Final
No Further Action Record of Decision for RVAAP-016-R-01 Fuze and Booster Quarry Munitions Response Site
Version 1.0

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Contract No. W912DR-15-D-0016
Delivery Order No. 0001

Prepared for:

US Army Corps of Engineers®

U.S. Army Corps of Engineers
Baltimore District
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Prepared by:
HydroGeoLogic, Inc. (HGL)
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June 3, 2019

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None

14. ABSTRACT

The U.S. Department of the Army (U.S. Army) is presenting this No Further Action (NFA) Record of Decision to document the No Further Action determination for the former Ravenna Army Ammunition Plant, RVAAP-016-R-01 Fuze and Booster Quarry Munitions Response Site (MRS), in Portage and Trumbull Counties, Ohio. This NFA Record of Decision presents the U.S. Army's No Further Action determination, Ohio EPA Concurrence with the NFA decision, and the response from the public during the 30-day public comment period for the MRS. Investigations have found no munitions and explosives of concern or concentrated areas of munitions debris, and no potential source of munitions constituents exists at the MRS. Therefore, there is no source material or impacted environmental media resulting from historical U.S. munitions-related activities at the MRS.

15. SUBJECT TERMS

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Ohio Environmental Protection Agency

Mike DeWine, Governor
Jon Husted, Lt. Governor
Laurie A. Stevenson, Director

June 21, 2019

RE: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
ID # 267000859245

Mr. David Connolly
Army National Guard Directorate
Environmental Programs Division
ARNG-ILE-CR
111 South George Mason Drive
Arlington, VA 22204

Subject: Final Record of Decision for RVAAP-016-R-01 Fuze and Booster Quarry Munitions Response Site

Dear Mr. Connolly:

The Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) has received and reviewed the *Final No Further Action Record of Decision for RVAAP-016-R-01 Fuze and Booster Quarry Munitions Response Site Version 1.0*, dated June 3, 2019. It was prepared by HydroGeoLogic, Inc.

Ohio EPA has no additional comments on the *Final No Further Action Record of Decision for RVAAP-016-R-01 Fuze and Booster Quarry Munitions Response Site Version 1.0*. Based on the information contained in the Final Record of Decision (ROD) document, other investigation documents and reports, and Ohio EPA's oversight participation during the investigation, Ohio EPA concurs with the ROD document for the RVAAP-016-R-01 Fuze and Booster Quarry Munitions Response Site recommending No Further Action.

If you have any questions concerning this letter, please contact Nicholas Roope at (330) 963-1235.

Sincerely,

Melisa Witherspoon, Chief
Division of Environmental Response and Revitalization

ec: David Connolly, ARNG
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CONTRACTOR'S STATEMENT OF INDEPENDENT TECHNICAL REVIEW

HydroGeoLogic, Inc. has completed the *Final No Further Action Record of Decision for RVAAP-016-R-01 Fuze and Booster Quarry Munitions Response Site, Version 1.0,* at the Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio. Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of data quality objectives, technical assumptions; methods, procedures, and materials to be used; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets customer's needs consistent with law and existing United States Army Corps of Engineers policy.

Reviewed/Approved by: Janardan J Patel Digitally signed by Janardan J Patel DN: cn=Janardan J Patel, o=HGL, ou=ECD, email=jpatel@hgl.com, c=US Date: 2019.05.29 16:09:34 -04'00' Date: 6/3/2019

Janardan Patel, PMP
Program Manager

Prepared/Approved by: Kimberly Vaughn Date: 6/3/2019

Kimberly Vaughn
Project Manager

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Munitions Response Site
Version 1.0

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ARNG – Army National Guard
COR – Contracting Officer's Representative
IED – Installation and Environment Division
OHARNG – Ohio Army National Guard
RVAAP – Former Ravenna Army Ammunition Plant
USACE – United States Army Corps of Engineers

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

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ACRONYMS AND ABBREVIATIONS

amsl	above mean sea level
AOC	Area of Concern
ARAR	applicable or relevant and appropriate requirements
Army	U.S. Department of the Army
ARNG	Army National Guard
Camp Ravenna	Camp Ravenna Joint Military Training Center
CB&I	CB&I Federal Services, LLC
CD	cultural debris
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CJAG	Camp James A. Garfield Joint Military Training Center
COC	chemical of concern
COR	Contracting Officer's Representative
CSM	Conceptual Site Model
DA	U.S. Department of the Army
DERP	Defense Environmental Restoration Program
DFFO	Director's Final Findings and Orders
DMM	discarded military munitions
DoD	Department of Defense
e^2M	Engineering-Environmental Management, Inc.
ERA	Ecological Risk Assessment
FS	Feasibility Study
GOCO	U.S. Government-Owned and Contractor-Operated
HA	Hazard Assessment
HGL	HydroGeoLogic, Inc.
HHRA	Human Health Risk Assessment
HRR	Historical Records Review
I&E	Installation and Environment
IED	Installation and Environment Division
IRP	Installation Restoration Program
MC	munitions constituents
MD	munitions debris
MEC	munitions and explosives of concern
MMRP	Military Munitions Response Program
MRS	munitions response site
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No Further Action

NPDES	National Pollutant Discharge Elimination System
ODNR	Ohio Department of Natural Resources
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
PP	Proposed Plan
RAB	Restoration Advisory Board
RI	Remedial Investigation
ROD	Record of Decision
RVAAP	Ravenna Army Ammunition Plan
SARA	Superfund Amendments and Reauthorization Act
SI	Site Inspection
TESL	Threatened and Endangered Species List
TNT	2,4,6-trinitrotoluene
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USP&FO	U.S. Property and Fiscal Officer
UXO	unexploded ordnance

PART I: DECLARATION

A. SITE NAME AND LOCATION

The Army National Guard (ARNG) developed this No Further Action (NFA) Record of Decision (ROD) at RVAAP-016-R-01 Fuze and Booster Quarry Munitions Response Site (MRS). The Fuze and Booster Quarry MRS is located in the southern portion of Camp James A. Garfield Joint Military Training Center (**Figures 1 and 2**). The former Ravenna Army Ammunition Plant (RVAAP) is now known as Camp James A. Garfield Joint Military Training Center (CJAG). CJAG was previously known as Camp Ravenna Joint Military Training Center (Camp Ravenna) and that name was used in some historical reports.

CJAG is 21,683 acre federally owned installation is located in Portage and Trumbull Counties, Ohio approximately 3 miles east-northeast of the City of Ravenna (**Figure 1**). Administrative accountability for CJAG was transferred to the U.S. Property and Fiscal Officer (USP&FO) for Ohio (the property owner) in multiple transfers, the last completed in September 2013. The facility is licensed to the Ohio Army National Guard (OHARNG) for use as a military training facility (Federal Facility ID No. OH213820736).

To maintain a distinction between historical operations and current activities, the term "RVAAP" will be used for historical discussions and "CJAG" will be used when referring to the current facility activities.

B. STATEMENT OF BASIS AND PURPOSE

The Army National Guard (ARNG) is the lead agency for environmental response actions at the former RVAAP. The ARNG in consultation with the Ohio Environmental Protection Agency (Ohio EPA), determined that NFA is the selected remedy for the Fuze and Booster Quarry MRS at the former RVAAP. The NFA determination meets the requirements of the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) of 1980, as amended by the *Superfund Amendments and Reauthorization Act (SARA)* of 1986 and the *National Oil and Hazardous Substances Pollution Contingency Plan (NCP)*. The Army's decision is based on information contained in the Administrative Record file for the Fuze and Booster Quarry MRS.

The MRS is collocated with the Fuze and Booster Quarry Landfill/Ponds Area of Concern (AOC). The evaluation for the chemicals of concern identified during previous investigations under the Installation Restoration Program (IRP) will continue to be addressed under the IRP.

The Ohio EPA, the supporting state regulatory agency, reviewed and concurred with the *Final No Further Action Proposed Plan for RVAAP-016-R-01 Fuze and Booster Quarry Munitions Response Site* (HGL, 2018b). The NFA Proposed Plan (PP) presented the Army's preferred remedy for addressing the Fuze and Booster Quarry MRS and invited public involvement during the comment period (October 25 through December 1, 2018) and public meeting (November 1, 2018). No Department of Defense (DoD) military munitions (i.e., unexploded ordnance [UXO], discarded military munitions [DMM] or munitions constituents [MC]) originating from historical activities associated with the Fuze and Booster Quarry MRS were encountered during the investigations conducted to date, and none are suspected. The NFA determination under the CERCLA process at the Fuze and Booster Quarry MRS satisfies the requirements of the Ohio EPA *Director's Final Findings and Orders* (DFFO) (Ohio EPA, 2004), specifically by documenting the Ohio EPA's concurrence with the closeout of the Military Munitions Response Program (MMRP) investigation conducted for this MRS under Section XII, paragraph 26.

C. DESCRIPTION OF THE SELECTED REMEDY

No DoD military munitions confirmed to be munitions and explosives of concern (MEC) were encountered at the Fuze and Booster Quarry MRS during the Remedial Investigation (RI), only munitions debris (MD) were found. Additionally, the results of the RI concluded no MC-related contamination was present at the MRS during the RI. Therefore, NFA is the selected remedy for the Fuze and Booster Quarry MRS under the DoD's MMRP pursuant to CERCLA requirements.

D. STATUTORY DETERMINATION

The results of the RI fieldwork for the Fuze and Booster Quarry MRS support the determination that no unacceptable risk due to explosive hazards or potential sources of MEC have been found at the MRS, and no source of MC is known to exist. The human health and ecological risk assessments concluded that no risks due to MC-related contamination are present. The ARNG has determined that NFA is acceptable for the Fuze and Booster Quarry MRS because there is no risk associated with the presence of DoD military munitions or MC-related contamination. The NFA is protective of human health and the environment, and meets the statutory requirements for cleanup standards established in Section 121 of CERCLA. Because there are no risks to human health or the environment associated with DoD military munitions, or MC-related contamination at the MRS, five-year reviews are not required. No other remedial action is necessary to ensure protection of human health and the environment.

E. AUTHORIZING SIGNATURE

Approve:

for Hallet Brayton Jr — 7 Oct 2019

WILLIAM M. MYER
COL, GS
I&E, Army National Guard

Date

PART II: DECISION SUMMARY

A. SITE NAME, LOCATION, AND DESCRIPTION

The former RVAAP, now known as the Camp James A. Garfield Joint Military Training Center (CJAG), is located in northeastern Ohio within Portage and Trumbull Counties and is approximately 3 miles east-northeast of the city of Ravenna. The federally owned facility, approximately 11 miles long and 3.5 miles wide, is bounded by a Norfolk Southern railroad line to the north; State Route 5, the Michael J. Kirwan Reservoir, and a CSX railroad line to the south; State Route 534 to the east; and Garret, McCormick, and Berry Roads to the west. The facility is surrounded by the communities of Windham, Garrettsville, Newton Falls, Charlestown, and Wayland. (**Figure 1**).

Administrative accountability of the 21,683-acre facility has been transferred to the USP&FO for Ohio, which subsequently licensed CJAG to the OHARNG for use as a training site. The restoration program for the facility involves the remediation of areas affected by the activities of the former RVAAP.

The Fuze and Booster Quarry MRS is a 4.92-acre parcel located in the southern portion of CJAG as shown in **Figure 2**. The Fuze and Booster Quarry MRS was investigated under the MMRP, a program similar to the IRP. Investigation of the IRP AOC RVAAP-16 will address any potential contamination related to past industrial activities and sources (non-munitions related contamination or sources). Solid waste identified at the site will be managed under the Solid Waste Management Plan for CJAG.

The MMRP was established under the DoD's Defense Environmental Restoration Program (DERP) to address DoD military munitions located on current and former defense sites. Sites that are eligible under the MMRP are non-operational ranges where military munitions are known or suspected to be present. The Fuze and Booster Quarry MRS was determined to be eligible under the MMRP.

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The former RVAAP was constructed in 1940 and 1941 for the assembly/loading and depot storage of ammunition. While serving as an ammunition plant, RVAAP was a U.S. Government-owned and contractor-operated (GOCO) industrial facility. The ammunition plant consisted of 12 munitions assembly facilities, referred to as "load lines." Load Lines 1 through 4 were used to melt and load 2,4,6-trinitrotoluene (TNT) and Composition B (a mixture of TNT and Research Department Explosive) into large-caliber shells and bombs. Operations on the load lines produced explosive dust, spills, and vapors that collected on the floors and walls of each building. Periodically, the floors and walls were cleaned with water and steam. After cleaning, the "pink water" wastewater, which contained TNT and Composition B, was collected in concrete holding tanks, filtered, and pumped into unlined ditches for transport to earthen settling ponds. Load Lines 5 through 11 manufactured fuzes, primers, and boosters. From 1946 to 1949, Load Line 12 produced ammonium nitrate for explosives and fertilizers; subsequently, it was used as a weapons demilitarization facility.

In 1950, the facility was placed on standby status, and operations were limited to renovation, demilitarization, normal maintenance of equipment, and munitions storage. Production activities resumed from July 1954 to October 1957 and again from May 1968 to August 1972. Demilitarization and production activities were conducted at Load Lines 1, 2, 3, and 12.

Demilitarization activities included disassembling munitions, melt out, and recovering explosives using hot water and steam processes. These activities continued through 1992.

In addition to production and demilitarization activities at the load lines, other activities conducted at the former RVAAP included the burning, demolition, and testing of munitions. The locations used as burning and demolition grounds consisted of large, open areas and abandoned quarries. Other AOCs associated with the former RVAAP include a landfill, an aircraft fuel tank testing area, and various industrial support and maintenance facilities (CB&I, 2015).

The Fuze and Booster Quarry MRS is a 4.92-acre area located in the southern portion of CJAG as shown in **Figure 2**. Between 1945 and 1949 the quarry was used as an open burn area where sawdust waste generated at Load Lines 6 through 11 was thermally treated. The quarry was used as a landfill that reportedly accepted fuze and booster assemblies, projectiles, residual ash, and sanitary waste. In 1976, the landfill materials, inclusive of the munitions-related items historically disposed of at the MRS, were removed, and transferred to one of the other burning grounds at RVAAP. Around this time, three elongated settling ponds were constructed at the MRS. The depths of the water in the ponds fluctuates, averaging 6 to 7 feet deep and ranging from 1 feet to 10 feet deep based on precipitation. From 1987 through 1993, spent brine regenerate and sand filtration backwash water were discharged to the ponds from the facility's potable water treatment system (HGL, 2018b). The discharge was regulated under the National Pollutant Discharge Elimination System (NPDES) permit. The ponds have been inactive since 1993 (HGL, 2018).

There have been no CERCLA enforcement actions related to the Fuze and Booster Quarry MRS.

C. COMMUNITY PARTICIPATION

Using the RVAAP restoration program community relations program, the Army and the Ohio EPA have interacted with the public through news releases, public meetings, reading materials, and a website. Specific items of the community relations program include the following:

- **Restoration Advisory Board:** The Army established a Restoration Advisory Board (RAB) in 1996 to promote community involvement in DoD environmental cleanup activities and allow the public to review and discuss the progress with decision makers. Board meetings are generally held two to three times per year and are open to the public.
- **RVAAP Restoration Program Community Relations Plan:** The Final *Community Relations Plan for the Ravenna Army Ammunition Plant Restoration Program in Portage and Trumbull Counties, Ohio* (USACE, 2017) was prepared to establish processes to keep the public informed of activities being conducted as part of the RVAAP restoration program.
- **RVAAP Restoration Program Website:** The Army established a website in 2004 dedicated to the former RVAAP restoration program. The website provides information on the history of the former RVAAP; areas where DoD military munitions may be present; areas of potential contamination; the cleanup program being implemented; current activities; and a schedule of upcoming events. This website is accessible to the public at www.rvaap.org.

In accordance with Section 117(a) of CERCLA, Section 300.430(f)(2) of the *National Oil and Hazardous Substances Pollution Contingency Plan*, and the *Final U.S. Army Military Munitions Response Program Munitions Response, Remedial Investigation / Feasibility Study Guidance* (Army, 2009) the ARNG released the NFA PP for the Fuze and Booster Quarry MRS

(HGL, 2018b) in October 2018. The NFA PP and other project-related documents were made available to the public as part of the Administrative Record maintained at CJAG and in the two Information Repositories at Reed Memorial Library in Ravenna, Ohio and Newton Falls Public Library in Newton Falls, Ohio. The notice of availability for the NFA PP was sent to the Tribune Chronicle and the Record Courier, as specified in the Community Relations Plan (USACE, 2017). The notice of availability initiated the 30-day public comment period which began on October 25, 2018, and ended on December 1, 2018.

The ARNG held a public meeting on November 1, 2018, at the Shearer Community Center at 9355 Newton Falls Road, Ravenna, Ohio 44266, to present the NFA PP to the public. At this meeting, representatives of the ARNG provided information specific to the Fuze and Booster Quarry MRS history, investigations, current site conditions, and proposed NFA. ARNG representatives were also available to answer questions about the results of the munitions response investigations conducted under the MMRP at the Fuze and Booster Quarry MRS. A memorandum summarizing the public meeting and a transcript of the public meeting are available to the public and have been included in the Administrative Record. Responses to the comments received at this meeting and during the public comment period are included in the Responsiveness Summary, which is Part III of this ROD.

The ARNG considered the input received on the NFA PP when determining that NFA for both DoD military munitions, and MC-related contamination is appropriate for the Fuze and Booster Quarry MRS.

D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The overall goal of the munitions response conducted at the former RVAAP was to address risks to human health and the environment posed by DoD military munitions (i.e., unexploded ordnance [UXO] and discarded military munitions [DMM]) and MC-related contamination that may be present. The investigations the ARNG conducted determined that no unacceptable risk is posed by DoD military munitions within the Fuze and Booster Quarry MRS. Given there was no evidence that DoD military munitions creating an explosive hazard were present, there was no potential source of MC-related contamination. For this reason, the Army determined there is no source material or impacted environmental media associated with DoD military munitions at Fuze and Booster Quarry MRS.

Although not anticipated, if additional hazards related to historical DoD use are identified at the Fuze and Booster Quarry MRS, they would be addressed under the appropriate program.

E. SITE CHARACTERISTICS

This section described the physical characteristics, previous investigations, nature and extent of contamination, and conceptual site model (CSM) for the Fuze and Booster Quarry MRS.

E.1 Physical Characteristics

This section describes the physical characteristics such as topography, geology, hydrogeology, and ecological characteristics that contributed to identifying potential transport pathways, receptors and exposure scenarios used to evaluate health and ecological risks.

E.1.1 Topography/Physiography

CJAG is located within the Southern New York section of the Appalachian Plateaus physiographic province characterized by rolling hills, incised streams, and dendritic drainage patterns. Past

glacial activity created bogs, lakes, and other wetland areas. The topography of the Fuze and Booster Quarry MRS is described as gentle slopes to the east and west of the MRS down toward three elongated ponds that make up the majority of the MRS. The elevation of the Fuze and Booster Quarry MRS ranges from approximately 1,140 feet above mean sea level (amsl) to approximately 1,125 feet amsl (CB&I, 2015).

E.1.2 Soils and Geology

The facility is located atop Mississippian- and Pennsylvanian-age bedrock strata overlain by unconsolidated glacial deposits of varying thickness. The Fuze and Booster Quarry MRS is located over the Homewood Sandstone Member with a bedrock elevation of 1,125 feet amsl. Depth to bedrock ranges from several inches beneath the pond floors to approximately 10 feet below ground surface (CB&I, 2015).

During former quarry operations, the native soil at the MRS was significantly reworked and removed. The three settling ponds that make up the majority of the MRS acreage are classified as pits and quarries. Soils to the east of the settling ponds are described as Mitiwanga Silt Loam with a 2 to 6 percent slope and permeability of 9.1×10^{-5} centimeter/second. This soil is characterized by seasonable saturation with water in the winter and early spring and draught conditions in the summer (CB&I, 2015).

E.1.3 Hydrology

The facility is located within the Ohio River Basin with a major surface stream running adjacent to the western portion of the facility flowing to the Mahoning River before joining the Michael J. Kirwan Reservoir. After leaving the reservoir, the west branch joins the Mahoning River east of the facility. Surface water at the Fuze and Booster Quarry MRS consists of three elongated settling ponds classified as seasonal wetlands in the shallow areas of the ponds. The ponds intersect with surface water flow from the east-northeast direction. Surface water flows from the northern ponds to the southern pond through gated culverts exiting at a ditch to the southwest. Surface water at the MRS drains to the Michael J. Kirwan Reservoir (CB&I, 2015).

E.1.4 Ecology

The facility is home to a range of habitats, vegetation types, and animal species. The Fuze and Booster Quarry MRS is classified as a 'Mixed Swamp Forest Community' with shrub species covering half the area with a few large trees throughout. A few dominant species at the MRS include gray dogwood, northern arrowwood, blackberry and hawthorn trees and shrubs. No man-made improvements exist within the MRS (CB&I, 2015).

The Integrated Natural Resources Management Plan and U.S. Fish and Wildlife Service (USFWS) Threatened and Endangered Species List (TESL) indicate that one federally-listed threatened species, the Northern Long-eared Bat, is known to reside within the installation boundary (OHARNG, 2014) (USFWS, 2018). In addition, the Ohio Department of Natural Resources (ODNR) has identified several state-listed threatened and endangered plant and animal species that are potentially present. Twelve state listed endangered species (1 mammal, 1 fish, 2 insect, 2 bird, and 6 plant species) and eight state listed threatened species (2 bird, 1 insect, 1 mammal, 4 plant species) are included on the Rare Species List (OHARNG, 2014). However, no confirmed sightings of these species within the Fuze and Booster Quarry MRS have been reported and no critical habitats are present within the MRS (CB&I, 2015).

E.2 Site Investigations

E.2.1 Site Inspection (SI)

In 2007, the ARNG completed a Site Inspection (SI) at the facility that included the Fuze and Booster Quarry MRS. The Army conducted instrument-assisted visual surveys for DoD military munitions along quarry banks and surrounding areas. All items encountered were evaluated to determine whether they posed an explosive hazard and were subsequently documented as safe. MD was found on the southeastern side of the southern pond. Multiple areas containing high-concentrations of subsurface anomalies were detected during the survey. These areas were suspected to represent possible buried munitions-related items. The Historical Records Review (HRR) reported that facility personnel had previously observed DoD military munitions items in the northern and southern ponds when water levels were low; however, the bottom of the ponds were not investigated during the SI (e^2M, 2008). Results of the SI field activities are depicted on **Figure 4**.

The *Final Site Inspection Report* (e^2M, 2008) recommended that the MRS footprint be decreased from 12.74 acres to 4.92 acres and the MRS further investigated under the MMRP with respect to DoD military munitions. The reduced MRS footprint recommended in the SI includes the quarry ponds and the area immediately surrounding them (e^2M, 2008). The revised MRS boundary is presented in **Figure 4.**

E.2.2 Remedial Investigation (RI)

The ARNG conducted an RI at the Fuze and Booster Quarry MRS to identify and bound areas where DoD military munitions were potentially present, and characterize the nature and extent of MC-related contamination potentially present within the MRS. The RI fieldwork design incorporated the findings of the Final HRR and the results of the SI. Field activities included the following (**Figure 5**):

- Digital geophysical mapping was performed over 2.6 acres of the accessible terrestrial areas surrounding the ponds. The remaining 0.75 acres was inaccessible due to thick vegetation at the water line and safety hazards associated with steep slopes.
- A total of 2.24 acres within the ponds were investigated using tactile underwater investigation methods which represented 96.6 percent coverage of the combined pond areas. These underwater surveys did not identify any MEC or MD.
- 208 clusters of high anomaly densities were identified around the shoreline of the northern pond. These clusters of high anomaly densities were investigated by 13 trench locations placed in the high anomaly density locations.
    - The 13 high anomaly density trench locations were investigated by mechanical excavation and no MEC or MD was identified. Other debris including scrap metal was identified during the trench investigations.
- A total of 1,175 individual anomalies were identified outside of the high anomaly density areas.
    - 259 were due to cultural features (abandoned water control intake structures, subsurface utilities), were inaccessible, or were placed for quality control purposes

- 227 individual anomalies were selected for intrusive investigation by hand digging, using statistical methods summarized in the RI Report. Of the 227 individual anomalies, 221 were successfully reacquired and intrusively investigated. No MEC was discovered at any of the individual target anomaly locations that were intrusively investigated. MD were recovered at 8 of the individual target anomaly locations. Four wet sediment samples were collected from the surface of the sediment in the ponds to 0.5-foot below using Incremental Sampling Methodology. Two samples were collected from the southern-most pond, and one sample was collected from each of the central and northern ponds.

No DoD military munitions identified as MEC were found during the intrusive investigation; only MD was encountered. The MD recovered during intrusive investigations included parts from the following munitions: 155mm HE projectile, MK1 series; 20mm projectile, AP-T, M75 series; and 75mm HE projectile MK1. Only cultural debris (CD) items (e.g., trash cans, metal pipes, and sheet metal) were observed within the ponds.

Sediment samples were analyzed for metals, geochemical metals, explosives, nitrocellulose, semi-volatile organic compounds, polychlorinated biphenyl, total organic carbon, and pH. Since no DoD military munitions determined to be MEC were identified, additional sampling for MC-related contamination was not warranted. Based on the analytical results of the sediment samples, 34 site-related chemicals were identified as potential chemicals of concern at the Fuze and Booster Quarry MRS (CB&I, 2015). The results of the human health risk assessment (HHRA) and ecological risk assessment (ERA) performed during the RI are presented in Section G.2. The results of the RI fieldwork are presented in **Figure 5**.

A Feasibility Study was recommended as the next course of action for the MRS to assess possible response action alternatives because MD has been found and some statistical uncertainty remains for MEC.

E.2.3 Feasibility Study (FS)

Based on further evaluation of the RI results, the Army concluded that the Fuze and Booster Quarry MRS should be recommended for NFA. However, the Army also determined that, because the RI recommended an FS, the FS should be conducted to provide the necessary rationale to support and document the NFA determination (HGL, 2018a).

The detailed analysis presented in the FS consisted of evaluating the NFA alternative using the nine criteria listed in the NCP. The NCP states that the first two criteria, protection of human health and the environment and compliance with applicable or relevant and appropriate requirements (ARARs), are "threshold criteria" that must be met by the selected remedial action unless a waiver is granted under Section 121(d)(4) of CERCLA. The next five criteria are "primary balancing criteria," and the trade-offs within this group must be balanced. The final two criteria, state and community acceptance, are "modifying criteria" that are evaluated following the comment periods on the FS report and the PP (HGL, 2018a). A summary of the detailed analysis performed in the FS using the nine NCP criteria is presented below.

Table 1
Evaluation of the No Further Action Alternative

NCP Criteria		No Further Action Alternative
Threshold Criteria	Overall Protection of Human Health and the Environment	No explosive hazard or unacceptable risk due to MC-related contamination is present at the MRS. Therefore, the NFA alternative is protective of human health and the environment and meets this criterion.
	Compliance with ARARs	There are no chemical-specific, location-specific, or action-specific ARARs identified for this alternative. Therefore, the NFA alternative meets this criterion.
	Long-Term Effectiveness and Permanence	No explosive hazard or unacceptable risk due to MC-related contamination is present; therefore, the NFA alternative will be effective in the long term and no residual hazards or risks will remain at the MRS.
Balancing Criteria	Reduction of Toxicity, Mobility, or Volume Through Treatment	The NFA alternative includes no treatment because there is no explosive hazard or unacceptable risk associated with MC-related contamination is present at the MRS.
	Short-Term Effectiveness	Because no active remediation activities are conducted, no additional hazards are posed to current receptors or the future industrial receptor as a result of implementing the NFA alternative. The NFA alternative will not result in any adverse short-term effects on the environment.
	Implementability	Since no remedial action will be performed, technical feasibility is not a consideration. The NFA alternative is administratively feasible to OHARNG/CJAG because no explosive hazard or unacceptable risk due to MC-related contamination is present on the MRS.
	Cost	The NFA alternative has no capital or long-term management costs associated with its implementation.
Modifying Critter	State Acceptance	The Ohio EPA concurs with the NFA determination presented in the Final PP and this ROD.
	Community Acceptance	Public comments and questions on the NFA alternative were received during the public comment period from October 25to December 1, 2018. A public meeting was held on November 1, 2018 to present a brief history of the MRS and the NFA alternative. Community feedback is presented in Part III of this ROD.

E.3 Nature and Extent of Contamination

Data gathered by the ARNG during the SI and subsequent RI of the Fuze and Booster Quarry MRS effectively characterized the nature and extent of DoD military munitions and MC-related contamination at the MRS. Additionally, evaluation of the NFA alternative in the FS supports the determination that NFA at the Fuze and Booster Quarry MRS is protective of human health and the environment. Based on the information presented in Part II, Sections A through E, it can be concluded that NFA at the Fuze and Booster Quarry MRS is necessary.

As outlined in the RI Report, there was no evidence that explosive hazards from DoD military munitions were present at the Fuze and Booster Quarry MRS. The RI data supports there are no unacceptable risks due to explosive hazards and no sources for a release of MC-related contamination. Therefore, neither DoD military munitions nor MC-related contamination posed a risk at the Fuze and Booster Quarry MRS (HGL, 2018a).

E.4 Conceptual Site Model (CSM)

The CSM discussion includes areas where DoD military munitions may be present, sources of contamination, release mechanisms, migration pathways, and potential receptors identified for the Fuze and Booster Quarry MRS in support of the HHRA and ERA.

E.4.1 Primary and Secondary Contaminant Sources and Release Mechanisms

The Fuze and Booster Quarry MRS was used as an open burn area prior to use as a landfill that reportedly accepted fuze and booster assemblies, projectiles, residual ash, and sanitary waste. The RI intrusively investigated 13 high-anomaly density trenches and 227 single point targets. MD and CD were recovered. No DoD military munitions confirmed to be MEC were encountered during the RI. Since no DoD military munitions confirmed to be MEC or concentrated areas of MD are present at the Fuze and Booster Quarry MRS, no source of MC-related contamination exists at the MRS (CB&I, 2015) (HGL, 2018a).

The release mechanisms evaluated during the RI and reevaluated in the FS included the potential for burning or disposal of military munitions in the MRS that could result in munitions exposed on the surface, mixed with other debris on the surface, buried in subsurface soil, or within the surface water in both the accessible and inaccessible areas of the MRS (CB&I, 2015) (HGL, 2018a).

E.4.2 Contaminant Migration Pathways

Further evaluation of the RI findings in the FS determined that no unacceptable risks due to explosive hazards exist within the surface and subsurface soils of the Fuze and Booster Quarry MRS. Since no unacceptable risks due to explosive hazards exist at the MRS, considerations for the mobility of DoD military munitions through environmental media was not warranted. No DoD military munitions or significant amounts of MD were identified within the MRS; therefore, no source for MC-related contamination exists at the MRS. The re-evaluation of the CSM in the FS concluded that exposure pathways for surface and subsurface soils and surface water were incomplete (CB&I, 2015) (HGL, 2018a).

E.4.3 Potential Human Receptors and Ecological Receptors

The likely human receptors identified for the Fuze and Booster Quarry MRS include the Industrial Receptor as described in the FS. The NFA determination is protective of other potential future human receptors (such as residential receptors); however, there are no current plans for the MRS to change from an industrial land use to a residential land use. There are no unacceptable risks to a potential future residential receptor from explosive hazards (HGL, 2018b).

Environmental receptors at the MRS include terrestrial invertebrates (earthworms), voles, shrews, robins, foxes, owls, hawks, muskrat, mink, mallards, great blue heron, benthic invertebrates, and aquatic biota (CB&I, 2015).

F. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Current and potential future activities at the Fuze and Quarry Booster MRS includes military training, maintenance, natural resource management, hunting and fishing activities and restoration activities (e.g., groundwater monitoring) (CB&I, 2018a). Though there are no current plans for the MRS to change from an industrial land use to a residential land use a theoretical future resident receptor was also evaluated. The HHRA included an evaluation of a theoretical future residential receptor for risks from MC and there are no unacceptable risks to a theoretical future residential receptor from explosive hazards.

G. SUMMARY OF SITE RISKS

During the RI, risks to potential human and ecological receptors were evaluated through the MEC Hazard Assessment (HA), HHRA, and ERA, based on site characteristics, results of previous investigations, and evaluation of the CSM. Risk assessments performed during the RI are summarized below.

G.1 Munitions and Explosives of Concern (MEC) Hazard Assessment (HA)

As part of the RI, the Army evaluated for explosive safety hazards at the Fuze and Booster Quarry MRS using the MEC HA. Because no DoD military munitions confirmed to be MEC were encountered at the Fuze and Booster Quarry MRS during either the 2007 SI or the subsequent 2015 RI, the Army determined that explosive hazards associated with former burning and disposal activities at the MRS were not present. As a result, evaluation of explosive hazards in a MEC HA was not warranted (CB&I, 2015).

G.2 Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA)

The purpose of the HHRA is to document whether MRS conditions may pose a risk to current or future human receptors and to identify which, if any, MRS conditions need to be addressed further in the CERCLA process. An ERA evaluates the potential for adverse effects posed to ecological receptors from the release of MC-related contamination at an MRS.

Section E.2.2 discusses the four sediment samples collected from the ponds during the RI field activities. Analytical results identified 34 chemicals that were further evaluated in an HHRA and ERA. Eight chemicals of concern (COCs) were identified for residential receptors, no COCs were identified for the Industrial receptor (National Guard Trainee), and 22 chemicals of potential ecological concern were identified for ecological receptors. However, no MEC, munitions potentially presenting an explosive hazard, or low concentrations of explosives or propellants were identified in the sediment samples or anywhere else in the MRS. Therefore, the COCs are not considered MC-related or attributable to any munitions or munitions-related activities in the MRS. The ERA conducted as part of the RI determined that ecological receptors in the aquatic environment could be affected by site-related chemicals in wet sediment. The COCs identified during previous investigations at the MRS were addressed under the IRP. No risks due to MC-related contamination was identified in the HHRA. Therefore, the results of the RI fieldwork concluded no unacceptable risks due to MC-related contamination exist at the Fuze and Booster Quarry MRS (CB&I, 2015). The IRP portion has been completed and the results of the wet sediment investigation can be found in the *Final Supplemental Remedial Investigation for Sediment and Surface Water at RVAAP-01, RVAAP-04, RVAAP-16, RVAAP-001-R-01* (Leidos, 2017). The specific conclusion for Fuze and Booster Quarry pond wet sediment can be found on pages 4-60 and 4-61 of the Final Supplemental Remedial Investigation.

H. DOCUMENTATION OF NO SIGNIFICANT CHANGE

The NFA PP for the Fuze and Booster Quarry MRS (HGL, 2018b) was released for public comment on October 25, 2018. The PP recommended NFA under the MMRP and pursuant to CERCLA requirements for the Fuze and Booster Quarry MRS. After the public comment period, no significant changes regarding the selected remedy, as originally identified in the NFA PP, were necessary or appropriate.

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PART III: RESPONSIVENESS SUMMARY FOR PUBLIC COMMENTS ON THE PROPOSED PLAN FOR RVAAP-016-R-01 FUZE AND BOOSTER QUARRY

A. Overview

In October 2018, the ARNG released the NFA PP. A public meeting for Fuze and Booster Quarry MRS was held on November 1, 2018 at the Shearer Community Center. The 30-day public comment period was held from October 25, 2018 to December 1, 2018. The notification for the public of the availability of the PP and the public meeting is included in Appendix A.

B. Stakeholder Issues and Lead Agency Responses

No site-specific verbal comments were received during the public meeting. The transcript from the meeting was incorporated into the Administrative Record.

B.1 Oral Comments from Public Meeting

No oral comments or questions were received from members of the public at the November 2018 public meeting.

B.2 Written Comments from Public Meetings

No written comments or questions were received from members of the public at the November 2018 public meeting.

B.3 Telephone Comments from Public

No telephone comments were received from members of the public during the public comment period.

C. Technical and Legal Issues

There were no technical or legal issues raised during the public comment period.

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FIGURES

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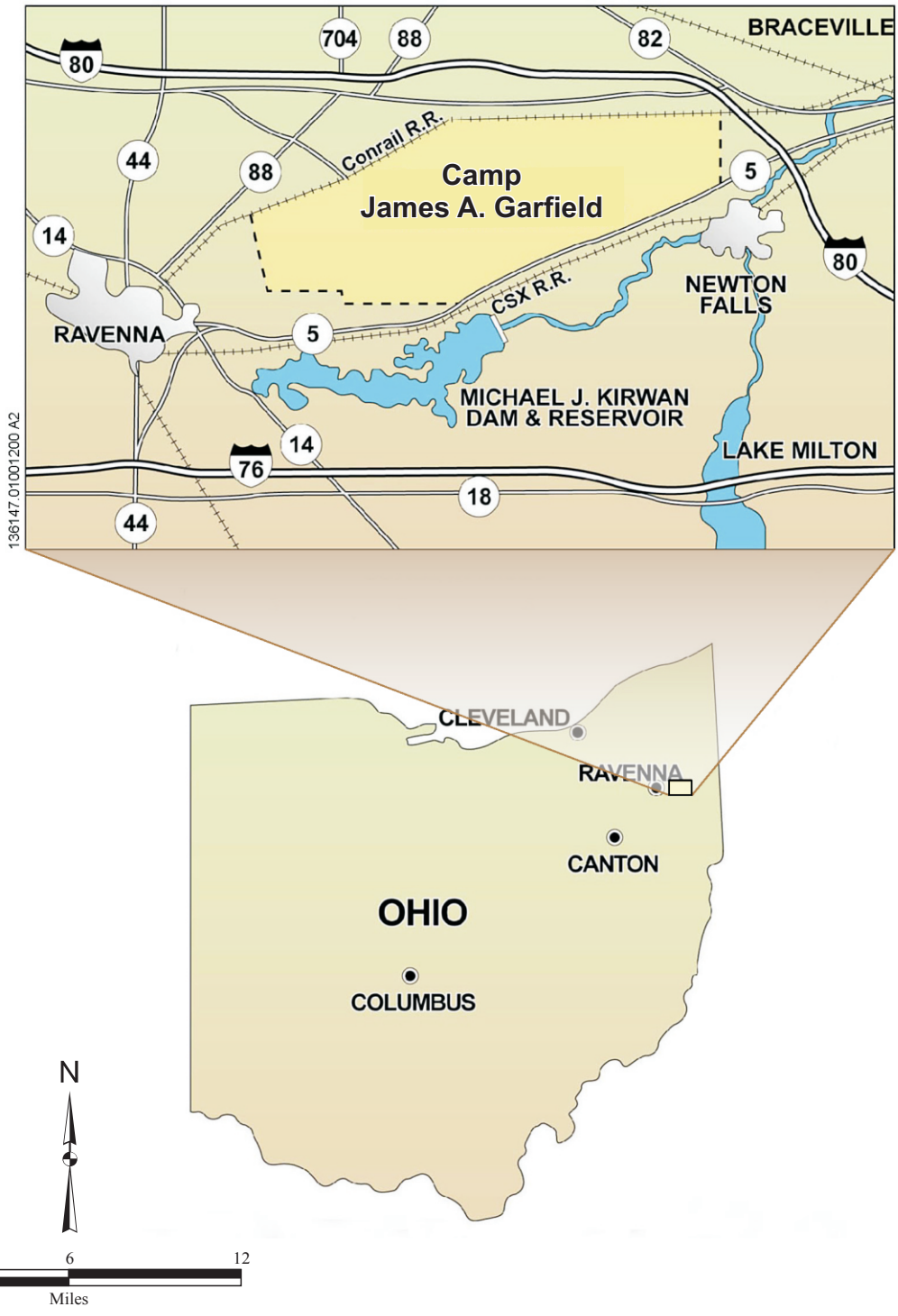

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3/21/2019 JG
Source: CB&I

Legend

Camp James A. Garfield

Note:
RVAAP=Ravenna Army Ammuntion Plant

Figure 1-1
Location Map
Camp James A. Garfield/
Former RVAAP
Portage and Trumbull
Counties, Ohio

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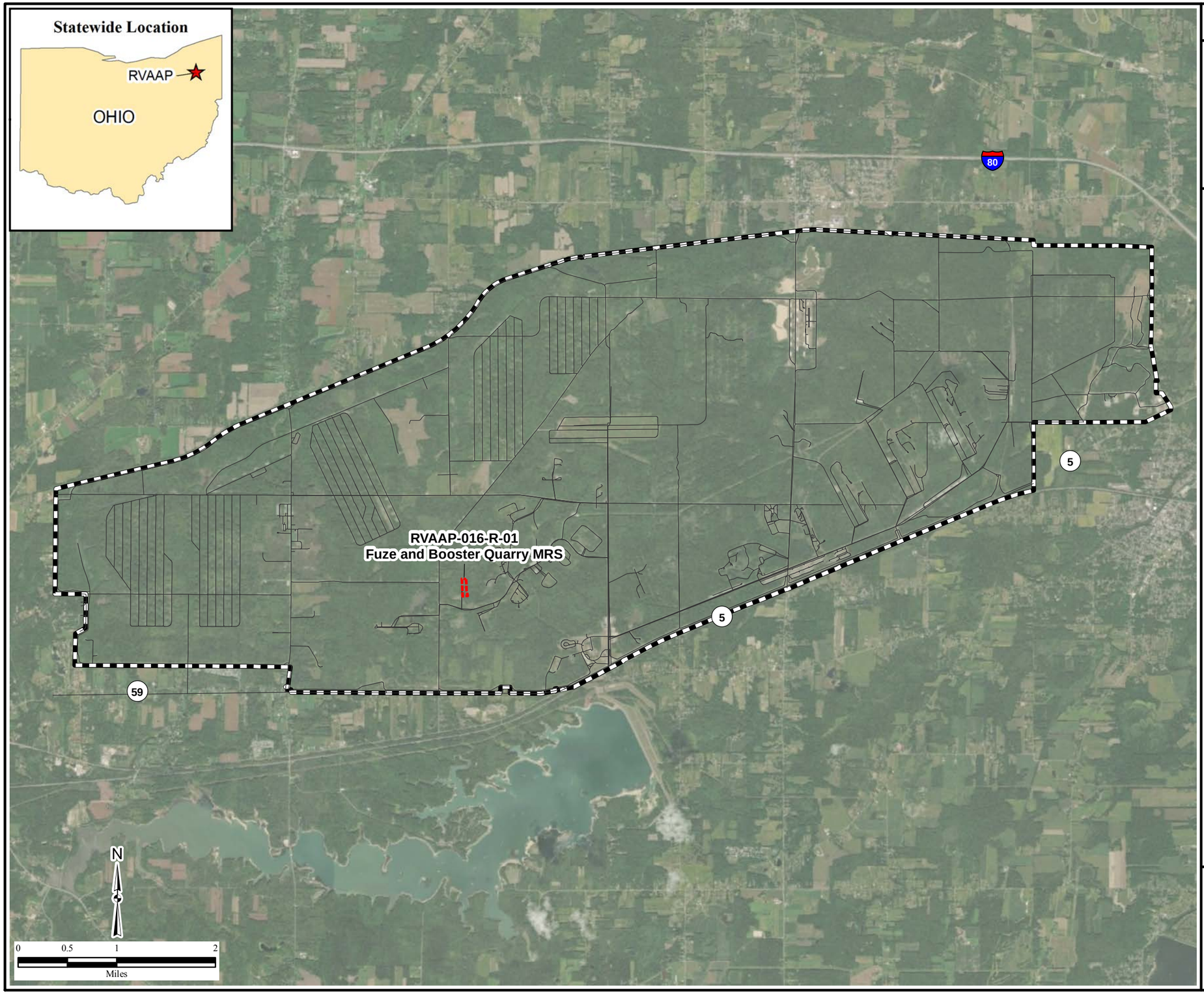
Figure 2
MRS Location
Fuze and Booster Quarry
Former RVAAP
Portage and Trumbull Counties, Ohio



Legend

- Road
- MRS
- Installation Boundary

Notes:
MRS=munitions response site
RVAAP=Ravenna Army Ammuntion Plant

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Source: HGL,CB&I, USACE, e²M
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HGL HydroGeoLogic, Inc

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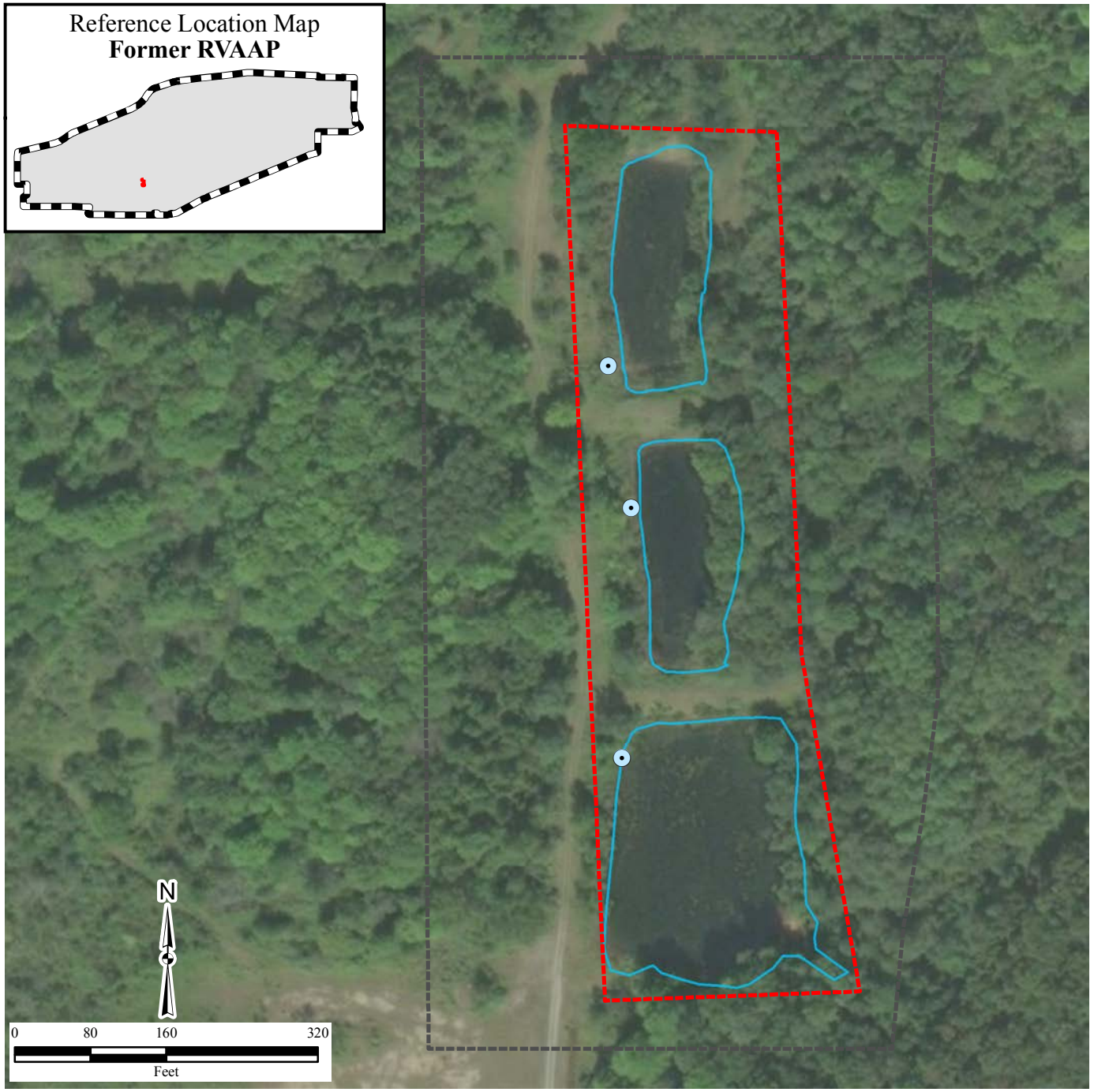

Figure 3
Fuze and Booster Quarry
MRS Boundary
and Site Features
Former RVAAP
Portage and Trumbull Counties, Ohio

Legend

- Former Water Control Intake
- Surface Water
- MRS
- 2007 HRR MRS Boundary
- Installation Boundary

Notes:
HRR=Historical Records Review
MRS=munitions response site
RVAAP=Ravenna Army Ammuntion Plant

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Source: HGL,CB&I, USACE, e²M ArcGIS Online Imagery

HGL HydroGeoLogic, Inc

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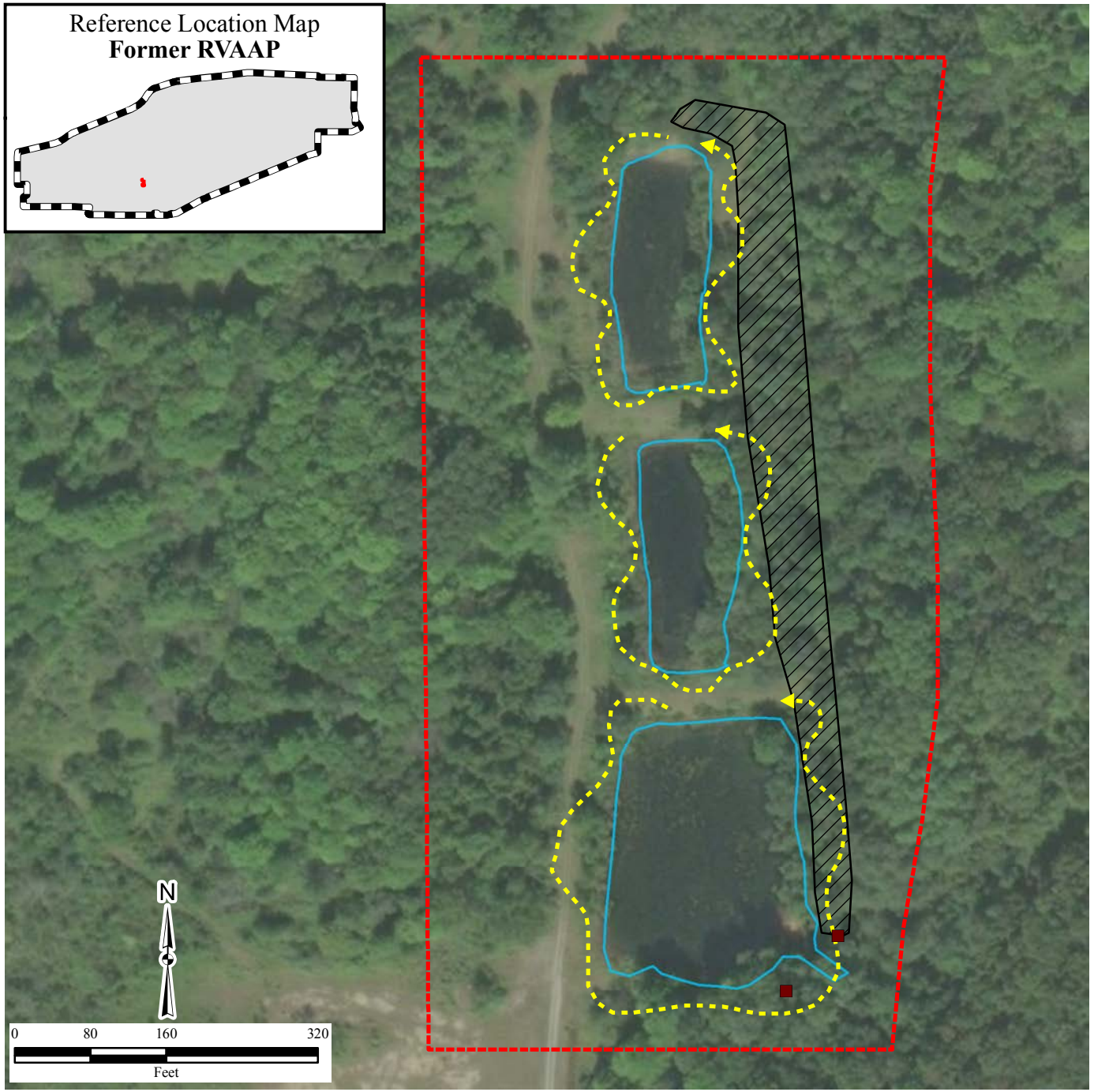

Figure 4
2007 Site Inspection Results
Former RVAAP
Portage and Trumbull Counties, Ohio

Legend

- Munitions Debris
- Meandering Path Survey Transect
- Subsurface Anomalies
- Surface Water
- MRS
- Installation Boundary

Notes:
MRS=munitions response site
RVAAP=Ravenna Army Ammuntion Plant

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7/16/2018 JAR
Source: HGL,CB&I, USACE, e²M ArcGIS Online Imagery

HydroGeoLogic, Inc

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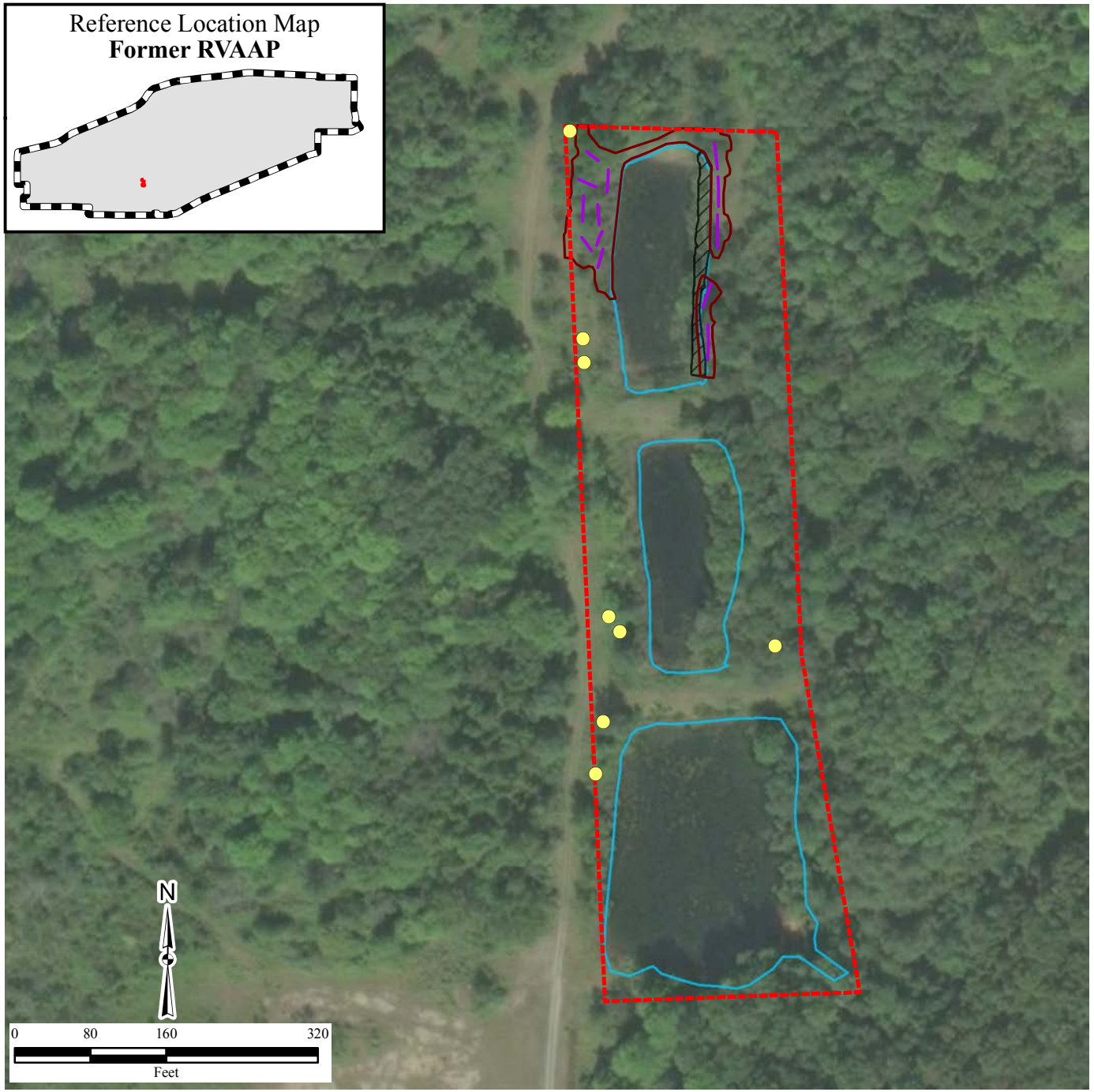

Figure 5
2015 Remedial Investigation Results
Former RVAAP
Portage and Trumbull Counties, Ohio

Legend

Single Anomaly Results:

- MDAS
- Exploratory Trench
- Area of Pond Not Accessible for Diving Operations
- Surface Water
- High Anomaly Density Area
- MRS
- Installation Boundary

Notes:
MDAS=material documented as safe
MRS=munitions response site
RVAAP=Ravenna Army Ammuntion Plant

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Source: HGL,CB&I, USACE, e²M
ArcGIS Online Imagery

HydroGeoLogic, Inc

HGL—No Further Action Record of Decision—Former RVAAP, Ohio

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Appendix A
Notice of Availability of the Proposed Plan

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Affidavit of Publication, Record Courier, October 21, 2018 and October 28, 2018

3124 0405

Proof of Publication
Record Publishing Company
1050 W. Main Street,
Kent, OH 44240
Phone (330) 541-9400
Fax (330) 673-6363

I, J Thompson being first duly sworn depose and say that I am Advertising Clerk of
Record Publishing Company

30 Record-Courier a newspaper printed and published in the city of Kent, and of General circulation in the County of Portage, State of Ohio, and personal knowledge of the facts herein stated and that the notice hereto annexed was Published in said newspapers for 2 insertions on the same day of the week from and after the 21st day of October, 2018 and that the fees charged are legal.

Joyce Thompson

Name of Account: HydroGeoLogic Inc
Ad Number: 12499589
No. of Lines: 70

Day(s) Published: 10/21, 10/28.
Printers Fee: $432.00

Sworn ~~to~~ and subscribed before this 29th day of October, 2018.

Elizabeth McDaniel

Elizabeth McDaniel
Notary Public
Commission Expires June 19, 2021

PUBLIC NOTICE
Camp Ravenna Joint Military Training Center
Camp Ravenna Environmental Office
1438 State Route 534 SW – Newton Falls, OH 44444
614-336-6136

Public meeting to be held Thursday, November 1, 2018 for Army National Guard Release of Proposed Plans for two Munitions Response Sites at the Former Ravenna Army Ammunition Plant: Fuze and Booster Quarry 40mm Firing Range

Ravenna – The Army National Guard, in consultation with the Ohio Environmental Protection Agency, submits for public review and comment two (2) Proposed Plans for two Munitions Response Sites at the former Ravenna Army Ammunition Plant (RVAAP) in Portage and Trumbull counties, Ohio.

The Fuze and Booster Quarry and 40mm Firing Range are Munitions Response Sites (MRSs) within the former RVAAP (now known as Camp Ravenna) in Portage and Trumbull Counties, Ohio. These MRSs are being addressed under the Military Munitions Response Program (MMRP) in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The Proposed Plans present the current status and information regarding the MRSs. The Proposed Plans detail the recommendation for No Further Action at both MRSs and provide the rationale for these recommendations.

On Thursday November 1, 2018, a public meeting will be held at the Shearer Community Center (Paris Township Hall) at 9355 Newton Falls Road, Ravenna, Ohio 44266 beginning at 6:00 p.m., with an informal open house when technical staff will be available to answer questions. At 6:30 p.m., the Army National Guard will briefly describe the assessment of the MRSs, present the No Further Action recommendation, and then request verbal comments from the public. Written comments regarding this recommendation may be submitted to the Army National Guard during the 30-day comment period from October 25, 2018 to December 1, 2018. All written comments should be addressed to Camp Ravenna Environmental Office; 1438 State Route 534 SW, Newton Falls, OH 44444 or sent via email to Kathryn.s.tait.nfg@mail.mil.

In accordance with CERCLA, the No Further Action recommendation presented in the Proposed Plans was summarized and also presented in earlier remedial investigation and feasibility study reports. All reports are now available for public review at the RVAAP Restoration Program Information Repositories at the Reed Memorial Library (167 East Main Street, Ravenna) and the Newton Falls Public Library (204 South Canal Street, Newton Falls). The reports are also available online at www.rvaap.org.

The final remedy for the MRSs will be selected based, in part, on public comments. In coordination with Ohio Environmental Protection Agency, the Army National Guard will select a final remedy after reviewing and considering all public comments submitted during the 30-day public comment period from October 25, 2018 to December 1, 2018. The Army National Guard encourages the public to review and comment on the recommendation presented in this document.

For more information or to participate in the review, please visit the RVAAP Restoration Program website (www.rvaap.org) or call Kathryn Tait at 614-336-6136.

KO-10648637

Affidavit of Publication, Tribune Chronicle, October 21, 2018 and October 28, 2018

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Camp Ravenna Joint Military Training Center
Camp Ravenna Environmental Office
1438 State Route 534 SW – Newton Falls, OH 44444
614-336-6136

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#294-2T-October 21 & 28, 2018 #WOH0046311

PROOF OF PUBLICATION

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