Final No Further Action Proposed Plan for
RVAAP-034-R-01 Sand Creek Dump Munitions Response Site
Version 1.0

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Contract No. W912DR-09-D-0005
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Prepared for:

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U.S. Army Corps of Engineers
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14. ABSTRACT

This No Further Action (NFA) Proposed Plan provides the public with information to comment upon the selection of the recommended response action for RVAAP-034-R-01 Sand Creek Dump Munitions Response Site (MRS) at the former Ravenna Army Ammunition Plant under the Military Munitions Response Program. This NFA Proposed Plan presents the U.S. Army's preliminary recommendations concerning how best to address the Sand Creek Dump MRS where no munitions and explosives of concern 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 U.S. Army is issuing this NFA Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act 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). Implementation of the selected remedy for the MRS will also satisfy the requirements of the Ohio EPA Director's Final Findings and Orders.

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CB&I Federal Services LLC has completed the *Final No Further Action Proposed Plan for RVAAP-034-R-01 Sand Creek Dump Munitions Response Site*, Version 1.0, at the former Ravenna Army Ammunition Plant in 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.

Prepared/Approved by:  Date: May 28, 2015

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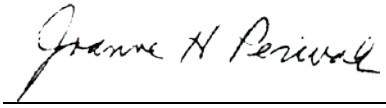
Project Manager

Reviewed/Approved by:  Date: May 28, 2015

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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
bgs	below ground surface
BHC	benzene hexachloride
Camp Ravenna	Camp Ravenna Joint Military Training Center
CB&I	CB&I Federal Services LLC
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
cm/s	centimeters per second
CMCOPC	contaminant migration chemicals of potential concern
COC	chemical of concern
COPC	chemical of potential concern
DGM	digital geophysical mapping
Draft Phase I RI Report	*Draft Phase I Remedial Investigation Report for RVAAP-34 Sand Creek Disposal Road Landfill*
e^2M	environmental-engineering Management, Inc.
EPA	U.S. Environmental Protection Agency
ERA	ecological risk assessment
Final RI Report	*Final Remedial Investigation Report for RVAAP-034-R-01 Sand Creek Dump Munitions Response Site, Version 1.0*
FWCUG	Facility-Wide Cleanup Goal
FWCUG guidance	*Final Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant, Ravenna, Ohio*
HHRA	human health risk assessment
IRP	Installation Restoration Program
MC	munitions constituents
MD	munitions debris
MEC	munitions and explosives of concern
MEC HA	MEC Hazard Assessment
mm	millimeter
MMRP	Military Munitions Response Program
MRS	Munitions Response Site
NFA	No Further Action
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
RI	Remedial Investigation
RVAAP	former Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation
Shaw	Shaw Environmental & Infrastructure, Inc.
SI	Site Inspection
SI Report	*Final Site Inspection Report*
TNT	trinitrotoluene
U.S.	United States
U.S. Army	U.S. Department of the Army
USDA	U.S. Department of Agriculture

1.0 INTRODUCTION

This *No Further Action Proposed Plan* is presented by the United States Department of the Army (U.S. Army) to involve the public in the remedy selection process for the RVAAP-034-R-01 Sand Creek Dump Munitions Response Site (MRS) requiring No Further Action (NFA) at the former Ravenna Army Ammunition Plant (RVAAP) in Portage and Trumbull Counties, Ohio (**Figure 1**). The U.S. Army, in consultation with the Ohio Environmental Protection Agency (Ohio EPA), is the lead agency for investigating, reporting, making remedial decisions, and taking remedial actions at the RVAAP. This NFA Proposed Plan presents the U.S. Army's preliminary recommendations concerning how best to address the Sand Creek Dump MRS where no munitions and 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.

This NFA Proposed Plan provides the public with information to comment upon the selection of the recommended response action. The U.S. Army, in consultation with the Ohio EPA, will review and consider all comments during the 30-day public comment period. Therefore, the public is encouraged to review and comment on all recommendations presented in this NFA Proposed Plan.

The U.S. Army is issuing this NFA Proposed Plan as part of its public participation responsibilities under Section 117(a) of the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), 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). Implementation of the selected remedy at the MRS will also satisfy the requirements of the *Director's Final Findings and Orders (DFFO) for RVAAP* (Ohio EPA, 2004).

This NFA Proposed Plan summarizes information that can be found in greater detail in the *Final Remedial Investigation Report for RVAAP-034-R-01 Sand Creek Dump Munitions Response Site, Version 1.0* (Final RI Report; CB&I Federal Services LLC [CB&I], 2015). The U.S. Army encourages the public to review this document to gain a more comprehensive understanding of the MRS and activities that have been conducted to date at the MRS under the Military Munitions Response Program (MMRP).

2.0 FACILITY AND MRS BACKGROUNDS

This section presents the descriptions and background history for the RVAAP and the Sand Creek Dump MRS presented in this NFA Proposed Plan.

2.1 Facility History

The RVAAP (Federal Facility ID No. OH213820736), now known as the Camp Ravenna Joint Military Training Center (Camp Ravenna), is located in northeastern Ohio within Portage and Trumbull Counties and is approximately 3 miles east-northeast of the city of Ravenna. 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**).

Public Comment Period:
June 4, 2015, to July 3, 2015

Public Meeting:
The U.S. Army will hold an open house and public meeting to explain the NFA Proposed Plan. Oral and written comments will also be accepted at the meeting. The open house and public meeting are scheduled for 6:00 p.m., June 3, 2015, at the Newton Falls Community Center, 52 East Quarry Street, Newton Falls, Ohio 44444.

Information Repositories:
Information used in selecting the conclusion is available online for public review at www.rvaap.org and at the following locations:

Reed Memorial Library
167 East Main Street
Ravenna, Ohio 44266
(330) 296-2827
Hours of operation:
9 a.m.–9 p.m. Monday–Thursday
9 a.m.–6 p.m. Friday
9 a.m.–5 p.m. Saturday
1 p.m.–5 p.m. Sunday

Newton Falls Public Library
204 South Canal Street
Newton Falls, Ohio 44444
(330) 872-1282
Hours of operation:
10 a.m.–8 p.m. Monday–Thursday
9 a.m.–5 p.m. Friday and Saturday

The **Administrative Record File**, containing information used in selecting the preferred alternative, is available for public review at the following location:

Camp Ravenna Joint Military Training Center (Camp Ravenna)
Environmental Office
1438 State Route 534
Newton Falls, Ohio 44444
(330) 872-8003

Note: Access is restricted to Camp Ravenna, but the file can be obtained or viewed with prior notice to Camp Ravenna.

Administrative control of the 21,683-acre facility has been transferred to the U.S. Property and Fiscal Officer for Ohio and subsequently licensed to the Ohio Army National Guard (OHARNG) for use as a training site, Camp Ravenna. The restoration program involves cleanup of former production areas across the facility related to former operations under the RVAAP.

The RVAAP was constructed in 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 areas of concern (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).

2.2 MRS Background and History

The Sand Creek Dump MRS is an approximately 0.85-acre area that is located in the eastern portion of the facility (**Figure 2**). The MRS is collocated with an Installation Restoration Program (IRP) AOC known as the Sand Creek Disposal Road Landfill (Army Environmental Database Restoration No. RVAAP-34). The site is a former open dump area that operated from 1950 to 1960. Details regarding the operational history of disposal activities are incomplete, including the types of materials and quantities dumped at the site; however, the following kinds of construction and debris materials have been verified during previous actions at the collocated AOC:

- Asbestos-containing material (i.e., large piles of corrugated transite roofing and flat transite siding)
- Rubble (i.e., concrete, brick, and masonry fragments)
- Drywall and plaster
- Glass bottles, fluorescent light tubes, and broken glass
- Scrap metal items including wire fencing
- Wooden debris

In general, it is assumed that the construction- and debris-type materials were delivered and dumped over an embankment located immediately adjacent to Sand Creek. The dump site extended along the embankment for approximately 1,200 feet and varied in width from 20 to 40 feet from the top of the bank to the bottom. The bank slopes from east to west towards Sand Creek at 40 to 60 degrees from horizontal (CB&I, 2015).

The only cultural feature at the MRS is a former rail bed that bisects the site. The former rail bed culvert that crossed over Sand Creek was removed in 2013. Several buildings associated with the former Sand Creek Sewage Treatment Plant are located northeast of the MRS. **Figure 3** presents the current MRS boundaries and cultural features associated with the Sand Creek Dump MRS.

2.3 MRS Historical Investigations

The following investigations and reports have been completed for the Sand Creek Dump MRS under the MMRP:

- *Final Military Munitions Response Program Historical Records Review* (engineering-environmental Management, Inc. [e^2M], 2007)
- *Final Site Inspection Report* (SI Report; e^2M, 2008)

In October 2003, a Removal Action was performed under the IRP to remove all surface and subsurface debris in order to eliminate source contamination to protect human and ecological receptors. Prior to the Removal Action, the entire site was littered with the aforementioned types of construction and debris materials, with large piles of debris concentrated mostly in the southern portion of the AOC.

During confirmation sampling following the Removal Action, two 75 millimeter (mm) projectile shells were discovered at the northern portion of the AOC. The shells were verified to

be inert and were considered munitions debris (MD). Evaluation of the Sand Creek Dump as an MRS was initiated following the MD findings during the Removal Action.

In 2008, a Site Inspection (SI) was conducted at the MRS under the MMRP, and the field activities included a meandering-path magnetometer and metal detector–assisted MEC survey at all open areas. Multiple subsurface anomalies were recorded; however, the nature of the anomalies could not be determined because an intrusive investigation was not performed during the SI. No evidence of MEC was found on the ground surface during the SI field work; however, a 105mm projectile was observed on the bottom of Sand Creek at the portion of the creek located adjacent to the northern boundary of the MRS. The projectile appeared to be empty, but it was not inspected to determine the explosive safety status as either "safe" or "hazardous." Based on historical findings and SI field observations made, further characterization for potential MEC was recommended in the SI Report (e^2M, 2008). Sampling for munitions constituents (MC) was not conducted during the SI field work because chemical contamination was being addressed at the collocated AOC under the IRP.

In 2010, a full-coverage digital geophysical mapping (DGM) survey was completed at the collocated AOC under the IRP. The primary objective of the DGM survey was to determine the horizontal extent of potential MEC and other suspected buried anomalies without performing intrusive activities. The secondary objective was to evaluate the data to characterize the anomaly density at the AOC. The DGM survey data indicated that the largest area of metal debris is present northeast of the former railroad bed. Several areas characterized by relatively higher densities of anomalies are located between the stream and the edge of the eastern plateau. Areas characterized by relatively lower densities of anomalies are present throughout the southern portion of the collocated AOC (CB&I, 2015).

A Phase I Remedial Investigation (RI) was completed at the collocated AOC under the IRP in 2010 and included the collection of surface soil, subsurface soil, and sediment samples. The results of the Phase I RI samples were aggregated with the qualified historical data to identify site-related chemicals in accordance with the evaluation process presented in the *Final Facility-Wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant, Ravenna, Ohio* (SAIC, 2010); hereafter referred to as the Facility-Wide Cleanup Goal (FWCUG) guidance. The site-related chemicals were then used to evaluate for contaminant fate and transport and were carried forward into the risk assessments in the *Draft Phase I Remedial Investigation Report for RVAAP-34 Sand Creek Disposal Road Landfill* (Draft Phase I RI Report; Shaw Environmental & Infrastructure, Inc. [Shaw], 2012), for human and ecological receptors.

The contaminant migration chemicals of potential concern (CMCOPCs) identified in the Draft Phase I RI Report as having the potential for impacting groundwater and surface water include 2,4,6-TNT and 2-amino-4,6-dinitrotoluene, 1,4-dichlorobenzene, carbazole, pentachlorophenol, benzene, alpha-benzene hexachloride (BHC), and beta-BHC. It was noted in the Draft Phase I RI Report that the identified CMCOPCs represented a conservative comparison, since groundwater at the Sand Creek Dump has not been investigated and the hydrogeologic parameters were either assumed values or literature values for comparable lithologies. Of the identified CMCOPCs, alpha-BHC and beta-BHC are pesticides that are not considered as MC at the collocated MRS under the MMRP (Shaw, 2012).

The AOC was considered as a single exposure unit under the Phase I RI; however, soil data collected within and adjacent to the AOC were aggregated by depth intervals to better define exposure at various depths. The Draft Phase I RI Report (Shaw, 2012) included analyses to

assess for subsurface soil. The soil interval for Unrestricted Land Use, which includes evaluation for the Adult and Child Resident Receptors, was also assessed. Sediment samples collected for the Phase I RI and the results of the surface water samples collected from Sand Creek at stations located adjacent to the AOC (as part of previous investigations, namely the 2003 Removal Action and 2003 Facility-Wide Biological and Water Quality Study) were evaluated in the same manner for the identified receptors. The sample intervals that were evaluated in the Draft Phase I RI Report (Shaw, 2012) are as follows:

- Surface soil (0 to 1 foot and 0 to 4 feet below ground surface [bgs])
- Subsurface soil (1 to 13 feet and 4 to 7 feet bgs)
- Sediment (0 to 0.5 feet bgs)
- Surface water

The human health risk assessment (HHRA) in the Draft Phase I RI Report (Shaw, 2012) was prepared using the streamlined approach to risk decision-making as described in the *Ravenna Army Ammunition Plant Position Paper for the Application and Use of Facility-Wide Human Health Cleanup Goals* (U.S. Army Corps of Engineers, 2012). The approach identifies chemicals of potential concern (COPCs) by comparing detected concentrations to background values, eliminating essential nutrients, and comparing those concentrations to the cleanup goals in the FWCUG guidance (SAIC, 2010). The chemicals of concern (COCs) were identified through additional screening of the COPCs by comparing detected concentrations to specific FWCUGs and using a "Sum of Ratios" approach to account for cumulative effects.

Only chemicals associated with the munitions that may have been historically used and/or disposed at the MRS are considered MC for evaluation under the MMRP. As such, not all of the COCs identified at the collocated AOC under the IRP were considered as MC. A summary of the COCs identified in the HHRA in the Draft Phase I RI Report (Shaw, 2012) that were considered as potential MC are as follows:

- Antimony, copper, mercury, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo(a,h) anthracene in surface soil (0 to 1 foot bgs) for the Resident Receptor (Adult and Child)
- Benzo(a)pyrene in subsurface soil (1 to 13 feet bgs) for the Resident Receptor (Adult and Child)
- Benzo(a)pyrene and benzo(b)fluoranthene in surface soil (0 to 4 feet bgs) for the National Guard Trainee
- Lead in subsurface soil (4 to 7 feet bgs) for the National Guard Trainee

No COCs were identified in sediment or surface water for the Resident Receptor (Adult and Child) or the National Guard Trainee (CB&I, 2015).

2.4 MRS Characteristics

The Sand Creek Dump MRS is located in the eastern portion of the facility along the eastern bank of Sand Creek (**Figure 2**). The bank slopes from east to west towards Sand Creek 40 to 60 degrees from horizontal. Topographic relief between the top of embankment and the surface of Sand Creek varies across the MRS, but ranges from approximately 15 to 25 feet. The slope of the embankment is the area at the MRS where construction debris was historically dumped. A former railroad bed bisects the MRS, and the top of the embankment at both the northern and southern portions of the MRS are relatively level with elevations ranging between approximately 965 to 970 feet above mean sea level (amsl). A narrow floodplain occupies the land between the bottom of the embankment and Sand Creek. The bottom of the embankment represents the lowest elevation at the MRS at approximately 950 feet amsl (CB&I, 2015).

As a former dump site, it is expected that much of the native soil at the Sand Creek Dump MRS was reworked, removed, or used as cover material during the disposal activities. Borings were advanced during the Phase I RI field activities that were conducted under the IRP at the collocated AOC in 2010. Evidence of fill material that included coal ash and glass debris was encountered in borings advanced along the top of the embankment as deep as 8 feet bgs, primarily at the northern portion of the AOC. The depth of fill material along the top of the slopes appeared to decrease to less than 2 feet bgs as the borings were advanced south towards the former railroad bed. Only native glacial materials were observed in the one boring that was advanced at the southern portion of the AOC, south of the former railroad bed. Glacial materials encountered in the borings were consistent with the deposits associated with the silt loam types at the facility that include light brown to dark brown, gray, and mottled silt with sand. Associated sediments were observed below the till and consisted of well-sorted, saturated gray silt with clay lenses and unconsolidated fine- to medium-grained sands. The depth to sediments ranged from 13 to 15 feet bgs across the MRS, which was the approximate depth where groundwater was encountered in three borings at the northern portion of the MRS. Bedrock was not encountered at any of the boring locations that were advanced to a maximum depth of 20 feet bgs (Shaw, 2012).

There are two native soil types at the Sand Creek Dump MRS. These soil types include the Hornell Silt Loam and the Orville Silt Loam (AMEC Earth and Environmental, Inc. [AMEC], 2008).

The Hornell Silt Loam is the predominant soil type at the MRS. The soil type consists of moderately deep, somewhat poorly drained to moderately well drained gently sloping soils that formed partly in glacial till and partly in residuum from the underlying shale bedrock. This soil has a moderately deep root zone and low available water capacity. Permeability is very slow in this soil type and is seasonally saturated with water. The average permeability of the Hornell Silt Loam with a 3 to 8 percent slope is also 9.1×10^{-5} centimeters per second (cm/s) (U.S. Department of Agriculture [USDA] et al., 1978).

The Orville Silt Loam soil type is situated at the lowland portions of the MRS along Sand Creek. This soil type is characterized with deep, somewhat poorly drained, nearly level soils that formed in loamy alluvium on flood plains. Orville soils have a deep root zone in summer when the water table is low and in drained areas. The available water capacity is high, and permeability is moderate. These soils are subject to occasional flooding, and they have a water table near the surface late in winter and in spring. The average permeability of the Orville Silt Loam is 1.31×10^{-3} cm/s (USDA et al., 1978).

The Sand Creek Dump MRS straddles two bedrock formations, the Sharon Sandstone Conglomerate Unit and the Berea Sandstone. The Berea Sandstone consists of isolated deposits beneath the facility and is the primary formation beneath the MRS (AMEC, 2008). No bedrock formations were observed at the MRS, and bedrock was not encountered in the borings advanced to 20 feet bgs during the Phase I RI at the collocated AOC (Shaw, 2012).

There are various depressions and several areas of standing water at the top of the embankment, which is indicative of the silt-clay soils that are present in the surface and subsurface soils at the site. However, in general, surface water runoff follows the topography of the site and flows in a westerly direction where it enters Sand Creek.

Typical wetlands located within the facility consist of seasonally saturated wetlands, wet fields, and forested wetlands (MKM Engineers, Inc., 2007). No wetlands were identified at the Sand Creek Dump MRS; however, the lower portions of the embankments for the MRS run

along Sand Creek and the MRS is located within a 100-year floodplain (CB&I, 2015).

No groundwater monitoring wells have been specifically installed for the Sand Creek Dump MRS. Throughout the facility, average depth to groundwater is as deep as 50 feet bgs with static water levels occurring between 958 and 1,184 feet amsl (Kammer, 1982). However, groundwater has been encountered at much shallower depths in the upper unconsolidated aquifer across the facility. The latter is most likely the case at the Sand Creek site where the top of the embankment ranges from 15 to 25 feet above the surface of Sand Creek, and saturated soil was encountered in the soil borings at the northern portion of the AOC during the Phase I RI in 2010 where the embankment is the shortest, at depths of approximately 13 feet bgs (Shaw, 2012).

The vegetation community present at the Sand Creek Dump MRS is categorized as a "Mixed Swamp Forest Community." The vegetation formation in this community is typically associated with floodplains near streams and rivers and other temporarily flooded areas. The dominant species consist of green ash, American elm, hackberry, and red maple. Black walnut, white ash, swamp white oak, cottonwood, and black willow are also present (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).

Current activities at the Sand Creek Dump MRS include maintenance and natural resource management activities.

2.5 Remedial Investigation Results

Between December 2011 and August 2013, CB&I conducted RI field work under the MMRP at the Sand Creek Dump MRS. The RI field work included a DGM survey that encompassed the remainder of the MRS that was not covered during the 2010 DGM survey and intrusive investigation activities for the locations identified as potentially containing buried MEC. The DGM survey included an additional 150-foot (0.13-acre) section north of the AOC boundary as well as a number of small fill-in areas within the MRS.

Sampling for MC at the MRS was not proposed during development of the RI field work unless MEC or concentrated areas of MD were found (Shaw, 2011). No MEC or MD were identified at the Sand Creek Dump MRS during RI field work, and sampling for MC was not warranted.

To date, no confirmed MEC have been found at the Sand Creek Dump MRS. Two demilitarized 75mm projectiles were found following the 2003 Removal Action at the collocated AOC and were considered MD. A 105mm projectile was observed in Sand Creek during the SI field work; however, it is not known from where the projectile originated. The projectile appeared to be empty, but it was not inspected to determine the explosive safety status as either "safe" or "hazardous." The projectile was not observed in the creek during the RI field work, and the disposition of this projectile is unknown. The RI field work confirmed the results of previous investigations at and outside the MRS where no MEC have ever been found; therefore, it is not expected that an explosive safety hazard is present at the Sand Creek Dump MRS. Based on the results of MEC investigation, it was determined that no potential source of MC was present at the Sand Creek Dump MRS. Chemical contamination identified as COCs in the Phase I RI will continue to be addressed at the collocated AOC under the IRP (e^2M, 2008).

3.0 SCOPE AND ROLE OF RESPONSE ACTION

The Sand Creek Dump MRS is federal property that is licensed to the OHARNG for future use as a military training site. The purpose of the RI field work was to evaluate for the presence of MEC associated with the historical findings of MD at the MRS in support of its intended use. The selected remedy must be protective of the receptors associated with the future land use.

No explosive safety hazards have ever been found at the Sand Creek Dump MRS during the RI or at the collocated AOC during previous investigations under the IRP. Further, since no MEC or concentrated areas of MD have been identified, there is no potential source of MC. Therefore, there are no source materials or impacted environmental media resulting from MMRP-related hazards at the MRS.

Former dumping and disposal operations occurred at the Sand Creek Dump site, and the potential exists for non-MMRP COCs or other non-munitions related hazards to be present in the environmental media there. The collocated AOC is still being investigated under the IRP. Since no MEC or MC sources were identified at the MRS, any response actions associated with non-MMRP related hazards will be addressed under the IRP and are not included in this NFA Proposed Plan.

4.0 SUMMARY OF HUMAN AND ECOLOGICAL RISKS

The overall recommendation of NFA under the MMRP must be protective of the human and environmental receptors identified for the MRS. The planned method for risk evaluation for explosive safety hazards at an MRS is the *Interim Munitions and Explosives of Concern Hazard Assessment (MEC HA) Methodology* (U.S. Environmental Protection Agency [EPA], 2008). In addition to the risk assessment for MEC, screening-level risk assessments for both human health and ecological risks were proposed when environmental media that represented the potential for MC were identified and collected (Shaw, 2011). The evaluation of risk is required to estimate risk reduction for any response action including NFA, and the evaluation and determinations for risk at the Sand Creek Dump MRS, as presented in the Final RI Report (CB&I, 2015), are discussed in this section.

4.1 MEC Hazard Assessment

The MEC HA (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 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 because there are no human health safety concerns.

No MEC representing an explosive safety hazard at the Sand Creek Dump MRS were identified during the RI field activities. Therefore, calculation of a MEC HA score was not warranted for the MRS and the MEC exposure pathways for all receptors at the MRS are incomplete.

4.2 Human Health and Ecological Risk Assessment

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

Since no MEC or concentrated areas of MD were identified between the SI and RI field activities that were conducted at the Sand Creek Dump MRS under the MMRP, media

sampling for MC was not warranted. Therefore, an HHRA or an ERA was not required to be performed for the MRS and no risk associated with MC was identified for human or ecological receptors at the MRS.

5.0 CONCLUSIONS AND RECOMMENDATIONS

No evidence of MEC or source of MC was found at the Sand Creek Dump MRS during the RI field work that was conducted under the MMRP. Based on these results, no risks associated with exposures to MEC or MC are present and the U.S. Army, in consultation with the Ohio EPA, is recommending NFA under the MMRP for the Sand Creek Dump MRS. The overall recommendation of NFA under the MMRP is protective of the human and environmental receptors identified for the MRS. This recommendation is not a final decision. The U.S. Army, in consultation with the Ohio EPA, will select the remedy for the MRS after reviewing and considering all comments submitted during the 30-day public comment period.

6.0 COMMUNITY PARTICIPATION

Public participation is an important component of the remedy selection. The U.S. Army, in coordination with Ohio EPA, is soliciting input from the community on the preferred alternative. The comment period extends from June 4, 2015, to July 3, 2015. This period includes a public meeting at which the U.S. Army will present this NFA Proposed Plan. The U.S. Army will accept oral and written comments at this meeting.

6.1 Public Comment Period

The 30-day comment period is from June 4, 2015, to July 3, 2015, and provides an opportunity for public involvement in the decision-making process for the proposed action. The public is encouraged to review and comment on this NFA Proposed Plan. All public comments will be considered by the U.S. Army and Ohio EPA before selecting a remedy. During the comment period, the public is encouraged to review documents pertinent to the Sand Creek Dump MRS. This information is available at the Information Repositories and online at www.rvaap.org. To obtain further information, contact the Camp Ravenna Environmental Office.

6.2 Public Meeting

The U.S. Army will hold an open house and public meeting on this NFA Proposed Plan on June 3, 2015, at 6:00 p.m., at the Newton Falls Community Center, 52 East Quarry Street, Newton Falls, Ohio 44444 to accept comments. This meeting will provide an opportunity for the public to comment on the proposed action. Comments made at the meeting will be transcribed.

6.3 Written Comments

If the public would like to comment in writing on this NFA Proposed Plan or other relevant issues, please deliver comments to the U.S. Army at the public meeting or mail written comments (postmarked no later than July 3, 2015).

POINT OF CONTACT FOR WRITTEN COMMENTS

Camp Ravenna Environmental Office
1438 State Route 534 SW
Newton Falls, Ohio 44444

6.4 U.S. Army Review of Public Comments

The U.S. Army will review the public's comments as part of the process in reaching a final decision for the most appropriate action to be taken. The Responsiveness Summary, a document that summarizes the U.S. Army's responses to comments received during the public comment period, will be included in the Record of Decision. The U.S. Army's final choice of action will be documented in the Record of Decision. The Record of Decision will be added to the RVAAP Administrative Record and Information Repositories.

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GLOSSARY OF TERMS

Administrative Record: This is a collection of documents, typically reports and correspondence, generated during site investigation and remedial activities. Information in the Administrative Record is used to select the preferred alternative. It is available for public review at the Camp Ravenna Environmental Office; call (330) 872-8003 for an appointment.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA): This federal law was passed in 1980 and is commonly referred to as the Superfund Program. It provides for liability, compensation, cleanup, and emergency response in connection with the cleanup of inactive hazardous waste release sites that endanger public health or the environment.

Complete Pathway: Complete pathways imply potential risks or hazards that may exist and need to be addressed by managing the pathway.

Discarded Military Munitions (DMM): Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance (UXO), military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations.

Incomplete Pathway: No risk or hazard associated with the pathway. No further data required to confirm the pathway is incomplete.

Military Munitions Response Program (MMRP): A Department of Defense program consisting of actions necessary to ensure protection of human health, welfare, and the environment from the hazards associated with MEC and MC at locations impacted by historical military activities.

Munitions Constituents (MC): Any material originating from UXO, DMM, or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.

Munitions Debris (MD): Remnants of military munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.

Munitions and Explosives of Concern (MEC): A munitions or explosive that may pose an explosive safety risk because it either did not function as designed, was discharged and/or abandoned, or is an explosive constituent. MEC includes UXO, DMM, and explosive constituents of munitions present in high enough concentrations to pose an explosive hazard.

Munitions Response Site (MRS): Any area on a defense site that is known or suspected to contain MEC or MC.

National Contingency Plan: The National Oil and Hazardous Substances Pollution Contingency Plan. These CERCLA regulations provide the federal government the authority to respond to the problems of abandoned or uncontrolled hazardous waste disposal sites as well as to certain incidents involving hazardous wastes (e.g., spills).

Potentially Complete Pathway: Data needs determine if the pathway is complete. If the pathway is determined to be incomplete, there is no risk or hazard. If the pathway is determined to be complete, a potential risk or hazard exists.

Proposed Plan: This CERCLA document provides the public with information necessary to participate in the selection of a remedy. It is designed to solicit public comment on a preferred alternative before a ROD is established.

Record of Decision (ROD): A legal record signed by the U.S. Army following coordination and concurrence with the Ohio EPA as per a June 10, 2004, agreement between the two parties. It describes the cleanup action or remedy selected for a site, the basis for selecting that remedy, public comments, responses to comments, and the estimated cost of the remedy.

Remedial Investigation (RI): A CERCLA investigation that involves sampling environmental media, such as air, soil, and water, to determine the nature and extent of contamination and to calculate human health and environmental risks that result from the contamination.

Responsiveness Summary: A section of the ROD where the U.S. Army documents and responds to written and oral comments received from the public about the Proposed Plan.

Unexploded Ordnance (UXO): Military munitions that have been primed, fuzed, armed, or otherwise prepared for action; have been fired, dropped, launched, projected, or placed in such a manner as to constituent a hazard to operations, installations, personnel, or material; and remain unexploded either by malfunction, design, or any other cause.

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engineering-environmental Management, Inc. (e^2M), 2007. *Military Munitions Response Program Historical Records Review, Ravenna Army Ammunition Plant, Ohio*, Final, January.

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FIGURES

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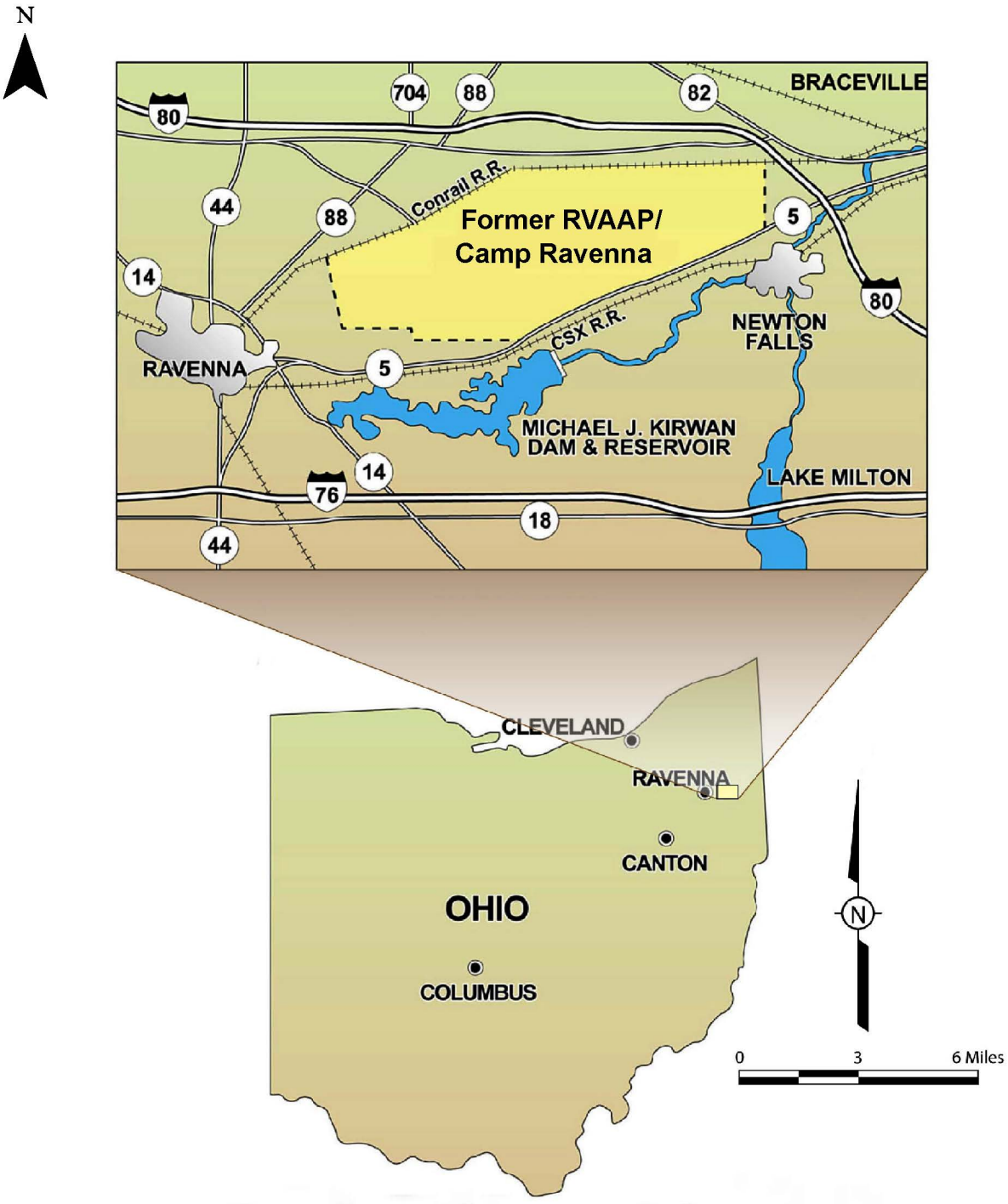

Note:
The Scale is for the Upper Map Only
Showing the Former RVAAP/Camp Ravenna Location

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

H:\MAMMS\Ravenna\GIS Documents\Project Maps\MMRP\RIFS\RIFS WW\42014 Sept r1\RVAAP WW4 001 Fig1 1 SiteLoc r1.mxd Analyst: qvt Date: 9/18/2014 1:28:21 PM

FIGURE 1 INSTALLATION LOCATION MAP

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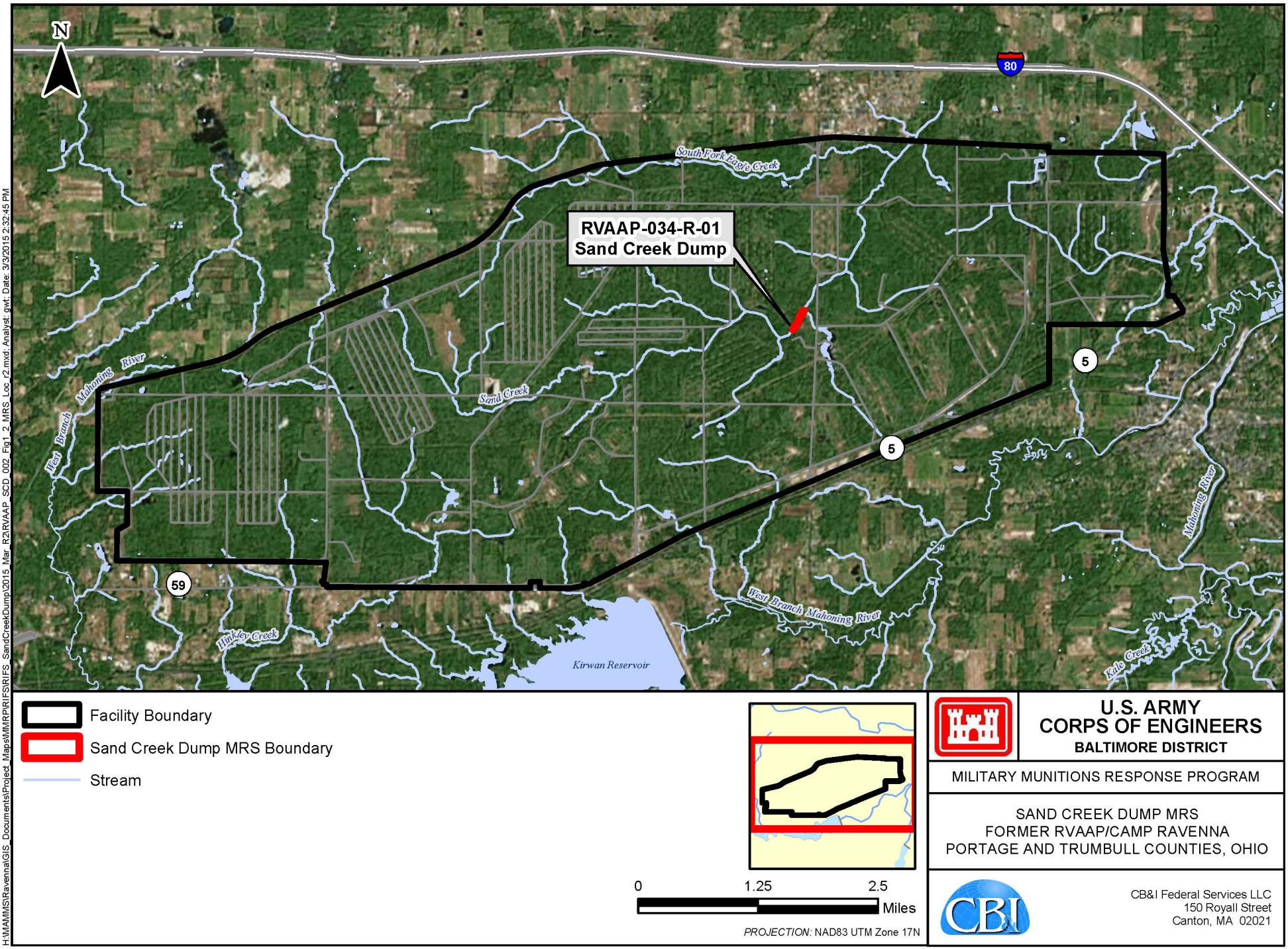

FIGURE 2 MRS LOCATION MAP

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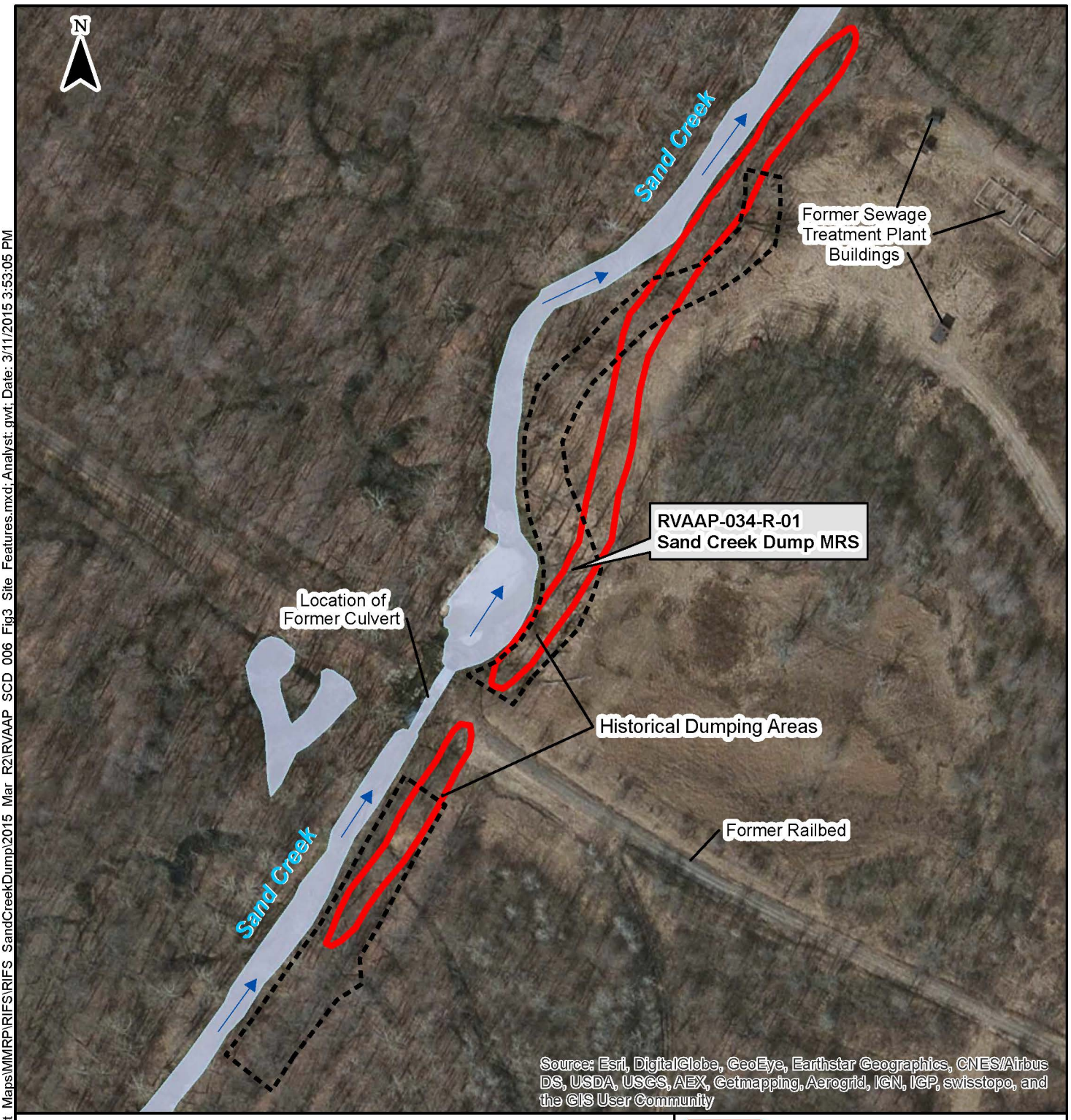

MRS Boundary
AOC Boundary
Stream
Direction of Flow

0 150
Feet

Projection : NAD_1983_UTM_Zone_17N

U.S. ARMY CORPS OF ENGINEERS

MILITARY MUNITIONS RESPONSE PROGRAM

SAND CREEK DUMP MRS
FORMER RVAAP/CAMP RAVENNA
PORTAGE AND TRUMBULL COUNTIES, OHIO

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

H:\MAMMS\Ravenna\GIS Documents\Project Maps\MMRP\RIFS\RIFS SandCreekDump\2015 Mar R2\RVAAP SCD 006 Fig3 Site Features.mxd; Analyst: gwt; Date: 3/11/2015 3:53:05 PM

FIGURE 3 SITE FEATURES MAP

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OHIO EPA CORRESPONDENCE

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

May 18, 2015

Re: **US Army Ravenna Ammunition Plt RVAAP**
Remediation Response
Plans
Remedial Response
Portage County
267000859226

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

Subject: Review of the "Draft No Further Action Proposed Plan for RVAAP-034-R-01 Sand Creek Dump Munitions Response Site," Former Ravenna Army Ammunition Plant, Ravenna, Ohio: Dated April 23, 2015 (Work Activity No. 267-000859-226)

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 document entitled, "Draft No Further Action Proposed Plan for RVAAP-034-R-01 Sand Creek Dump Munitions Response Site," dated April 24, 2015. This document, received by Ohio EPA's Northeast District Office (NEDO) on April 23, 2015, was prepared by the CB&I Federal Services, LLC. Ohio EPA has no comments. Please add dates in which the public meeting will take place in the final version of the No Further Action Proposed Plan for the RVAAP-034-R-01 Sand Creek Dump Munitions Response Site. Also, note that the work activity number has changed to reflect the progression of the project. When sending documents pertaining to the proposed plan for the Sand Creek Dump Munitions Response Site, in the future, please use the 267-000859-226 numerical identification, as shown above.

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
Haney/Harris, Vista Sciences
Katie Tait/Kevin Sedlak, Newton Falls

ec: Rod Beals, NEDO, DERR
Andrew Kocher, NEDO, DERR
Justin Burke, Ohio EPA, CO, DERR

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Ohio Environmental Protection Agency

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

July 27, 2015

Re: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Plans
Remedial Response
Portage County
267000859226

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

Subject: Approval of the "Final No Further Action Proposed Plan for RVAAP-034-R-01 Sand Creek Dump Munitions Response Site, Version 1.0" Former Ravenna Army Ammunition Plant, Ravenna, Ohio: Dated May 28, 2015 (Work Activity No. 267-000859-226)

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 "Final No Further Action Proposed Plan for RVAAP-034-R-01 Sand Creek Dump Munitions Response Site, Version 1.0" document, dated May 28, 2015 and received by Ohio EPA's NEDO on May 29, 2015.

The Military Munitions Response Program (MMRP) Remedial Investigation (RI) for the Sand Creek Dump munitions response site investigated only the potential presence of munitions debris, munitions of explosive concern, and associated munitions constituents within the defined portion of the Sand Creek Dump. Ohio EPA concurs with the preferred remedy of no further action described in this MMRP Proposed Plan for concerns at the Sand Creek Dump Munitions Response Site.

If you have any questions or concerns, please do not hesitate to contact Nicholas Roope of my staff at (330) 963-1235.

Sincerely,

Peter Whitehouse, Division Chief
Division of Environmental Response and Revitalization

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
Robert Princic, Ohio EPA, NEDO, DERR
Justin Burke, Ohio EPA, CO, DERR
Andrew Kocher, Ohio EPA, NEDO, DERR
Nicholas Roope, Ohio EPA, NEDO, DERR

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