of Addendum

As part of the RI, EQM has performed a preliminary assessment of the analytical data for the RVAAP wells dating from October 2006 through October 2012. The data were compared to the more conservative of the U.S. EPA Risk Screening Levels (RSLs) (November 2012) and drinking water standards Maximum Contaminant Levels (MCLs) as a preliminary determination of the nature and extent of impact within the RVAAP fence line. The objective of this evaluation was to determine if any additional RI wells are warranted at the site. (Note that this screening was performed as an initial attempt to determine nature and extent and not as part of the overall risk assessment screening process). This nature and extent evaluation focused on those constituents that can be strictly tied to historical activities conducted at RVAAP (e.g., explosives/propellants, volatile organic compounds, semivolatile organic compounds, pesticides, and polychlorinated biphenyls), although metals in the groundwater will also be evaluated.

Based on EQM's review,

- One of the new wells installed in 2012, LL3mw-244, consistently contains low levels of explosive constituents (HMX, RDX, 2-amino-4,6-DNT, and 4-amino-2,6-DNT). This well is located approximately 40 feet north of the southern fence line and indicates a potential exit pathway. While none of the concentrations of explosives detected in this well exceed their respective RSLs or the COPC screening level RSLs of 10^{-6} (carcinogen) or HI=0.1 (non-carcinogen), these explosives are all considered COPCs at RVAAP. Note that this well also has detections above the reporting limit for hexavalent chromium. Wells LL3mw-242 and LL3mw-243 are located north-northeast of this well, and they have generally not been found to contain explosive constituents. Preliminarily, the fate-and-transport model indicates that the flow path from the source area near LL3mw-241, LL3mw-239, and LL3mw-238 is slightly to the south-southwest. Based on this information, the extent of explosives in groundwater has not been defined south-southwest of well LL3mw-244.
- Well LL2mw-059 has also been found to consistently contain low concentrations of explosive constituents (2,4-DNT, HMX, 1,3,5-trinitrobenzene 1,3-dinitrobenzene, 2-amino-4,6-DNT, and 4-amino-2,6-DNT). This well is located approximately 300 feet north of the southern fence line and indicates a potential exit pathway. Detected levels of 2,4-DNT have ranged from 0.39 µg/L to 0.49 µg/L. The RSL is 0.2 µg/L for this constituent. Note that this well is not one of the wells installed in 2012. It is being sampled as part of the ongoing semiannual groundwater monitoring activities. Three wells (LL2mw-060, LL2mw265, and SCFmw-003) are located east-southeast of well LL2mw-059, but they have not been found to contain explosives constituents. Based on this information, we recommend that a well be installed approximately due south of LL2mw-059.
- Well LL1mw-086 has been found to contain low concentrations of the organochloride pesticide, beta-BHC. This well also indicates a potential exit pathway along the eastern property boundary. Beta-BHC was detected at a concentration of 0.027 µg/L in July 2012 (there was also a detection above the reporting limit for beta-BHC in January 2013). The RSL is 0.022 µg/L.

In order to more fully define the nature and extent of impacts at the facility (as well as to determine potential offsite contamination), EQM proposes to install three additional groundwater

monitoring wells hydraulically down-gradient of the above-referenced wells. The new wells will be installed beyond the existing RVAAP perimeter fence line on RVAAP property. The new wells will be installed in accordance with the *Facility-Wide Groundwater Monitoring Program Plan RVAAP-66 Facility-Wide Groundwater Addendum* (EQM, January 2012), which included amendments to the *Facility-Wide Sampling and Analysis Plan for Environmental Investigations, Ravenna Army Ammunition Plant, Ravenna, Ohio, Field Sampling Plan* (SAIC, 2011); *Facility-Wide Sampling and Analysis Plan for Environmental Investigations, Ravenna Army Ammunition Plant, Ravenna, Ohio, Quality Assurance Project Plan* (SAIC, 2011); and *Facility-Wide Safety and Health Plan for Environmental Investigations* (SAIC, 2011). Since the new wells will be installed outside the RVAAP fence line, field personnel will be asked to direct any public/media persons to the RVAAP Facility Manager to answer any questions regarding field activities outside the fence boundary as directed in the RVAAP Community Relations Plan (September 2003). A copy of the plan is maintained at the RVAAP facility (Building 1037). The plan can also be accessed on the RVAAP public website at http://www.rvaap.org/.

The three additional wells will be installed at the facility as described below.

Scope of Work under the Addendum

Two additional wells will be installed south of the RVAAP fence line but north of State Route 5, and one well will be installed east-northeast of LL1mw-086. The attached figures (1 through 3) show the proposed locations of the three new RI wells on aerial photographs overlain with the property boundaries/right-of-ways. These locations are based on the existing potentiometric maps for the facility, preliminary fate-and-transport model outputs, and facility right-of-way maps. The Army also anticipates Ohio EPA input as to the final location of these wells. During installation of the well east of LL1mw-086, the location will be accessed through privately-owned property, through the RVAAP perimeter fence, or along the corridor between the fence line and the adjacent property (access along the corridor will only be possible if the ground is dry and there is no ponded water). If access through privately-owned property is required, the access route will be via Butts-Kistler Road alongside a farm field. Access from Route 5 would require traversing designated wetlands, which may be possible in dry weather. The farm property is designated a wetland. There is also a 12-in. gas line located approximately 25 feet east of the fence line.

It is anticipated the wells to be installed will be sampled for all constituents for two (2) consecutive quarters prior to completing the RI evaluation. These data will be included in the RI report. Ultimately, the new wells will be sampled for all constituents for a total of four (4) consecutive quarters in accordance with the *Final Facility-Wide Groundwater Monitoring Program Plan RVAAP-66 Facility-Wide Groundwater Addendum* dated January 6, 2012.
The new wells will be installed in accordance with the requirements set forth in Section 2 of the *Facility-Wide Groundwater Monitoring Program Plan RVAAP-66 Facility-Wide Groundwater Addendum* (EQM, January 2012). The new wells will be screened in the same interval as the nearby exiting wells as follows:

- The well (PW-1) south of LL3mw-244 will be screened in first water, which is in the upper Sharon in this area of the site. Bedrock is about 18 feet below grade. Groundwater

in RI well LL3mw-244 is approximately 14.5 feet below the top of casing; groundwater is confined at this location. The overburden will be cased off with 6-in.-dia. black pipe, and the well will be constructed of 2-in.-dia. polyvinyl chloride (PVC) with 10 feet of 0.010-in. slotted screen. The completion depth will be approximately 45 feet below grade.

- The well (PW-2) south of the well cluster containing wells LL2mw-059 and LL2mw-265 will be screened in first water, which is in the upper Sharon in this area of the site. Bedrock is approximately 6 to 8 feet below grade in this area. The depth to groundwater is approximately 18 feet below grade. The overburden will be cased off with 6-in.-dia. black pipe, and the well will be constructed of 2-in.-dia. PVC with 10 feet of 0.010-in. slotted screen. Based on the well logs for nearby existing wells LL2mw-059 and LL2mw-265, the completion depth of the new well will be approximately 20 to 25 feet below grade.
- The well (PW-3) east of LL1mw-086 will be completed in first water, which is in the unconsolidated glacial strata. The depth to groundwater is approximately 10 to 15 feet below grade. The well will be constructed of 2-in.-dia. PVC with 10 feet of 0.010-in. slotted screen. The well completion depth will be approximately 20 feet below grade.

Note that the proposed wells south of well LL3mw-244 and the well cluster containing wells LL2mw-059 and LL2mw-265 will be located between SR 5 and the fence line located on the north side of SR 5. The wells will be placed outside the fence but within the RVAAP property boundary, which extends approximately 25 feet south of the fence. Along the eastern fence line, the RVAAP property boundary is located approximately 74 feet east of the fence. Again, the proposed well east of LL1mw-086 will be installed outside the fence but within the property boundary.

If any of the newly installed wells are shown to be impacted with the investigational constituents (i.e. pesticides, explosives) further nature and extent investigation, including the installation of additional downgradient wells, will be conducted as necessary.

Schedule

EQM will begin well installation activities immediately upon approval of this addendum. It is anticipated the new wells will be installed and developed no later than early September 2013, and sampling will commence shortly thereafter. Note that installation of the eastern well may be contingent on receiving access from the adjacent farmer to drive on his property. The data will be included in the groundwater RI report. The new wells will ultimately be sampled for four consecutive quarters for the analyte list (including perchlorates and hexavalent chromium) detailed in the *Final Facility-Wide Groundwater Monitoring Program Plan RVAAP-66 Facility-Wide Groundwater Addendum* dated January 6, 2012.

Based on the additional proposed RI activities described above, a revised schedule will also be necessary to complete the groundwater RI report. We anticipate that the RI report will be completed in early 2014.

Attachment 1 presents the Correspondence & Comment Response between the Army and the Ohio EPA.

ATTACHMENT 1

CORRESPONDENCE & COMMENT/RESPONSE

Ohio EPA
40 years and moving forward

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Scott J. Nally, Director

September 4, 2013

RE: RAVENNA ARMY AMMUNITION PLANT, PORTAGE/TRUMBULL COUNTIES, REGARDING RESP. TO COMMENTS ON DRAFT ADDITIONAL WELL INSTALL-ATION ADDENDUM, DATED MAY 24, 2013, OHIO EPA ID # 267-000859-036

Mr. Mark Patterson
Installation Manager
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, OH 44266

CERTIFIED MAIL
7012 3460 0002 1239 4075

Dear Mr. Patterson:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the response to the Ohio EPA's Notice of Deficiency (NOD) Comments dated July 9, 2013, on the "Draft Facility-Wide Ground Water Monitoring Program-RVAAP-66 Facility-Wide Ground Water Additional Well Installation Addendum" for the Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio. This Addendum was received at Ohio EPA's Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR), on May 28, 2013 and is dated May 24, 2013. The document was prepared for the U.S. Army Corps of Engineers (USACE) – Louisville District by EQM, under contract No. W912QR-11-F-0266.

On August 15, 2013, a conference call was held between the Ohio EPA, Army National Guard Directorate (ARNGD), Ohio Army National Guard (OHARNG), USACE, and Environmental Quality Management, Incorporated to discuss questions regarding this document and other issues related to the Facility-Wide Ground Water Monitoring Program. Ohio EPA received a letter from the ARNGD on August 20, 2013 that summarizes the agreements made during the conference call and also provides responses to Ohio EPA's NOD comments. Ohio EPA is in agreement with the contents of the letter and proposed path forward.

These responses were reviewed by personnel from Ohio EPA's DERR. The Draft document should be revised with the August 20, 2013 responses, finalized, and

E-MAILED 09-09-2013 RMH

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submitted for approval according to the Directors Final Findings and Orders. If you have any questions, please call me at (330) 963-1160.

Sincerely,

Nancy Zikmanis

Nancy Zikmanis, CHMM
Environmental Supervisor
Division of Environmental Response and Revitalization

KP:NZ/nvr

cc: Brett Merkel, ARNG
Katie Tait, OHARNG RTLS
Cullen Grasty, U S Army Corps of Engineers

ec. Eileen Mohr, Ohio EPA, NEDO, DERR
Kevin Palombo, Ohio EPA, NEDO, DERR
Justin Burke, Ohio EPA, CO, DERR

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1. Article Addressed to:

MARK PATTERSON
RAVENNA ARMY AMMUNITION PLANT
BUILDING 1037
8451 STATE ROUTE 5
RAVENNA OH 44266-9297

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Ohio EPA
40 years and moving forward

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Scott J. Nally, Director

July 10, 2013

RE: RAVENNA ARMY AMMUNITION PLANT
PORTAGE/TRUMBULL COUNTIES
NOTICE OF DEFICIENCY, DRAFT FWGWMP-ADDITIONAL WELL INSTALLATION
ADDENDUM DATED MAY 24, 2013
OHIO EPA ID # 267-000859-036

Mr. Mark Patterson
Facility Manager
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, OH 44266

CERTIFIED MAIL
7012 1010 0002 2260 4572

Dear Mr. Patterson:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the "Draft Facility-Wide Ground Water Monitoring Program-RVAAP-66 Facility-wide Ground Water Additional Well Installation Addendum" for the Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio. This document was received at Ohio EPA's Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR), on May 28, 2013 and is dated May 24, 2013. The document was prepared for the U.S. Army Corps of Engineers (USACE) – Louisville District by EQM, under contract No. W912QR-11-F-0266.

Pursuant to the June 10, 2004 Director's Final Findings (DFFOs), Ohio EPA has prepared this notice of deficiency documenting Ohio EPA's disapproval under paragraph 39.

Pursuant to the DFFOs, Paragraph 41, and this notification, the "Respondent shall within thirty (30) days from the date of actual receipt of the disapproval, correct the deficiencies and submit revised page(s) to Ohio EPA for approval. This time limitation may be extended by mutual written agreement of the Project Managers. The revised submission shall incorporate all of the uncontested changes, additions, and/or deletions specified by Ohio EPA in its notice of deficiency." Paragraph 42 of the DFFOs provides for a meeting request by the Respondent to discuss and clarify issues. The DFFOs state, "... the meeting shall commence within fifteen (15) days of the close of the comment period" and again can be extended by mutual written agreement of the Project Managers.

Please let Ohio EPA know if the Army wants to request a meeting.

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The following are the deficiencies identified:

1. Global: This Additional Well Installation Addendum needs to reference the Facility-Wide Sampling and Analysis Plan for Environmental Investigations and state that all activities will follow these plans and associated Health and Safety Plans, etc.

2. Global: Since drilling and monitoring well installation activities will be occurring near off-property locations, outside of facility fencing and visible to the public, this Additional Well Installation Addendum should provide reference to public relations plans or provide some direction for field crews and management for responding to potential questions from public/media concerns.

3. Page 1, paragraph 2, describes that 38 groundwater monitoring wells were installed to provide additional information in support of hydrogeologic and fate-and-transport models, evaluate potential exit pathways, evaluate vertical contaminant distribution and/or particle inflow/outflow through the central portion of the facility, and assess potential ground water impacts from Compliance Restoration sites. Please provide the range of dates when these wells were installed.

4. Page 2 and 3 provide general information on how and why the locations for additional wells were determined, but does not provide much specific information (data) on which Ohio EPA can agree or verify. Specifically, what are the estimated depths of the proposed wells and estimated depths to water? Generally, how will the wells be constructed? Which wells are bedrock wells? Is there a need for deeper monitoring wells at the same locations to determine the vertical limits of potential contamination? What is the Army's contingency plan/path forward if it is determined these new wells are impacted?

Comments related to Figures 1, 2 and 3:

5. Figures 1, 2, and 3 do not provide any legend describing the well symbols and the significance of the one labeled existing monitoring well. Please revise the map accordingly and provide additional information as requested in comment 8.

6. The existing monitoring well in white on Figure 2 is mislabeled. It should be LL2mw-059.

7. The existing monitoring well in white on Figure 3 is mislabeled. It should be LL1mw-086.

8. Page 3, paragraph 1, states that the locations of well installations are based on the existing potentiometric surface maps for the facility, preliminary fate-and-transport

model outputs, and facility right-of-way maps. Figures 1, 2 and 3 should provide the information on which these decisions were made. For example, please provide a few potentiometric surface contour lines associated with the areas of concern from the units affected (it is assumed the most recent maps were used). Provide some generalized information from the fate and transport model that supports decisions to place wells in these areas. Provide the locations of two or three monitoring wells, not just one, that show contaminants of concern upgradient of the proposed wells.

If you have any questions concerning this correspondence, please do not hesitate to contact me at (330) 963-1160.

Sincerely,

Nancy Zikmanis
Environmental Supervisor
Division of Environmental Response and Revitalization

KP:NZ/kss

cc: Katie Tait, OHARNG
Ann Wood, ARNG
Cullen Grasty, USACE

ec: Kevin Palombo, Ohio EPA, NEDO, DERR
Justin Burke, Ohio EPA, CO, DERR
Rod Beals, Ohio EPA, NEDO, DERR
Eileen Mohr, Ohio EPA, NEDO, DERR
Todd Fisher, Ohio EPA, NEDO, DERR
Vicki Deppisch, Ohio EPA, NEDO, DERR

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1. Article Addressed to:

MARK PATTERSON
RAVENNA ARMY AMMUNITION PLANT
8451 STATE ROUTE 5
RAVENNA OH 44266

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Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266

August 20, 2013

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

Subject: Additional Well Installation Addendum
Ohio EPA ID # 267-000859-036
Ravenna Army Ammunition Plant

Dear Mr. Palombo:

On July 10, 2013, the Army received the above-listed "Notice of Deficiency" letter (Certified Mail 7012 1010 0002 2260 4572) from the Ohio Environmental Protection Agency (Ohio EPA). The letter was dated July 10, 2013. The letter presented notice of deficiency comments. The purpose of this letter is to address the Ohio EPA's comments prior to submitting the revised, final document.

The following paragraphs list the Ohio EPA's specified comments, and provide the Army's respective responses:

1. Global: This Additional Well Installation Addendum needs to reference the Facility-Wide Sampling and Analysis Plan for Environmental Investigations and state that all activities will follow these plans and associated Health and Safety Plans, etc.

   Response: *The following text will be revised to the addendum:*
   The new wells will be installed in accordance with the Facility-Wide Groundwater Monitoring Program Plan RVAAP-66 Facility-Wide Groundwater Addendum (EQM, January 2012), which included amendments to the Facility-Wide Sampling and Analysis Plan for Environmental Investigations, Ravenna Army Ammunition Plant, Ravenna, Ohio, Field Sampling Plan (SAIC, 2011); Facility-Wide Sampling and Analysis Plan for Environmental Investigations, Ravenna Army Ammunition Plant, Ravenna, Ohio, Quality Assurance Project Plan (SAIC, 2011); and Facility-Wide Safety and Health Plan for Environmental Investigations (SAIC, 2011). Since the new wells will be installed outside the RVAAP fence line, field personnel will be asked to direct any public/media persons to the RVAAP Facility Manager to answer any questions regarding field activities outside the fence boundary as directed in the RVAAP Community Relations Plan (September 2003). A copy of the plan is maintained at the RVAAP facility (Building 1037). The plan can also be accessed on the RVAAP public website at http://www.rvaap.org/

2. Global: Since drilling and monitoring well installation activities will be occurring near off-property locations, outside of facility fencing and visible to the public, this Additional Well Installation Addendum should provide reference to public relations plans or provide some direction for field crews and management for responding to potential questions from public/media concerns.

   Response: *In accordance with the RVAAP Community Relations Plan (September 2003), field personnel will be asked to direct any public/media persons to the RVAAP Facility Manager, to answer any questions regarding field activities outside the fence boundary. A copy of the plan is maintained at the RVAAP facility (Building 1037). The plan can also be accessed on the RVAAP public website at http://www.rvaap.org/.*

3. Page 1, paragraph 2, describes that 38 groundwater monitoring wells were installed to provide additional information in support of hydrogeologic and fate-and-transport models, evaluate potential exit pathways, evaluate vertical contaminant distribution and/or particle inflow/outflow through the central portion of the facility, and assess potential ground water impacts from Compliance Restoration sites. Please provide the range of dates when these wells were installed.

   Response: *The following text will be added to the addendum: The 38 RI wells were installed during two mobilizations: 31 wells were installed between February 27 and April 17, 2012, and seven wells located within three Munitions Response (MR) areas [DA2, Winklepeck Burning Grounds (WBG), and Erie Burning Grounds (EBG)] were installed between May 29 and June 27, 2012.*

4. Page 2 and 3 provide general information on how and why the locations for additional wells were determined, but does not provide much specific information (data) on which Ohio EPA can agree or verify. Specifically, what are the estimated depths of the proposed wells and estimated depths to water? Generally, how will the wells be constructed? Which wells are bedrock wells? Is there a need for deeper monitoring wells at the same locations to determine the vertical limits of potential contamination?

   Response:

   a) *Well PW-1 will be completed in first water in the Upper Sharon bedrock; bedrock is about 18 ft. below grade. Groundwater in new RI well LL3mw-244 is approximately 14.5 ft. below the top of casing; groundwater is confined at this location. The overburden will be cased off with 6-in.-dia black pipe; the well will be constructed of 2-in.-dia. PVC with 10 feet of 0.010-in. slotted screen; the completion depth will be approximately 45 feet below grade.*
   b) *Well PW-2 will be completed in first water in the Upper Sharon bedrock; bedrock is 6 to 8 feet below grade. The depth to groundwater is approximately 18 feet below grade. The overburden will be cased off with 6-in.-dia. black pipe; the well will be constructed of 2-in.-dia. PVC with 10 feet of 0.010-in. slotted screen. Based on nearby existing wells LL2mw-059 and LL2mw-265, the well completion depth will be approximately 20-25 feet below grade.*
   c) *Well PW-3 will be completed in first water in unconsolidated strata. The depth to groundwater is approximately 10 to 15 feet below grade. The well will be constructed of 2-in.-dia. PVC with 10 feet of 0.010-in. slotted screen. The well completion depth will be approximately 20 feet below grade.*

4d. What is the Army's contingency plan/path forward if it is determined these new wells are impacted.

Response:
The following text will be added to the addendum: If any of the newly installed wells are shown to be impacted with the investigational constituents (i.e. pesticides, explosives) further nature and extent investigation, including the installation of additional downgradient wells, will be conducted as necessary.

Comments related to Figures 1, 2 and 3:

5. Figures 1, 2, and 3 do not provide any legend describing the well symbols and the significance of the one labeled existing monitoring well. Please revise the map accordingly and provide additional information as requested in comment 8.

   Response: *The figures will be revised to include this information.*

6. The existing monitoring well in white on Figure 2 is mislabeled. It should be LL2mw-059.

   Response: *We will make this correction.*

7. The existing monitoring well in white on Figure 3 is mislabeled. It should be LL1mw-086.

   Response: *We will make this correction.*

8. Page 3, paragraph 1, states that the locations of well installations are based on the existing potentiometric surface maps for the facility, preliminary fate-and-transport model outputs, and facility right-of-way maps. Figures 1, 2 and 3 should provide the information on which these decisions were made. For example, please provide a few potentiometric surface contour lines associated with the areas of concern from the units affected (it is assumed the most recent maps were used). Provide some generalized information from the fate and transport model that supports decisions to place wells in these areas. Provide the locations of two or three monitoring wells, not just one, that show contaminants of concern upgradient of the proposed wells.

   Response: *The figures will be revised to include this information.*

Finalization of the addendum will occur in accordance with the Director's Final Findings and Orders upon receipt of the Ohio Environmental Protection Agency approval letter for the notice of deficiency comments. If the Ohio EPA finds the RTCs suitable and provides their concurrence before August 28, 2013, then the Army will provide the Revised Final Additional Well Installation Addendum before the Director's Final Findings and Orders (DFFO) schedule delivery date of August 30, 2013. If further discussion is necessary to achieve resolution on the Ohio EPA comments, then the Army will request an extension and the remaining Ohio EPA comments will be addressed in a tentatively scheduled, September 12, 2013, in-person, groundwater technical meeting.

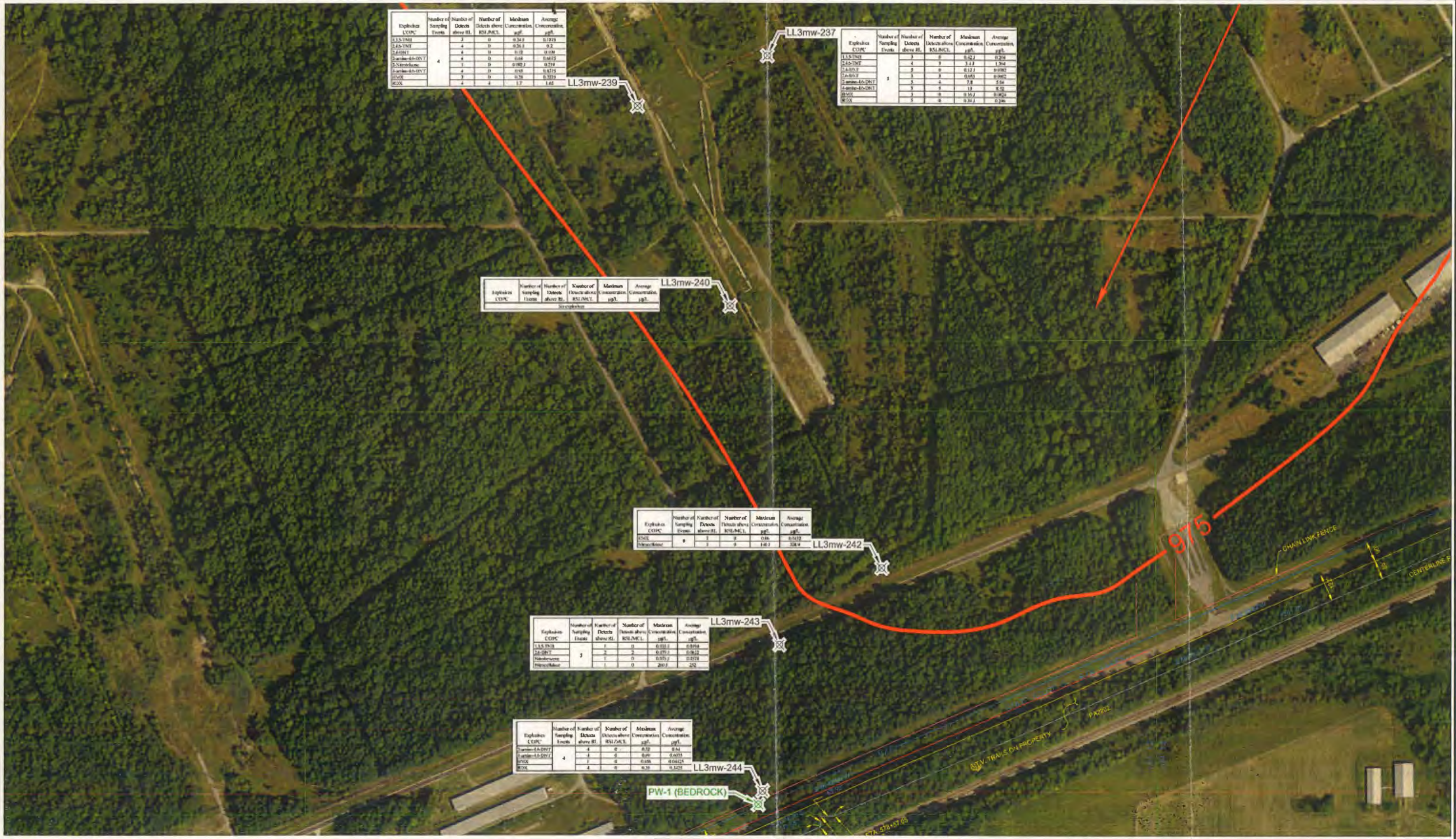
Please contact the undersigned at (330) 358-7312 or mark.c.patterson@us.army.mil if there are issues or concerns with this submission.

Sincerely,

Mark C. Patterson

Mark C. Patterson
RVAAP Facility Manager
Base Realignment and Closure Division

Cc: Vicki Deppisch, Ohio EPA, NEDO, DERR
Nancy Zikmanis, Ohio EPA, NEDO, DERR
Rodney Beals, Ohio EPA, NEDO, DERR
Kevin Sedlak, ARNG
Brett Merkel, ARNG
Katie Tait, OHARNG Camp Ravenna
Glen Beckham, USACE Louisville
Nat Peters, USACE Louisville
Mark Nichter, USACE Louisville
John Miller, EQM
Mark Patterson, RVAAP Facility Manager/Gail Harris, Vista Sciences
REIMS - attn. Pat Ryan, SAIC



LEGEND

SHARON WELL

PROPOSED WELL

1100 LINE OF EQUAL GROUNDWATER ELEVATION (ft., amsl) [DASHED WHERE INFERRED] - UPPER SHARON AQUIFER

GROUND WATER DIRECTION

N

SCALE IN FEET

0 100 200 400

REV	DESCRIPTION	DATE	APPROVED

REVISIONS

EQ

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CHECKED	S. SPESSHARDT	07-17-2013
APPROVED	J. MILLER	07-17-2013
SCALE:	1" = 200'	

PROPOSED ADDITIONAL RI WELL LOCATIONS IN EASTERN PORTION RVAAP

SIZE	PROJECT NO.	DWG NO.	REV
D	030174.0016	FIGURE 1	0

Explosives COPC	Number of Sampling Events	Number of Detects above RL	Number of Detects above RSL/MCL	Maximum Concentration, µg/L	Average Concentration, µg/L
HMX	4	1	0	0.078	0.0563

LL2mw-269

Explosives COPC	Number of Sampling Events	Number of Detects above RL	Number of Detects above RSL/MCL	Maximum Concentration, µg/L	Average Concentration, µg/L
1,3,5-TNB	6	1	0	0.062 J	0.0455
2-amino-4,6-DNT		5	0	0.62	0.299
4-amino-4,6-DNT		5	0	0.91	0.419
Nitrocellulose		1	0	210 J	368.3

LL2mw-060

Explosives COPC	Number of Sampling Events	Number of Detects above RL	Number of Detects above RSL/MCL	Maximum Concentration, µg/L	Average Concentration, µg/L
1,3,5-TNB	8	1	0	0.056 J	0.0701

SCFmw-003

Explosives COPC	Number of Sampling Events	Number of Detects above RL	Number of Detects above RSL/MCL	Maximum Concentration, µg/L	Average Concentration, µg/L
2,6-DNT	9	2	2	0.092	0.0583
2-amino-4,6-DNT		1	0	0.05 J	0.0532
4-amino-4,6-DNT		1	0	0.097	0.0584
HMX		3	0	0.055	0.0492

LL2mw-265

LL2mw-059

Explosives COPC	Number of Sampling Events	Number of Detects above RL	Number of Detects above RSL/MCL	Maximum Concentration, µg/L	Average Concentration, µg/L
1,3,5-TNB	10	10	0	4.1	1.484
1,3-DNB		7	1	0.15	0.075
2,4,6-TNT		1	0	0.08 J	0.0503
2,4-DNT		10	9	0.86	0.387
2-amino-4,6-DNT		10	0	1.0	0.589
4-amino-4,6-DNT		10	0	0.97	0.576
HMX		10	0	0.14 J	0.0924
Nitrobenzene		1	0	0.11 J	0.05605
Nitrocellulose		2	0	170 J	379
RDX		1	0	0.046 J	0.04255

PW-2 (BEDROCK)

950

975

CHAIN LINK FENCE

CENTERLINE R/W

A.T.V. TRAILS ON PROPERTY

PAVED

LEGEND

- SHARON WELL
- PROPOSED WELL
- 1100 — LINE OF EQUAL GROUNDWATER ELEVATION (ft., amsl) [DASHED WHERE INFERRED] - UPPER SHARON AQUIFER
- GROUND WATER DIRECTION

SCALE IN FEET

0 100 200 400

REV	DESCRIPTION	DATE	APPROVED

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SCALE:	1" = 200'	

PROPOSED ADDITIONAL RI WELL LOCATIONS IN EASTERN PORTION RVAAP

SIZE	PROJECT NO.	DWG NO.	REV
D	030174.0016	FIGURE 2	0

LL1mw-064

Explosives COPC	Number of Sampling Events	Number of Detects above RL	Number of Detects above RSL/MCL	Maximum Concentration, µg/L	Average Concentration, µg/L
No Pesticides					

LL1mw-066

Explosives COPC	Number of Sampling Events	Number of Detects above RL	Number of Detects above RSL/MCL	Maximum Concentration, µg/L	Average Concentration, µg/L
beta-BHC	3	2	1	0.027 J	0.0122

LL1mw-065

Explosives COPC	Number of Sampling Events	Number of Detects above RL	Number of Detects above RSL/MCL	Maximum Concentration, µg/L	Average Concentration, µg/L
No Pesticides					

LL1mw-067

Explosives COPC	Number of Sampling Events	Number of Detects above RL	Number of Detects above RSL/MCL	Maximum Concentration, µg/L	Average Concentration, µg/L
No Pesticides					

SCFmw-004

Explosives COPC	Number of Sampling Events	Number of Detects above RL	Number of Detects above RSL/MCL	Maximum Concentration, µg/L	Average Concentration, µg/L
No Pesticides					

LEGEND

- SHARON WELL
- UNCONSOLIDATED WELL
- PROPOSED WELL
- 1100 LINE OF EQUAL GROUNDWATER ELEVATION (ft., amsl) [DASHED WHERE INFERRED] - UNCONSOLIDATED AQUIFER
- GROUND WATER DIRECTION
- POTENTIAL ACCESS ROUTE TO WELLS

SCALE IN FEET: 0 100 200 400

REV	DESCRIPTION	DATE	APPROVED

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PROPOSED ADDITIONAL RI WELL LOCATIONS IN EASTERN PORTION RVAAP

SIZE	PROJECT NO.	DWG NO.	REV
D	030174.0016	FIGURE 3	0