

**Final
No Further Action Record of Decision for
RVAAP-008-R-01 Load Line #1A Munitions Response Site
Version 1.0**

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

**Contract No. W912DR-09-D-0005
Delivery Order No. 0002**

Prepared for:



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14. ABSTRACT This Record of Decision (ROD) provides the final remedy of No Further Action (NFA) that was selected for RVAAP-008-R-01 Load Line #1A Munitions Response Site (MRS) at the former Ravenna Army Ammunition Plant under the Military Munitions Response Program (MMRP). The selection of the final remedy included a public meeting that was presented by the U.S. Army followed by a 30-day public comment period in accordance with its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations 300). The recommendation of NFA at the MRS under the MMRP is protective of human health and the environment and meets the statutory requirements for cleanup standards established in Section 121 of CERCLA.					
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ARNG—Army National Guard

CB&I—CB&I Federal Services LLC

Ohio EPA—Ohio Environmental Protection Agency

RVAAP—former Ravenna Army Ammunition Plant

USACE—United States Army Corps of Engineers

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Acronyms and Abbreviations

AMEC	AMEC Earth and Environmental, Inc.
amsl	above mean sea level
AOC	Area of Concern
ARNG	U.S. Army National Guard
bgs	below ground surface
Camp Ravenna	Camp Ravenna Joint Military Training Center
CB&I	CB&I Federal Services LLC
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act</i>
cm/s	centimeters per second
COC	chemical of concern
COL	colonel
Community Relations Plan	<i>Community Relations Plan for the Ravenna Army Ammunition Plan Restoration Program in Portage and Trumbull Counties, Ohio</i>
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
DERR	Division of Environmental Response and Revitalization
DFFO	<i>Director's Final Findings and Orders (DFFO) for RVAAP</i>
e ² M	engineering-environmental Management, Inc.
EPA	U.S. Environmental Protection Agency
ERA	ecological risk assessment
FWCUG	Facility-Wide Cleanup Goal
HA	Hazard Assessment
HHRA	human health risk assessment
HHRAM	<i>RVAAP's Facility-Wide Human Health Risk Assessor Manual</i>
IRP	Installation Restoration Program
ISM	incremental sampling methodology
MC	munitions constituents
MEC	munitions and explosives of concern
mg/kg	milligrams per kilogram
MKM	MKM Engineers, Inc.
MMRP	Military Munitions Response Program
MRS	Munitions Response Site
NCP	<i>National Oil and Hazardous Substances Pollution Contingency Plan</i>
NFA	No Further Action
NFA Proposed Plan	<i>No Further Action Proposed Plan for RVAAP-008-R-01 Load Line #1A Munitions Response Site</i>
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
RAB	Restoration Advisory Board

Acronyms and Abbreviations (continued)

RI	Remedial Investigation
RI Report	Final <i>Remedial Investigation for RVAAP-008-R-01 Load Line #1A Munitions Response Site</i>
ROD	Record of Decision
RVAAP	former Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation
Shaw	Shaw Environmental & Infrastructure, Inc.
SI	Site Inspection
SRC	site-related chemical
TNT	trinitrotoluene
U.S.	United States
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
UXO	unexploded ordnance
Work Plan	Final <i>Work Plan for Military Munitions Response Program Remedial Investigation Environmental Services</i>

PART I: DECLARATION

A. Site Name and Location

This No Further Action (NFA) Record of Decision (ROD) addresses investigations conducted at RVAAP-008-R-01 Load Line #1A Munitions Response Site (MRS) under the Military Munitions Response Program (MMRP) at the former Ravenna Army Ammunition Plant (RVAAP), now known as the Camp Ravenna Joint Military Training Center (Camp Ravenna). Camp Ravenna is located in east-central Portage County and southwestern Trumbull County, Ohio, approximately 3 miles east-northeast of Ravenna and approximately 1 mile northeast of the city of Newton Falls (**Figure 1**). The Load Line #1A MRS is located at the eastern portion of Camp Ravenna (**Figure 2**). The United States (U.S.) Environmental Protection Agency (EPA) *Comprehensive Environmental Response, Compensation, and Liability Information System* Identifier for Camp Ravenna is OH5210020736.

B. Statement of Basis and Purpose

The U.S. Army National Guard (ARNG) is the lead agency and presents the decision that NFA is considered as the recommended alternative for the Load Line #1A MRS. NFA is selected in accordance with the requirements of the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) of 1980, as amended by the *Superfund Amendments and Reauthorization Act* of 1986 and the *National Oil and Hazardous Substances Pollution Contingency Plan* (NCP). The ARNG's decision is based on information contained in the Administrative Record file for the Load Line #1A MRS.

The Ohio Environmental Protection Agency (Ohio EPA), the lead regulatory agency, as per the *Director's Final Findings and Orders (DFFO) for RVAAP* (DFFO; Ohio EPA, 2004), reviewed and concurred with the *No Further Action Proposed Plan for RVAAP-008-R-01 Load Line #1A Munitions Response Site* (NFA Proposed Plan; CB&I Federal Services [CB&I], 2015). The NFA Proposed Plan presented the ARNG's preliminary recommendations concerning how best to address the Load Line #1A MRS where no munitions and/or explosives of concern (MEC) were found that had the potential to originate from historical activities associated with manufacturing, storing, transporting, testing, training, and/or disposal that occurred at the facility. The NFA decision under the MMRP at this MRS satisfies the requirements of the DFFO (Ohio EPA, 2004).

C. Description of the Selected Remedy

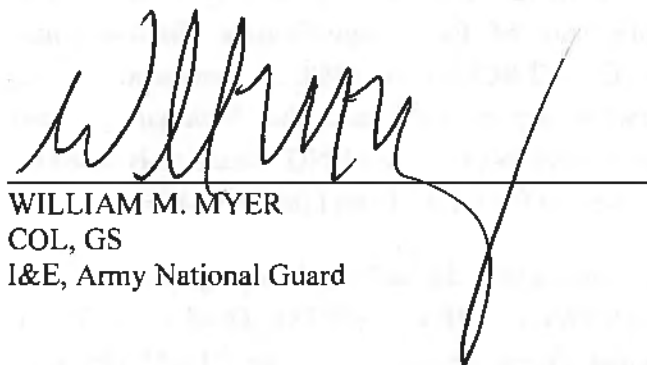
NFA under CERCLA is necessary for the Load Line #1A MRS under the MMRP. No evidence of MEC was found at the MRS during the Remedial Investigation (RI) field work that was conducted under the MMRP. The MRS was further evaluated for munitions

constituents (MC) at locations specified in the Final *Work Plan for Military Munitions Response Program Remedial Investigation Environmental Services* (Work Plan; Shaw Environmental & Infrastructure, Inc. [Shaw], 2011), and no chemicals of concern (COCs) or chemicals of potential ecological concern (COPECs) that presented potential risks to human or environmental receptors, respectively, were found. The MRS is collocated with a designated Installation Response Program (IRP) Area of Concern (AOC), RVAAP-08 Load Line #1. COCs identified in the environmental media at the collocated AOC, if any, have either already been addressed or will continue to be addressed under future CERCLA decisions to be carried out under the IRP.

D. Statutory Determination

No MEC were encountered at the Load Line #1A MRS, and there are no explosive hazards or sources for MC. The recommendation of NFA at the MRS under the MMRP is protective of human health and the environment and meets the statutory requirements for cleanup standards established in Section 121 of CERCLA.

E. Authorizing Signatures and Support Agency Acceptance


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

4 Dec 18
Date

PART II: DECISION SUMMARY

A. Site Name, Location, and Description

Camp Ravenna, formerly known as the RVAAP, is located in northeastern Ohio within Portage and Trumbull Counties and is approximately 3 miles east-northeast of the City of Ravenna and 1 mile west-northwest of the City of Newton Falls. The facility is federally owned and is approximately 11 miles long and 3.5 miles wide. The facility is bounded by State Route 5, the Michael J. Kirwan Reservoir, and the CSX System Railroad to the south; Garret, McCormick, and Berry Roads to the west; the Norfolk Southern Railroad to the north; and State Route 534 to the east. In addition, the facility is surrounded by the communities of Windham, Garrettsville, Newton Falls, Charlestown, and Wayland (**Figure 1**).

Camp Ravenna was formerly utilized as a load, assemble, and pack facility. Administrative control of the 21,683-acre facility has been transferred to the U.S. Property and Fiscal Officer for Ohio in a series of transfers, with the last one taking place in September 2013. The property is licensed to the Ohio Army National Guard (OHARNG) for use as a military training site, Camp Ravenna. When the RVAAP was operational, Camp Ravenna did not exist and the entire 21,683-acre parcel was a federal government-owned, contractor-operated, industrial facility. The RVAAP restoration program involves cleanup of former production areas across the facility related to former operations under the RVAAP.

The Load Line #1A MRS is located at the north end of the former Load Line #1, which is situated at the eastern portion of Camp Ravenna (**Figure 2**). **Figure 3** presents the current MRS boundaries and cultural features that remain near the Load Line #1A MRS.

B. Site History

The RVAAP was constructed between 1940 and 1941 for depot storage and ammunition assembly/loading. During operations as an ammunition plant, the RVAAP was a government-owned and contractor-operated industrial facility. Industrial operations at the facility 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 (mixture of TNT and Research Department Explosive) into large-caliber shells and bombs. The 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. Following cleaning, the “pink water” waste water, 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 were used to

manufacture fuzes, primers, and boosters. From 1946 to 1949, Load Line 12 was used to produce ammonium nitrate for explosives and fertilizers prior to use as a weapons demilitarization facility.

In 1950, the facility was placed in standby status and operations were limited to renovation, demilitarization, and normal maintenance of equipment, along with storage of munitions. Production activities were resumed from July 1954 to October 1957 and again from May 1968 to August 1972. In addition to production missions, various demilitarization activities were conducted at facilities constructed at Load Lines 1, 2, 3, and 12. Demilitarization activities included disassembly of munitions and explosives melt-out and recovery operations using hot water and steam processes. Periodic demilitarization of various munitions continued through 1992.

In addition to production and demilitarization activities at the load lines, other facilities at the RVAAP include MRSs that were used for the burning, demolition, and testing of munitions. These burning and demolition grounds consist of large parcels of open space or abandoned quarries. Other AOCs present at the facility include landfills, an aircraft fuel tank testing area, and various general industrial support and maintenance facilities (Science Applications International Corporation [SAIC], 2011).

The former Load Line #1, in which the Load Line #1A MRS is located, is approximately 164 acres in area and was used to melt and load TNT and Composition B explosives into large-caliber shells during World War II and the Korean War. Activities initially conducted in the vicinity of the MRS, situated at the northern portion of the load line, included packing and shipping. After munitions manufacturing ceased at Load Line #1, the later activities in the vicinity of the MRS included the demilitarization of primers containing propellants at a former popping furnace.

The MRS was originally referred to as “Load Line #1 MRS” during the previous investigations and activities that occurred at the MRS under the MMRP and prior to the RI field work. In coordination with the Ohio EPA and the ARNG, the designation for the current MRS area was revised to “Load Line #1A MRS” following the RI field work due to propellants that have since been observed outside the current MRS boundary. The purpose of revising the MRS name designation to “1A” is to provide a sequencing mechanism (e.g., “1B”, “1C”, etc.) that the ARNG can use to differentiate it from other areas at Load Line #1 that may require further actions under the MMRP.

Investigation and remediation activities under the IRP have been ongoing at the Load Line #1 AOC, in which the MRS is collocated, since 1996. From 1996 through 1998, salvage operations continued, with the removal of the overhead steam lines, major rail spurs, and all

telephone lines. The majority of the buildings were demolished and removed by 2000. The remainder of the floor slabs were demolished and removed in 2009 (CB&I, 2014).

B.1 e²M 2007 Site Inspection

A Site Inspection (SI) was completed under the MMRP at the Load Line #1A MRS in 2007 by engineering-environmental Management (e²M). At the time of the SI, the MRS was 4.63 acres and was composed of several buildings associated with packing and shipping, the location of the former popping furnace, and the area around the former propellant charge building. Three pieces of triple-base propellant (1 inch by ¼ inch each) were found on the ground surface during an unexploded ordnance (UXO) survey that was conducted during the SI and were classified as MEC. One nodule was found on the northwestern side of the former elevated building CA-14 slab that was located next to the MRS. The other two nodules were located outside the current MRS, along the rail bed adjacent to the northeast side of the building CA-14 slab.

One surface soil sample was collected using the incremental sampling methodology (ISM) during the SI field activities. The sample was collected at the northwest side of the former elevated building CA-14 slab where one of the pieces of triple-base propellants was found. Lead is considered an MC associated with propellants and was detected in the ISM sample. Low concentrations of explosives that consisted of TNT and nitrobenzene were also detected; however, neither of these explosives is considered to be MC associated with propellants. Additionally, the concentrations of TNT and nitrobenzene were found to be too low to pose an explosives hazard.

The principle sources of MEC (i.e., triple-based propellants) on the ground surface that were identified during the SI at the Load Line #1A MRS were reported to be accidental releases during the loading of munitions during World War II and the Korean War. These activities resulted in the potential for MEC and MC to be present in surface soil at the Load Line #1A MRS (e²M, 2008).

Based on the UXO survey and MC results for lead and low detects for explosives, it was recommended in the SI Report (e²M, 2008) that further characterization be conducted to address MEC and MC concerns at the Load Line #1 MRS as the density of propellants at the MRS was not fully understood. The SI Report also recommended that the MRS footprint be reduced from the original 4.63 acres to the current 0.41 acres where a propellant was found on the ground surface and the ISM sample with detected elevated lead concentrations was collected. The area adjacent to the northeast of the former elevated building CA-14 slab where the two other propellants were found during the SI survey activities was not recommended for further characterization because soil remediation activities were planned at the location by another contractor (Shaw) in late 2007.

B.2 CB&I 2011 Remedial Investigation

Between April and August 2011, CB&I conducted the field work for the RI under the MMRP at the Load Line #1A MRS. The purpose of the RI was to determine whether the Load Line #1A MRS warranted further response action pursuant to CERCLA and the NCP. More specifically, the RI was intended to determine the nature and extent of MEC and MC and to subsequently identify the potential hazards and risks posed to likely human and ecological receptors by MEC and MC.

Taking into consideration the historical activities that occurred at the MRS, it was expected that triple-base propellants that may be present at the MRS would be found primarily on the ground surface. The RI field work for MEC consisted of nonintrusive visual surveys that were performed over 100 percent of the MRS. No MEC were found at the MRS during the RI field work.

Environmental samples for MC were collected at the Load Line #1A MRS during the RI field work that consisted of two ISM surface soil samples. Each ISM sample comprised one half of the MRS acreage (0.2 acres) and was collected at depths between 0 and 0.5 feet below ground surface (bgs). Together, the two ISM sampling units represented 100-percent coverage of the MRS that was the decision unit and is considered the exposure unit area where human and ecological receptors potentially are exposed to potential site-related chemicals (SRCs). The ISM samples were analyzed for lead using EPA Method SW846 6010B, explosives by EPA Method SW846 8330B, nitrocellulose by EPA Method SW846 9056, total organic carbon by the Lloyd Kahn Method, and pH by EPA Method SW846 9045D.

The MC sample results were evaluated using the RVAAP data screening process presented in the Final *Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant* (SAIC, 2010) that provides a statistical analysis of the results and as well as a comparison of the results against established facility-wide background value (inorganics only). If a MC was retained as an SRC, then it was carried forward for evaluation of human and ecological risks.

Lead concentrations were found in both samples with a maximum detected concentration of 109 milligrams per kilogram (mg/kg). Both of the detected lead concentrations were above the facility background value of 26.1 mg/kg; therefore, lead was retained as an SRC.

The propellant nitroguanidine was detected in both ISM sampling unit locations and was retained as an SRC because it was a detected organic. The maximum detected concentration was 0.25 mg/kg. No other explosives or propellants were detected at either of the ISM sample locations.

Based on the results of the laboratory analysis, both lead and nitroguanidine that are considered MC at Load Line #1A were carried forward as SRCs for the evaluation of human and ecological risks. The detected concentrations were considered to be low and were below the applicable risk screening levels after they were evaluated for the identified human and environmental receptors. The human receptor that was evaluated for the future land use at the MRS was the National Guard Trainee. The Resident Receptor (Adult and Child) were also evaluated for Unrestricted Land Use. Further discussions of the human and ecological risk determinations are provided in more detail in Section G.

C. Highlights of Community Participation

Using the RVAAP community relations program, the ARNG and the Ohio EPA have interacted with the public through news releases, public meetings, reading materials, direct mailing, an internet website, and receiving and responding to public comments. Specific items of the community relations program include the following:

- **Restoration Advisory Board (RAB):** The U.S. Army established the RAB in 1996 to promote community involvement in the U.S. Department of Defense environmental cleanup activities and to allow the public to review and discuss the progress with decision makers. RAB meetings are typically held every 4 months, except during the summer months, and are open to the public.
- **RVAAP Community Relations Plan:** The Final *Community Relations Plan for the Ravenna Army Ammunition Plan Restoration Program in Portage and Trumbull Counties, Ohio* (Community Relations Plan; U.S. Army Corps of Engineers [USACE], 2015) was prepared to establish processes to keep the public informed of activities being conducted as part of the RVAAP restoration program. The plan is available in the Administrative Record at Camp Ravenna.
- **RVAAP Internet Website:** The U.S. Army established an internet website in 2004 for the RVAAP restoration program. This internet website is accessible to the public at www.rvaap.org.

In accordance with Section 117(a) of CERCLA and Section 300.430(f)(2) of the NCP, the ARNG released the NFA Proposed Plan for the Load Line #1A MRS (CB&I, 2015) to the public in May 2015. The NFA Proposed Plan and other project-related documents were made available to the public in the Administrative Record maintained at Camp Ravenna 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 Proposed Plan was sent to the following media outlets: radio stations, television stations, and newspapers (*Newton Falls Press, Youngstown Vindicator, Warren Tribune-Chronicle, Akron Beacon*

Journal, and *Ravenna Record Courier*), as specified in the Community Relations Plan (USACE, 2015). The notice of availability initiated the 30-day public comment period beginning May 27, 2015, and ending June 26, 2015.

The ARNG held a public meeting on June 3, 2015, at the Newton Falls Community Center, 52 East Quarry Street, Newton Falls, Ohio 44444, to present the NFA Proposed Plan to the public. At this meeting, representatives of the ARNG provided information and answered questions about the results of the MMRP-related investigations at the Load Line #1A MRS. A transcript of the public meeting is available to the public and has been included in the Administrative Record. Responses to the verbal and written 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 public's input from the public meeting on the NFA Proposed Plan in selecting NFA under the MMRP at the Load Line #1A MRS.

D. Scope and Role of Response Action

The former Load Line #1, inclusive of the Load Line #1A MRS, is federal property, which is licensed to the OHARNG for use as a military training site. The purpose of the RI field work was to evaluate for the presence of MEC and MC associated with the historical activities at the MRS in support of the intended future use. This NFA ROD addresses surface soil at the MRS where the release of MEC consisting of triple-base propellant reportedly occurred. There are no nearby surface water features where surface water and/or sediment may be impacted. The selected remedy at any MRS must also be protective of groundwater, which is monitored under the facility-wide groundwater monitoring program and in accordance with the DFFO (Ohio EPA, 2004).

Due to former operations and the fact that the site is still being investigated under the IRP, the potential exists for non-MMRP COCs, COPECs, or other non-munitions-related hazards to be present at the Load Line #1A MRS. Response actions associated with non-MMRP-related hazards will be addressed under the IRP and are not included in the selected remedy presented in this NFA ROD.

E. Summary of Site Characteristics

Characteristics, nature and extent of contamination, and the conceptual site model for the Load Line #1A MRS are based on the various assessments, investigations, and/or removal actions that were conducted at the MRS.

E.1 Topography/Physiography

This section presents the discussion of the topography and physiography characteristics at Camp Ravenna and the Load Line #1A MRS. Camp Ravenna, in general, is located within the Southern New York section of the Appalachian Plateaus physiographic province. Rolling topography containing incised streams and dendritic drainage patterns are prevalent in the province. Rounded ridges, filled major valleys, and areas covered with glacially derived unconsolidated deposits were the product of glaciation in the Southern New York section. In addition, bogs, kettle lakes, and kames are evidence of past glacial activity in the province; however, none are located at the MRS. Old stream drainage patterns were disturbed and wetlands were created within the province as a result of past glacial activity (e²M, 2008).

Topography across the Load Line #1A MRS is relatively flat with little change in elevation. The MRS is located in a slight depression related to its immediate surroundings. Based on topographical maps, local surface drainage is to the east. The ground surface elevation at the MRS is approximately 990 feet above mean sea level (amsl) (CB&I, 2014).

No surface water features, natural streams or ponds, wetlands, bogs, kettle lakes, or kames are located at the Load Line #1A MRS. The MRS is not located in a floodplain. The nearest surface water drainage is an unnamed drainage outlet at the northeast corner of Load Line #1 and is considered an intermittent surface water drainage channel (CB&I, 2014).

E.2 Soils and Geology

This section presents the discussion of the soils and geology characteristics at Camp Ravenna and at the Load Line #1A MRS. Based on regional geology, the facility consists of Mississippian- and Pennsylvanian-age bedrock strata, which dips to the south at approximately 5 to 10 feet per mile. The bedrock is overlain by unconsolidated glacial deposits of varying thickness.

Bedrock is overlain by deposits of Wisconsin-age Lavery Till and Hiram Till in the western and eastern portions of the facility, respectively. The thickness of the glacial deposits varies throughout the facility, ranging from ground surface in parts of the eastern portion of the facility to an estimated 150 feet in the south-central portion of the facility.

Bedrock is present near the ground surface in many locations at the facility, including the former Load Line #1 at the east end of Camp Ravenna in which the Load Line #1A MRS is located. Where glacial deposits are still present, their distribution and character are indicative of ground moraine origin. Laterally discontinuous groupings of yellow-brown, brown, and gray silty clays to clayey silts, with sand and rock fragments are present. Glacial-age standing-water-body deposits may be present at the facility, in the form of uniform light gray silt deposits over 50 feet thick. At approximately 200 feet bgs, the Mississippian Cuyahoga Group is present throughout most of the facility. In the northeastern corner of the facility, the

Meadville Shale Member of the Cuyahoga Group is present close to the surface. The Meadville Shale Member of the Cuyahoga Group is blue-gray silty shale characterized by alternating thin beds of sandstone and siltstone.

The Sharon Member of the Pennsylvanian Pottsville Formation unconformably overlies the Meadville Shale Member of the Mississippian Cuyahoga Group. A relief of as much as 200 feet exists in Portage County, which can be seen in the Sharon Member thickness variations. The Sharon Member is made up of shale and a conglomerate.

The Sharon Member conglomerate unit is identified as highly porous, permeable, cross-bedded, frequently fractured, and weathered quartzite sandstone, which is locally conglomeratic and has an average thickness of 100 feet. A thickness of as much as 250 feet exists in the Sharon Conglomerate where it was deposited in a broad channel cut into Mississippian rocks. In marginal areas of the channel, the conglomerate unit may thin out to approximately 20 feet, or in places, it may be missing owing to nondeposition on the uplands of the early Pennsylvanian erosional surface. Thin shale lenses occur intermittently within the upper part of the conglomerate unit.

The Sharon Member shale unit is identified as a light to dark gray fissile shale, which overlies the conglomerate in some locations; however, it has been eroded throughout the majority of the facility. The Sharon Member outcrops in many locations in the eastern half of the facility.

The remaining members of the Pottsville Formation overlie the Sharon Member in the western portion of the facility. Due to erosion and because the land surface is above the level of deposition, the Pottsville Formation is not found in the eastern half of the facility.

The Connoquenessing Sandstone Member, which is sporadic, relatively thin-channel sandstone comprised of gray to white, coarse-grained quartz with a higher percentage of feldspar and clay than the Sharon Conglomerate, unconformably overlies the Sharon Member. The Mercer Member, which is found above the Connoquenessing Sandstone Member, consists of silty to carbonaceous shale with many thin and discontinuous lenses of sandstone in its upper part. The Homewood Sandstone Member unconformably overlies the Mercer Member and consists of the uppermost unit of the Pottsville Formation. The Homewood Sandstone Member ranges from well-sorted, coarse-grained, white quartz sandstone to a tan, poorly sorted, clay-bonded, micaceous, medium- to fine-grained sandstone. The Homewood Sandstone Member occurs as a caprock on bedrock highs in the subsurface (MKM Engineers, Inc. [MKM], 2007).

The soils identified at the facility are generally derived from the Wisconsin-age silty clay glacial till. The majority of native soil at the facility has been reworked or removed during

construction activities (MKM, 2007). The major soil types found at the facility are silt or clay loams, ranging in permeability from 6.0×10^{-7} to 1.4×10^{-3} centimeters per second (cm/s) (U.S. Department of Agriculture [USDA] et al., 1978).

The Load Line #1A MRS is located over the Sharon Sandstone formation, and the depth to bedrock is less than 3.5 feet bgs (USDA et al., 1978). The approximate elevation of bedrock at the MRS is 987 feet amsl (AMEC Earth and Environmental, Inc. [AMEC], 2008).

The native soil type at the Load Line #1A MRS is the Mitiwanga silt loam with 0-to-2-percent slopes (AMEC, 2008). This is a nearly level soil type in wide flat areas such as the MRS. Permeability is very slow in the subsoil and underlying glacial till with an average rate of 1.04×10^{-7} cm/s. Runoff is slow and ponding is common after heavy rains or seasonally wet weather (USDA et al., 1978).

E.3 Hydrology and Hydrogeology

This section presents the discussion of the hydrology and hydrogeology characteristics at Camp Ravenna and the Load Line #1A MRS. The facility is located within the Ohio River Basin. The major surface stream at the facility is the west branch of the Mahoning River, which flows adjacent to the western end of the facility, generally from north to south, before flowing into the Michael J. Kirwan Reservoir. After leaving the reservoir, the west branch joins the Mahoning River east of the facility.

Surface water features within Camp Ravenna include a variety of streams, lakes, ponds, floodplains, and wetlands. Numerous streams drain the facility, including approximately 19 miles of perennial streams. The combined stream length at the facility is 212 linear miles (AMEC, 2008).

Three primary watercourses drain Camp Ravenna: (1) the south fork of Eagle Creek, (2) Sand Creek, and (3) Hinkley Creek. Eagle Creek and its tributaries, including Sand Creek, are designated as State Resource Waters. With this designation, the stream and its tributaries fall under the state's antidegradation policy. These waters are protected from any action that would degrade the existing water quality.

Approximately 153 acres of ponds are found on the facility. Most of the ponds were created by beaver activity or small man-made dams and embankments. Some were constructed within natural drainage ways to function as settling ponds for effluent or runoff. No ponds are located at the Load Line #1A MRS (AMEC, 2008).

A planning-level survey (i.e., desktop review of wetlands data and resources [National Wetlands Inventory maps, aeriels, etc.]) for wetlands was conducted for the entire facility, including the MRS. Wetlands located within the facility include seasonally saturated

wetlands, wet fields, and forested wetlands. Sand and gravel aquifers are present within the buried-valley and outwash deposits in Portage County. In general, the aquifer is too thin and localized to provide large quantities of water; however, yields are sufficient for residential water supplies. Wells located on the facility were primarily located within the sandstone facies of the Sharon Member (MKM, 2007).

Although groundwater recharge and discharge areas have not been delineated at the facility, it is assumed that the extensive uplands areas at the facility, primarily located at the western portion of Camp Ravenna, are regional recharge zones. Sand Creek, Hinkley Creek, and Eagle Creek are presumed to be major groundwater discharge areas (e²M, 2008). The Load Line #1A MRS is located at either the eastern lowland portions of the facility that is not situated in the upland areas that are considered to be regional recharge zones.

Groundwater is present at the MRS at approximately 32 feet bgs in unconsolidated sediments [MKM, 2007; Environmental Quality Management, Inc., 2012]. Groundwater flow at the MRS is generally to the northeast (SAIC, 2003).

E.4 Ecology

This section presents the discussion of the ecological habitats and receptors at Camp Ravenna and at the Load Line #1A MRS. Camp Ravenna has a diverse range of vegetation and habitat resources. Habitats present within the facility include large tracts of closed-canopy hardwood forest, scrub/shrub open areas, grasslands, wetlands, and open-water ponds and lakes. Vegetation at the facility can be grouped into three categories: (1) herb dominated, (2) shrub dominated, and (3) tree dominated. Tree-dominated areas are most abundant, covering approximately 13,000 acres of the facility. Shrub vegetation covers approximately 4,200 acres. A plant species survey identified 18 vegetation communities on the facility. The facility has seven forest formations, four shrub formations, eight herbaceous formations, and one nonvegetated formation (AMEC, 2008).

The vegetation community present at the Load Line #1A MRS is categorized as the “Dry Midsuccessional Cold-Deciduous Shrubland Alliance.” This shrubland alliance is associated with relatively open areas characterized by shrub species covering more than 50 percent of the area, with relatively few large trees. This alliance often is found within previously disturbed areas, and is dominated by gray dogwood, northern arrowwood, blackberry, hawthorn, and multiflora rose (AMEC, 2008).

Biological inventories have not occurred specifically within the MRS boundary, although no confirmed sightings of federal- or state-listed species have been reported. Although there is the potential for federal, state-listed, or rare species to be within the MRS boundary, the potential is unlikely due to the minimal size of the MRS (Camp Ravenna, 2010).

E.5 Nature and Extent of Contamination

The determination of the nature and extent of contamination at the Load Line #1A MRS is based on the data collected during the RI field work under the MMRP (CB&I, 2014). Under the MMRP, the evaluation for nature and extent of contamination is inclusive of MEC and MC that may be present at an MRS. The presence of MEC and MC are known to be present at other MRSs at Camp Ravenna; however, those media and MRSs are being addressed separately from the Load Line #1A MRS included in this NFA ROD.

As outlined in the *Final Remedial Investigation for RVAAP-008-R-01 Load Line #1A Munitions Response Site* (RI Report; CB&I, 2014), no evidence of MEC was found at the MRS. The MRS was further evaluated for MC at locations specified in the Work Plan (Shaw, 2011) and no COCs or COPECs that presented potential risks to human or environmental receptors were found.

E.6 Contaminant Fate and Transport

The fate and transport analysis for the Load Line #1A MRS in the RI Report concluded that there were no MEC that justified concerns for explosive hazards. Since no MEC were found during the RI field activities at the MRS, there is no sources of potential release of MC and a fate and transport analysis for MC at the MRS was not required (CB&I, 2014).

F. Current and Potential Future Land Uses

Current activities at the Load Line #1A MRS include maintenance, remediation, and natural resource management activities. Possible users associated with the current activities at the MRS include facility personnel, contractors, and potential trespassers (CB&I, 2014).

The OHARNG future use at the MRS is military training. The potential user for the future land use is the National Guard Trainee (USACE, 2005).

G. Summary of Site Risks

For the Load Line #1A MRS where predetermined samples for MC were collected, risks were evaluated in terms of potential exposures associated with MEC and/or MC and evaluation of the potential transport pathways MEC and/or MC may take from a source to a receptor. Each pathway includes a source, activity, access, and receptor component with complete, potentially complete, or incomplete exposure pathways identified for each receptor.

Both a human health risk assessment (HHRA) and an ecological risk assessment (ERA) were performed to further evaluate the SRCs that were identified during the RI. The purpose of the HHRA was to evaluate whether site conditions may pose a risk to current or future human

receptors. The ERA was conducted to evaluate the potential for adverse ecological effects to environmental receptors.

G.1 MEC Hazard Assessment

The Interim *Munitions and Explosives of Concern Hazard Assessment Methodology* (EPA, 2008) addresses human health and safety concerns associated with potential exposure to MEC at a MRS under a variety of site conditions, including various cleanup scenarios and land use assumptions. If an explosive hazard is identified, the MEC Hazard Assessment (HA) evaluation will include the information available for the MRS up to and including the RI field activities and provide a scoring summary for the current and future land use activities. If no explosive hazard is found at the MRS, then there is no need to calculate a MEC HA score since there are no human health safety concerns.

No MEC were identified at the Load Line #1A MRS during RI field activities, and no explosive safety hazards are present at the MRS. Therefore, calculation of a MEC HA score was not warranted for the Load Line #1A MRS and the MEC exposure pathways for all receptors at the MRS are incomplete (CB&I, 2014).

G.2 Human Health Risk Assessment

The HHRA was prepared based on the RI data results using the streamlined approach to risk decision-making as described in the *Ravenna Army Ammunition Plant Final Position Paper for the Application and Use of Facility-Wide Human Health Cleanup Goals* (USACE, 2012). The approach identifies chemicals of potential concern (COPCs) by comparing concentrations to background screening values, eliminating essential nutrients, and comparing site concentrations to the Facility-Wide Cleanup Goals (FWCUGs). The COCs are identified through additional screening of the COPCs by comparing site concentrations to specific FWCUGs and using a “Sum of Ratios” approach to account for cumulative effects.

The HHRA evaluates the intended Representative Receptor for the future land use at each of the MRSs where sampling for MC occurred during the RI field work. The Representative Receptor for the future land use, in conjunction with the evaluation of the Resident Receptor (Adult and Child) for Unrestricted Land Use, forms the basis for identifying COCs in the RI. Evaluation for Unrestricted (Residential) Land Use is performed to assess for baseline conditions and the no action alternative under CERCLA, and as outlined in *RVAAP’s Facility-Wide Human Health Risk Assessor Manual* (HHRAM; USACE, 2005). The facility has defined exposure scenarios for the identified receptors that are presented in the HHRAM (USACE, 2005).

Surface soil for the Resident Receptor (Adult and Child) that is evaluated in conjunction with the National Guard Trainee, the potential user for the future land use, is defined as 0 to 1 foot

bgs. Because the National Guard Trainee is exposed more often to the upper 4 feet of soil during training activities, surface soil for this receptor is defined as 0 to 4 feet bgs (SAIC, 2010).

The samples collected for the RI at the Load Line #1A MRS were both collected from 0 to 0.5 feet bgs, and, although this sample interval is less than the 0-to-4-foot surface soil interval as defined for the National Guard Trainee, it is considered to be representative of potential MC exposure to receptors in surface soil at the MRS. The soils at the MRS consist of silty clay loam where MC such as metals tend to absorb and the low permeability associated with the soils would limit the migration of any mobile MC. Therefore, if MC was detected, then it would be expected to be found on or just below the ground surface, since this is the depth that the triple-base propellants were reportedly released at the MRS.

The first screening step of the HHRA process showed that maximum concentrations of lead and nitroguanidine did not exceed relevant screening values and were not identified as COPCs. Therefore, these SRCs were not further evaluated as COCs and are not likely to pose risks to human receptors. Since no COCs were identified for the Resident Receptor (Adult and Child), the MC exposure pathways for all human receptors at the Load Line #1A MRS are incomplete (CB&I, 2014).

G.3 Ecological Risk Assessment

The ERA process at the facility includes characterizing the ecological communities in the vicinity of the MRS, determining the particular SRCs that are present, identifying pathways for receptor exposure, and estimating the magnitude of the likelihood of potential adverse effects to identified receptors. The ERA process is consistent with the process described in the EPA's *Ecological Risk Assessment Guidance for Superfund* (1997) and the Ohio EPA's *Ecological Risk Assessment Guidance Document* (2008) and also follows the facility Unified Approach (USACE, 2011) to ERAs established at MRSs under environmental investigation at the facility. The environmental receptor species selected for evaluation in the ERAs for the MRSs where data were collected for the evaluation of MC were identified in the *RVAAP Facility-Wide Ecological Risk Assessment Work Plan* (USACE, 2003).

Both of the SRCs—lead and nitroguanidine—were identified as COPECs in the soil samples collected at 0 to 0.5 feet bgs for the RI at the Load Line #1A MRS. Given the low overall concentrations detected, the potential that exposure to the COPECs would adversely impact populations of ecological receptors at the Load Line #1A MRS was considered to be very low. Therefore, no further investigation or action was considered necessary at the Load Line #1A MRS for ecological purposes and the exposure pathways for all environmental receptors are incomplete (CB&I, 2014).

H. Documentation of No Significant Change

The NFA Proposed Plan for the Load Line #1A MRS (CB&I, 2015) was released for public comment in May 2015. The Proposed Plan recommended NFA under the MMRP for the MRS. After the public comment period, no significant changes regarding the recommended alternative, as originally identified in the NFA Proposed Plan, were necessary or appropriate.

PART III: RESPONSIVENESS SUMMARY FOR PUBLIC COMMENTS ON THE PROPOSED PLAN

A. Overview

In May 2015, the ARNG released the NFA Proposed Plan for the Load Line #1A MRS (CB&I, 2015) for public comment. A 30-day public comment period was held between May 27, 2015, and June 26, 2015. The ARNG hosted a public meeting on June 3, 2015, to present the preferred alternative and take questions and comments from the public for the record.

Based on comments received, the community voiced few objections to the NFA recommendation. All public input was considered during the selection of the final decision.

B. Summary of Public Comments and Agency Responses

Site-specific comments were received verbally during the public meeting. Written comments that included two general comments and one site-specific comment were received at the time of the public meeting. No written comments were received regarding the Load Line #1A MRS during the 30-day public comment period.

B.1 Oral Comments from Public Meeting

Oral comments received during the public meeting are grouped together in the following general topic categories: munitions constituents and other MMRP-related comments. The transcript from the meeting was incorporated into the Administrative Record. Oral comments and responses are paraphrased, as required for brevity and presentation in this section.

B.1.1 Munitions Constituents

Comment: One commenter noted that it was stated in one of the first slides in the public meeting presentation that “the munitions concentrations were determined to be low”. What is “low” in relation to?

Response: Any detected concentrations were compared to the FWCUGs as part of the risk assessment evaluations in the RI Report for the Load Line #1A MRS. The detected results were assessed through an established hierarchy tier and evaluation process for both the identified human and environmental receptors in the risk assessments. It was determined that the concentration for each of the detected chemicals did not present a risk to the human and environmental receptors and were therefore not considered to be COCs or COPECs.

B.1.2 Other MMRP-Related Comments

Comment: One commenter noted there is another area near Load Line #1A where propellants are known to be present in former railroad ballast and this area should rightfully be investigated. It is understood that the Ohio EPA has brought this issue up with the ARNG in the past, so where in the MMRP process is this particular area considered to be?

Response: The intent of this public meeting is to address the Load Line #1A MRS where no propellants were found and NFA under the MMRP is recommended. The ARNG intends to move forward with further investigation at the mentioned area outside of the Load Line #1A MRS. The first step will be to have all of the IRP partners to come to agreement on the area to be investigated and then to determine what the next step will be. It takes a while to get funding to investigate a new site; so even though it may take some time, it will happen.

Comment: One commenter noted, based on their knowledge of the area near the Load Line #1A MRS, that over the years after the railroad tracks and ties were removed, more propellants continued to be uncovered in the former railroad ballast. Is there any potential for removing the ballast at that area?

Response: Although a formal remedial strategy has not been identified at this time, a vacuum truck or “super sucker” could be an option to remove all the ballast, take it down to 6 inches below the soil surface, and then devise a way to sort it for propellants. The intent of any future action out there would be to get rid of the propellants once and for all because, eventually, the ARNG is going to stop providing funds for these back-and-forth actions. The intent is to get these sites opened up for training activities, so the ARNG is going to do what it takes to make the location safe for the intended land use.

B.2 Written Comments from Public Meeting

Written comments received during the public comment period are grouped together in the following general topic categories: groundwater monitoring, projected future land use, and the potential for future exposures and safety risks. Each comment was reformatted, where appropriate, for presentation in this section. Each comment is followed by a response.

B.2.1 Groundwater Monitoring

Comment: Is groundwater monitoring on site sufficient to detect all contaminants and is the Ohio EPA in agreement?

Response: The facility-wide groundwater monitoring program at the RVAAP has been ongoing since 2004 and was developed in accordance with Ohio EPA guidance documents. The annual monitoring reports, which include a description and results of the annual groundwater monitoring activities, are reviewed and approved by the Ohio EPA. The

chemicals that are analyzed for groundwater were identified for evaluation as part of the facility-wide groundwater monitoring program based on known or suspected contamination that may have resulted from historical activities at the RVAAP. The chemicals identified for potential concern and continued evaluation in groundwater at the RVAAP are presented in the Final *Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant* (USACE, 2010). With regards to the MMRP at the Load Line #1A MRS, no MC were found in surface soil that exceeded the risk-based levels for any of the human or environmental risk receptors that were evaluated, including for Unrestricted Land Use. Therefore, any contamination that may be found in groundwater at the former Load Line #1, which is being investigated under the facility-wide groundwater monitoring program, is not expected to be result of any munitions-related activities that occurred at the Load Line #1A MRS.

B.2.2 Projected Future Land Use

Comment: What is the projected future land use of the RVAAP if not classified?

Response: The facility will be used for military training. Due to residual contamination that may be left in place at some cleanup sites (landfills, asbestos in soil), some sites will be restricted and properly managed with land-use controls. These sites will not be used for military training.

B.2.3 Potential for Future Exposures and Safety Risks

Comment: Do the ongoing investigations protect all future exposures and safety risks for all future involvement on the RVAAP facility?

Response: Investigations of potential contamination are utilized to define nature and extent of contamination from past operations. If contamination is found, then risk assessments are completed to assess potential for future exposure to contamination and develop any remedial action alternatives that may be necessary to address the risk to future receptors. Ongoing cleanup activities, including investigations, are protective for all projected future exposures/uses at the facility. If the land use changes, additional investigative activities would be required to evaluate the new use to ensure protectiveness.

C. Technical and Legal Issues

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

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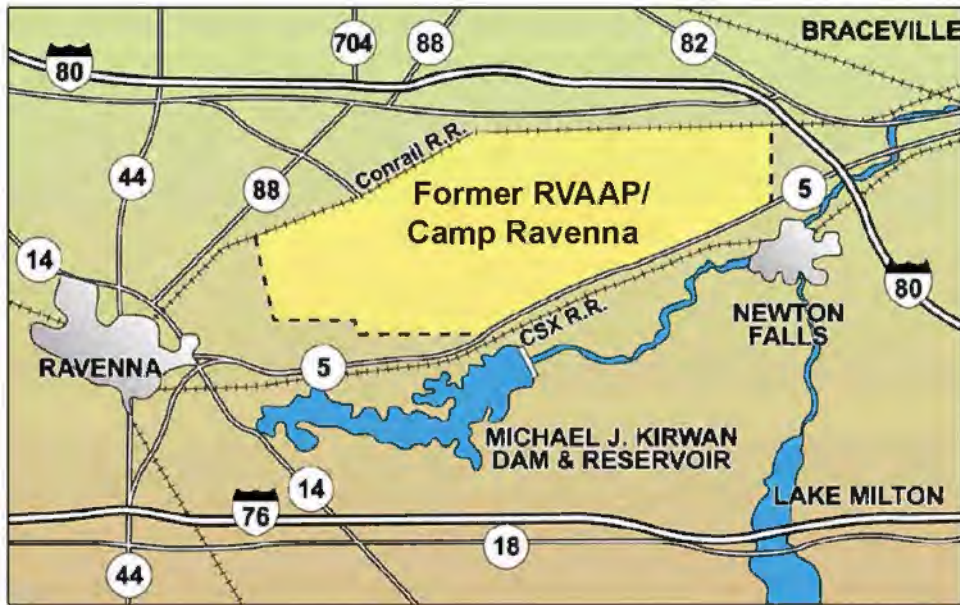
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FIGURES

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Note:
The Scale is for the Upper Map Only
Showing the Former RVAAP/Camp Ravenna Location



**U.S. ARMY
CORPS OF ENGINEERS
BALTIMORE DISTRICT**

MILITARY MUNITIONS RESPONSE PROGRAM

FORMER RVAAP/CAMP RAVENNA
PORTAGE AND TRUMBULL COUNTIES, OHIO



CB&I Federal Services LLC
150 Royall Street
Canton, MA 02021

FIGURE 1 INSTALLATION LOCATION MAP

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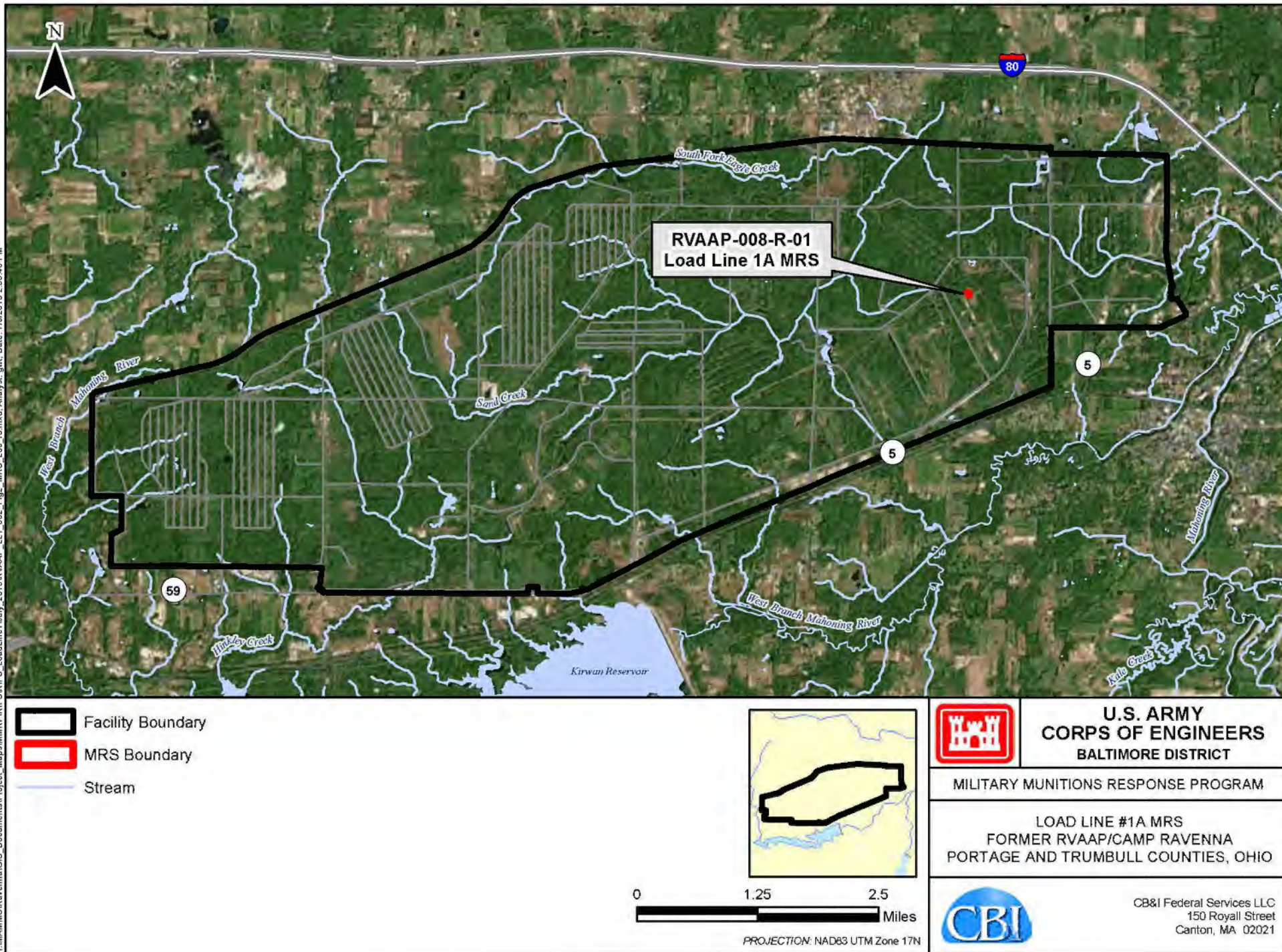


FIGURE 2 MRS LOCATION MAP

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RVAAP-008-R-01
Load Line 1A MRS



Former Building CA-14
Elevated Slab

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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 MRS Boundary



**U.S. ARMY
CORPS OF ENGINEERS
BALTIMORE DISTRICT**

MILITARY MUNITIONS RESPONSE PROGRAM

LOAD LINE #1A MRS
FORMER RVAAP/CAMP RAVENNA
PORTAGE AND TRUMBULL COUNTIES, OHIO

0 50 100 Feet
Projection : NAD_1983_UTM_Zone_17N



CB&I Federal Services LLC
150 Royall Street
Canton, MA 02021

FIGURE 3 SITE MAP

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OHIO EPA CORRESPONDENCE

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John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Director

September 21, 2015

Mr. Mark Leeper, P.G., MBA
Army National Guard Directorate
Environmental Programs Division
ARNG-ILE-CR
111 South George Mason Drive
Arlington, VA 22204

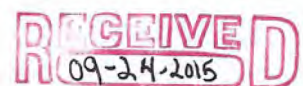
**Re: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Approval
Remedial Response
Portage County
267000859210**

Subject: Approval of the "Final No Further Action Record of Decision for RVAAP-008-R-01 Load Line #1A Munitions Response Site, Version 1.0" Former Ravenna Army Ammunition Plant, Ravenna, Ohio: Dated August 14, 2015 (Work Activity No. 267-000859-210)

Dear Mr. Leeper:

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-008-R-01 Load Line #1A Munitions Response Site, Version 1.0" document dated August 14, 2015. This document received by Ohio EPA's NEDO on August 14, 2015, was prepared by CB&I Federal Services LLC.

The Military Munitions Response Program (MMRP) Remedial Investigation (RI) for the Load Line #1A munitions response site investigated the potential presence of munitions debris and munitions of explosives of concern within the defined portion of the Load Line #1A area. In addition to the MMRP RI, investigation and remediation activities under the installation restoration program have been ongoing at the Load Line #1 area of concern since 1996. As there are no further comments or potential issues to address for the Load Line #1A munitions response site, Ohio EPA concurs with the remedy of no further action and has signed and dated the final record of decision for the Load Line #1 area of concern and will submit a signed copy for your records.



MR. MARK LEEPER, P.G., MBA
ARMY NATIONAL GUARD DIRECTORATE
SEPTEMBER 3, 2015
PAGE 2

If you have any questions or concerns, please do not hesitate to contact me at (614) 644-2896.

Sincerely,



Peter Whitehouse
Division Chief
Division of Environmental Response and Revitalization

PW:NCR/nvr

cc: Gregory F. Moore, USACE, Louisville District
Katie Tait/Kevin Sedlak, Camp Ravenna Environmental Office, Newton Falls

ec: Rod Beals, Ohio EPA, NEDO, DERR
Robert Prinic, Ohio EPA, NEDO, DERR
Justin Burke, Ohio EPA, CO, DERR
Andrew Kocher, Ohio EPA, NEDO, DERR
Nicholas Roope, Ohio EPA, NEDO, DERR



John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Director

August 7, 2015

Mr. Mark Leeper, P.G., MBA
Army National Guard Directorate
Environmental Programs Division
ARNG-ILE-CR
111 South George Mason Drive
Arlington, VA 22204

**Re: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Plans
Remedial Response
Portage County
267000859210**

Subject: Review of the "Draft No Further Action Record of Decision for RVAAP-008-R-01 Load Line # 1A Munitions Response Site Version 1.0," Former Ravenna Army Ammunition Plant, Ravenna, Ohio: Dated July 29, 2015 (Work Activity No. 267-000859-210)

Dear Mr. Leeper:

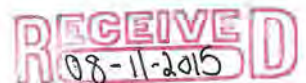
The Ohio Environmental Protection Agency (Ohio EPA), Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) has received and reviewed the, "Draft No Further Action Record of Decision for RVAAP-008-R-01 Load Line # 1A Munitions Response Site Version 1.0," dated July 29, 2015. This document, received by Ohio EPA's NEDO on July 30, 2015, was prepared by CB&I Federal Services LLC. Ohio EPA has completed the review of the draft record of decision and has no further comments. Please submit the final copy of the document for approval.

If you have any questions or concerns, please do not hesitate to contact me at (330) 963-1235.

Sincerely,

Nicholas Roope, Site Coordinator
Division of Environmental Response and Revitalization
NCR/nvr

- cc: Gregory F. Moore, USACE, Louisville District
- Katie Tait/Kevin Sedlak, Camp Ravenna Environmental Office, Newton Falls
- Haney/Harris, Camp Ravenna Environmental Office, Vista Sciences, Newton Falls
- ec: Rod Beals, Ohio EPA, NEDO, DERR
- Bob Princic, Ohio EPA, NEDO, DERR
- Justin Burke, Ohio EPA, CO, DERR
- Andrew Kocher, Ohio EPA, NEDO, DERR



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