

**Draft 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
Delivery Order No. 0002**

Prepared for:



**US Army Corps
of Engineers®**

**U.S. Army Corps of Engineers
Baltimore District
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13. SUPPLEMENTARY NOTES The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless designated by other documentation.						
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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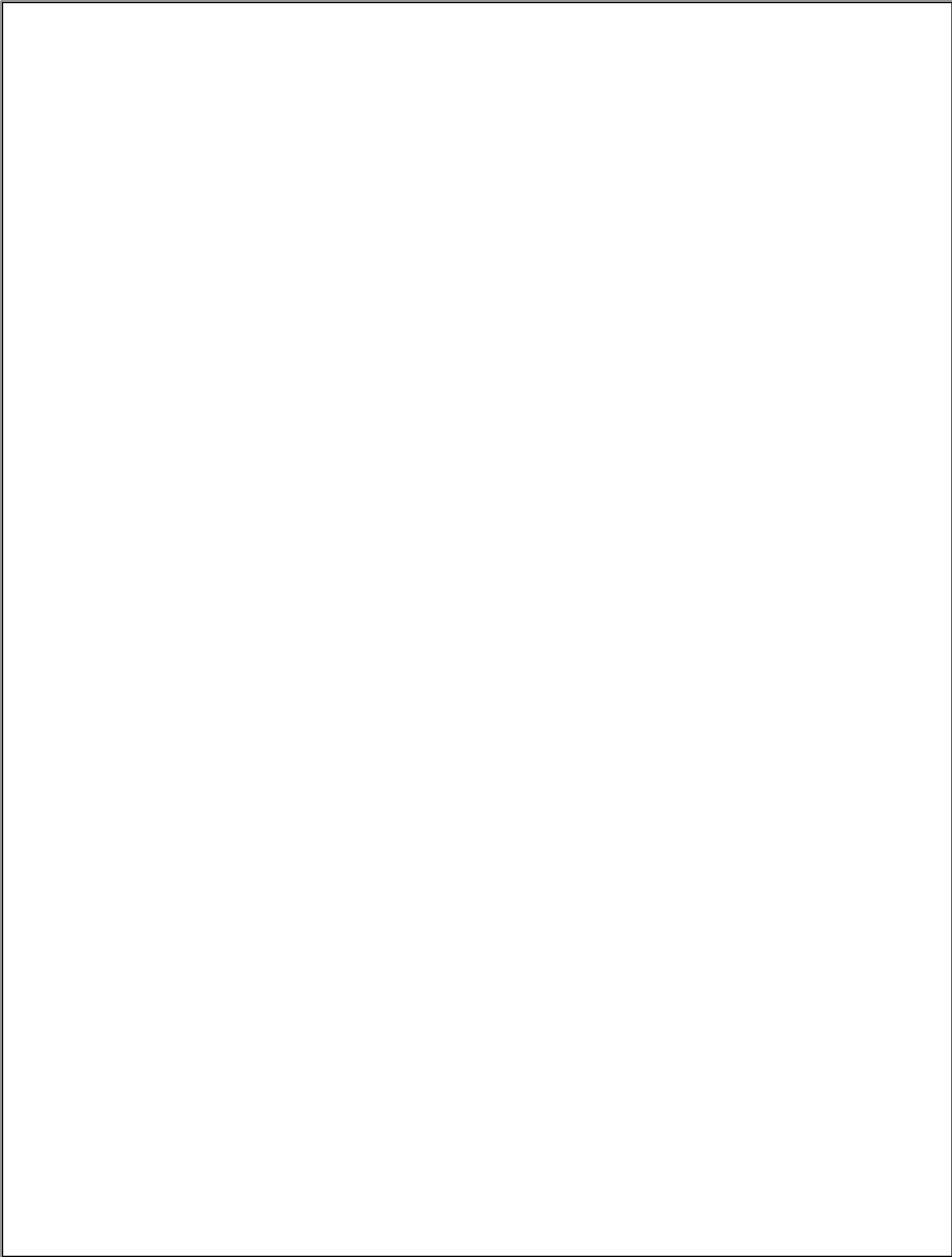
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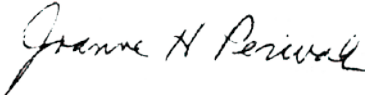
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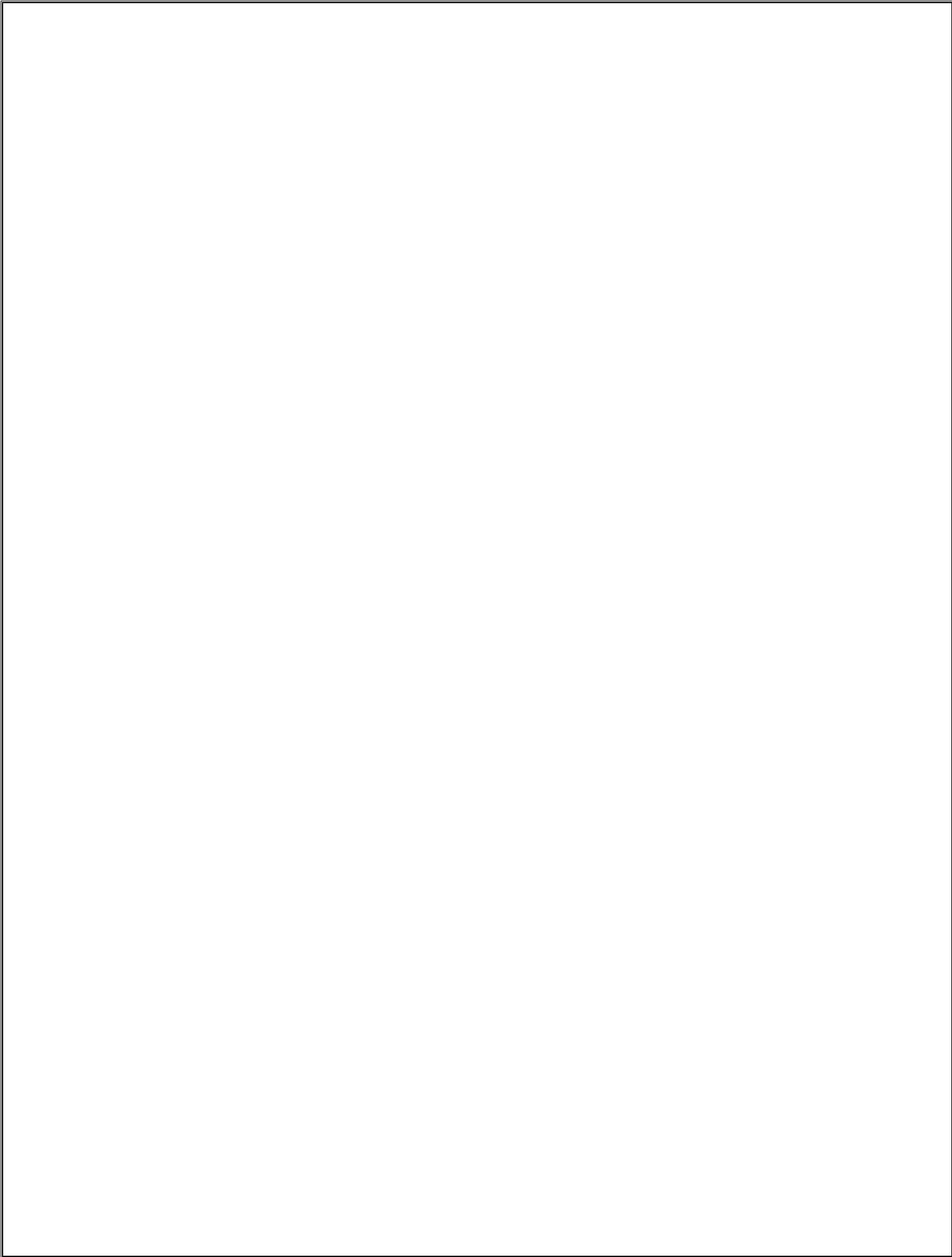
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CONTRACTOR'S STATEMENT OF INDEPENDENT TECHNICAL REVIEW

CB&I Federal Services LLC has completed the *Draft 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:	 _____ David Crispo Project Manager	Date:	<u>April 23, 2015</u>
Reviewed/Approved by:	 _____ Joanne Perwak Project Scientist/Technical Lead	Date:	<u>April 23, 2015</u>



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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

1	AMEC	AMEC Earth and	50	mm	millimeter
2		Environmental, Inc.	51	MMRP	Military Munitions
3	amsl	above mean sea level	52		Response Program
4	AOC	area of concern	53	MRS	Munitions Response Site
5	bgs	below ground surface	54	NFA	No Further Action
6	BHC	benzene hexachloride	55	OHARNG	Ohio Army National Guard
7	Camp Ravenna	Camp Ravenna Joint	56	Ohio EPA	Ohio Environmental
8		Military Training Center	57		Protection Agency
9	CB&I	CB&I Federal Services LLC	58	RI	Remedial Investigation
10	CERCLA	<i>Comprehensive</i>	59	RVAAP	former Ravenna Army
11		<i>Environmental Response,</i>	60		Ammunition Plant
12		<i>Compensation, and Liability</i>	61	SAIC	Science Applications
13		<i>Act of 1980</i>	62		International Corporation
14	cm/s	centimeters per second	63	Shaw	Shaw Environmental &
15	CMCOPC	contaminant migration	64		Infrastructure, Inc.
16		chemicals of potential	65	SI	Site Inspection
17		concern	66	SI Report	<i>Final Site Inspection Report</i>
18	COC	chemical of concern	67	TNT	trinitrotoluene
19	COPC	chemical of potential	68	U.S.	United States
20		concern	69	U.S. Army	U.S. Department of the
21	DGM	digital geophysical mapping	70		Army
22	Draft Phase I	<i>Draft Phase I Remedial</i>	71	USDA	U.S. Department of
23	RI Report	<i>Investigation Report for</i>	72		Agriculture
24		<i>RVAAP-34 Sand Creek</i>	73		
25		<i>Disposal Road Landfill</i>			
26	e ² M	environmental-engineering			
27		Management, Inc.			
28	EPA	U.S. Environmental			
29		Protection Agency			
30	ERA	ecological risk assessment			
31	Final RI Report	<i>Final Remedial Investigation</i>			
32		<i>Report for RVAAP-034-R-01</i>			
33		<i>Sand Creek Dump Munitions</i>			
34		<i>Response Site, Version 1.0</i>			
35	FWCUG	Facility-Wide Cleanup Goal			
36	FWCUG	<i>Final Facility-Wide Human</i>			
37	guidance	<i>Health Cleanup Goals for</i>			
38		<i>the Ravenna Army</i>			
39		<i>Ammunition Plant, Ravenna,</i>			
40		<i>Ohio</i>			
41	HHRA	human health risk			
42		assessment			
43	IRP	Installation Restoration			
44		Program			
45	MC	munitions constituents			
46	MD	munitions debris			
47	MEC	munitions and explosives of			
48		concern			
49	MEC HA	MEC Hazard Assessment			

1

2 **1.0 INTRODUCTION**

3 This *No Further Action Proposed Plan* is
4 presented by the United States Department of
5 the Army (U.S. Army) to involve the public in
6 the remedy selection process for the RVAAP-
7 034-R-01 Sand Creek Dump Munitions
8 Response Site (MRS) requiring No Further
9 Action (NFA) at the former Ravenna Army
10 Ammunition Plant (RVAAP) in Portage and
11 Trumbull Counties, Ohio (**Figure 1**). The U.S.
12 Army, in consultation with the Ohio
13 Environmental Protection Agency (Ohio EPA),
14 is the lead agency for investigating, reporting,
15 making remedial decisions, and taking remedial
16 actions at the RVAAP. This NFA Proposed
17 Plan presents the U.S. Army's preliminary
18 recommendations concerning how best to
19 address the Sand Creek Dump MRS where no
20 munitions and explosives of concern (MEC)
21 were found that had the potential to originate
22 from historical activities associated with
23 manufacturing, storing, transporting, testing,
24 training, and/or disposal that occurred at the
25 facility.

26
27 This NFA Proposed Plan provides the public
28 with information to comment upon the
29 selection of the recommended response action.
30 The U.S. Army, in consultation with the Ohio
31 EPA, will review and consider all comments
32 during the 30-day public comment period.
33 Therefore, the public is encouraged to review
34 and comment on all recommendations
35 presented in this NFA Proposed Plan.

36
37 The U.S. Army is issuing this NFA Proposed
38 Plan as part of its public participation
39 responsibilities under Section 117(a) of the
40 *Comprehensive Environmental Response,*
41 *Compensation, and Liability Act of 1980*
42 *(CERCLA)*, as amended by the *Superfund*
43 *Amendments and Reauthorization Act of 1986*
44 and Section 300.430(f)(2) of the *National Oil*
45 *and Hazardous Substances Pollution*
46 *Contingency Plan* (40 Code of Federal
47 Regulations 300). Implementation of the

48 selected remedy at the MRS will also satisfy
49 the requirements of the *Director's Final*
50 *Findings and Orders (DFFO) for RVAAP*
51 *(Ohio EPA, 2004)*.

52
53 This NFA Proposed Plan summarizes
54 information that can be found in greater detail
55 in the *Final Remedial Investigation Report for*
56 *RVAAP-034-R-01 Sand Creek Dump Munitions*
57 *Response Site, Version 1.0* (Final RI Report;
58 CB&I Federal Services LLC [CB&I], 2015).
59 The U.S. Army encourages the public to review
60 this document to gain a more comprehensive
61 understanding of the MRS and activities that
62 have been conducted to date at the MRS under
63 the Military Munitions Response Program
64 (MMRP).

65 **2.0 FACILITY AND MRS** 66 **BACKGROUNDS**

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

71 **2.1 Facility History**

72 The RVAAP (Federal Facility ID No.
73 OH213820736), now known as the Camp
74 Ravenna Joint Military Training Center (Camp
75 Ravenna), is located in northeastern Ohio
76 within Portage and Trumbull Counties and is
77 approximately 3 miles east-northeast of the city
78 of Ravenna. The facility is federally owned and
79 is approximately 11 miles long and 3.5 miles
80 wide. The facility is bounded by State Route 5,
81 the Michael J. Kirwan Reservoir, and the CSX
82 System Railroad to the south; Garret,
83 McCormick, and Berry Roads to the west; the
84 Norfolk Southern Railroad to the north; and
85 State Route 534 to the east. In addition, the
86 facility is surrounded by the communities of
87 Windham, Garrettsville, Newton Falls,
88 Charlestown, and Wayland (**Figure 1**).

89
90

Public Comment Period:**May XX, 2015, to June XX, 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., **May XX, 2015**, at the **LOCATION TBD**.

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.

3 Administrative control of the 21,683-acre
4 facility has been transferred to the U.S.
5 Property and Fiscal Officer for Ohio and

6 subsequently licensed to the Ohio Army
7 National Guard (OHARNG) for use as a
8 training site, Camp Ravenna. The restoration
9 program involves cleanup of former production
10 areas across the facility related to former
11 operations under the RVAAP.

12
13 The RVAAP was constructed in 1940 and 1941
14 for depot storage and ammunition
15 assembly/loading. During operations as an
16 ammunition plant, the RVAAP was a
17 government-owned and contractor-operated
18 industrial facility. Industrial operations at the
19 facility consisted of 12 munitions assembly
20 facilities, referred to as “load lines.” Load
21 Lines 1 through 4 were used to melt and load
22 2,4,6-trinitrotoluene (TNT) and Composition B
23 (mixture of TNT and Research Department
24 Explosive) into large-caliber shells and bombs.
25 The operations on the load lines produced
26 explosive dust, spills, and vapors that collected
27 on the floors and walls of each building.
28 Periodically, the floors and walls were cleaned
29 with water and steam. Following cleaning, the
30 “pink water” waste water, which contained
31 TNT and Composition B, was collected in
32 concrete holding tanks, filtered, and pumped
33 into unlined ditches for transport to earthen
34 settling ponds. Load Lines 5 through 11 were
35 used to manufacture fuzes, primers, and
36 boosters. From 1946 to 1949, Load Line 12
37 was used to produce ammonium nitrate for
38 explosives and fertilizers prior to use as a
39 weapons demilitarization facility.

40

41 In 1950, the facility was placed in standby
42 status and operations were limited to
43 renovation, demilitarization, and normal
44 maintenance of equipment, along with storage
45 of munitions. Production activities were
46 resumed from July 1954 to October 1957 and
47 again from May 1968 to August 1972. In
48 addition to production missions, various
49 demilitarization activities were conducted at
50 facilities constructed at Load Lines 1, 2, 3, and
51 12. Demilitarization activities included
52 disassembly of munitions and explosives melt-
53 out and recovery operations using hot water

1 and steam processes. Periodic demilitarization
2 of various munitions continued through 1992.

3
4 In addition to production and demilitarization
5 activities at the load lines, other facilities at the
6 RVAAP include MRSs that were used for the
7 burning, demolition, and testing of munitions.
8 These burning and demolition grounds consist
9 of large parcels of open space or abandoned
10 quarries. Other areas of concern (AOCs)
11 present at the facility include landfills, an
12 aircraft fuel tank testing area, and various
13 general industrial support and maintenance
14 facilities (Science Applications International
15 Corporation [SAIC], 2011).

16 2.2 MRS Background and History

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

- 32
- 33 • Asbestos-containing material (i.e., large
34 piles of corrugated transite roofing and flat
35 transite siding)
- 36 • Rubble (i.e., concrete, brick, and masonry
37 fragments)
- 38 • Drywall and plaster
- 39 • Glass bottles, fluorescent light tubes, and
40 broken glass
- 41 • Scrap metal items including wire fencing
- 42 • Wooden debris

43 In general, it is assumed that the construction-
44 and debris-type materials were delivered and

45 dumped over an embankment located
46 immediately adjacent to Sand Creek. The dump
47 site extended along the embankment for
48 approximately 1,200 feet and varied in width
49 from 20 to 40 feet from the top of the bank to
50 the bottom. The bank slopes from east to west
51 towards Sand Creek at 40 to 60 degrees from
52 horizontal (CB&I, 2015).

53
54 The only cultural feature at the MRS is a
55 former rail bed that bisects the site. The former
56 rail bed culvert that crossed over Sand Creek
57 was removed in 2013. Several buildings
58 associated with the former Sand Creek Sewage
59 Treatment Plant are located northeast of the
60 MRS. **Figure 3** presents the current MRS
61 boundaries and cultural features associated with
62 the Sand Creek Dump MRS.

63 2.3 MRS Historical Investigations

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

- 67
- 68 • *Final Military Munitions Response Program*
69 *Historical Records Review* (engineering-
70 environmental Management, Inc.
71 [e²M], 2007)
- 72 • *Final Site Inspection Report* (SI Report;
73 e²M, 2008)

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

84
85 During confirmation sampling following the
86 Removal Action, two 75 millimeter (mm)
87 projectile shells were discovered at the northern
88 portion of the AOC. The shells were verified to
89 be inert and were considered munitions debris
90 (MD). Evaluation of the Sand Creek Dump as

1 an MRS was initiated following the MD
2 findings during the Removal Action.

3
4 In 2008, a Site Inspection (SI) was conducted at
5 the MRS under the MMRP, and the field
6 activities included a meandering-path
7 magnetometer and metal detector-assisted
8 MEC survey at all open areas. Multiple
9 subsurface anomalies were recorded; however,
10 the nature of the anomalies could not be
11 determined because an intrusive investigation
12 was not performed during the SI. No evidence
13 of MEC was found on the ground surface
14 during the SI field work; however, a 105mm
15 projectile was observed on the bottom of Sand
16 Creek at the portion of the creek located
17 adjacent to the northern boundary of the MRS.
18 The projectile appeared to be empty, but it was
19 not inspected to determine the explosive safety
20 status as either “safe” or “hazardous.” Based on
21 historical findings and SI field observations
22 made, further characterization for potential
23 MEC was recommended in the SI Report
24 (e²M, 2008). Sampling for munitions
25 constituents (MC) was not conducted during
26 the SI field work because chemical
27 contamination was being addressed at the
28 collocated AOC under the IRP.

29
30 In 2010, a full-coverage digital geophysical
31 mapping (DGM) survey was completed at the
32 collocated AOC under the IRP. The primary
33 objective of the DGM survey was to determine
34 the horizontal extent of potential MEC and
35 other suspected buried anomalies without
36 performing intrusive activities. The secondary
37 objective was to evaluate the data to
38 characterize the anomaly density at the AOC.
39 The DGM survey data indicated that the largest
40 area of metal debris is present northeast of the
41 former railroad bed. Several areas characterized
42 by relatively higher densities of anomalies are
43 located between the stream and the edge of the
44 eastern plateau. Areas characterized by
45 relatively lower densities of anomalies are
46 present throughout the southern portion of the
47 collocated AOC (CB&I, 2015).

48

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

70
71 The contaminant migration chemicals of
72 potential concern (CMCOPCs) identified in the
73 Draft Phase I RI Report as having the potential
74 for impacting groundwater and surface water
75 include 2,4,6-TNT and 2-amino-4,6-
76 dinitrotoluene, 1,4-dichlorobenzene, carbazole,
77 pentachlorophenol, benzene, alpha-benzene
78 hexachloride (BHC), and beta-BHC. It was
79 noted in the Draft Phase I RI Report that the
80 identified CMCOPCs represented a
81 conservative comparison, since groundwater at
82 the Sand Creek Dump has not been investigated
83 and the hydrogeologic parameters were either
84 assumed values or literature values for
85 comparable lithologies. Of the identified
86 CMCOPCs, alpha-BHC and beta-BHC are
87 pesticides that are not considered as MC at the
88 collocated MRS under the MMRP
89 (Shaw, 2012).

90
91 The AOC was considered as a single exposure
92 unit under the Phase I RI; however, soil data
93 collected within and adjacent to the AOC were
94 aggregated by depth intervals to better define
95 exposure at various depths. The Draft Phase I
96 RI Report (Shaw, 2012) included analyses to
97 assess for subsurface soil. The soil interval for

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

- 14
- 15 • Surface soil (0 to 1 foot and 0 to 4 feet
- 16 below ground surface [bgs])
- 17 • Subsurface soil (1 to 13 feet and 4 to 7 feet
- 18 bgs)
- 19 • Sediment (0 to 0.5 feet bgs)
- 20 • Surface water

21 The human health risk assessment (HHRA) in
22 the Draft Phase I RI Report (Shaw, 2012) was
23 prepared using the streamlined approach to risk
24 decision-making as described in the *Ravenna*
25 *Army Ammunition Plant Position Paper for the*
26 *Application and Use of Facility-Wide Human*
27 *Health Cleanup Goals* (U.S. Army Corps of
28 Engineers, 2012). The approach identifies
29 chemicals of potential concern (COPCs) by
30 comparing detected concentrations to
31 background values, eliminating essential
32 nutrients, and comparing those concentrations
33 to the cleanup goals in the FWCUG guidance
34 (SAIC, 2010). The chemicals of concern
35 (COCs) were identified through additional
36 screening of the COPCs by comparing detected
37 concentrations to specific FWCUGs and using
38 a “Sum of Ratios” approach to account for
39 cumulative effects.

40
41 Only chemicals associated with the munitions
42 that may have been historically used and/or
43 disposed at the MRS are considered MC for
44 evaluation under the MMRP. As such, not all
45 of the COCs identified at the collocated AOC
46 under the IRP were considered as MC. A

47 summary of the COCs identified in the HHRA
48 in the Draft Phase I RI Report (Shaw, 2012)
49 that were considered as potential MC are as
50 follows:

- 51
- 52 • Antimony, copper, mercury,
- 53 benzo(a)anthracene, benzo(a)pyrene,
- 54 benzo(b)fluoranthene, and dibenzo(a,h)
- 55 anthracene in surface soil (0 to 1 foot bgs)
- 56 for the Resident Receptor (Adult and Child)
- 57 • Benzo(a)pyrene in subsurface soil (1 to 13
- 58 feet bgs) for the Resident Receptor (Adult
- 59 and Child)
- 60 • Benzo(a)pyrene and benzo(b)fluoranthene in
- 61 surface soil (0 to 4 feet bgs) for the National
- 62 Guard Trainee
- 63 • Lead in subsurface soil (4 to 7 feet bgs) for
- 64 the National Guard Trainee

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

69 2.4 MRS Characteristics

70 The Sand Creek Dump MRS is located in the
71 eastern portion of the facility along the eastern
72 bank of Sand Creek (**Figure 2**). The bank
73 slopes from east to west towards Sand Creek
74 40 to 60 degrees from horizontal. Topographic
75 relief between the top of embankment and the
76 surface of Sand Creek varies across the MRS,
77 but ranges from approximately 15 to 25 feet.
78 The slope of the embankment is the area at the
79 MRS where construction debris was
80 historically dumped. A former railroad bed
81 bisects the MRS, and the top of the
82 embankment at both the northern and southern
83 portions of the MRS are relatively level with
84 elevations ranging between approximately
85 965 to 970 feet above mean sea level (amsl). A
86 narrow floodplain occupies the land between
87 the bottom of the embankment and Sand Creek.
88 The bottom of the embankment represents the
89 lowest elevation at the MRS at approximately
90 950 feet amsl (CB&I, 2015).

91

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

35
36 There are two native soil types at the Sand
37 Creek Dump MRS. These soil types include the
38 Hornell Silt Loam and the Orville Silt Loam
39 (AMEC Earth and Environmental, Inc.
40 [AMEC], 2008).

41
42 The Hornell Silt Loam is the predominant soil
43 type at the MRS. The soil type consists of
44 moderately deep, somewhat poorly drained to
45 moderately well drained gently sloping soils
46 that formed partly in glacial till and partly in
47 residuum from the underlying shale bedrock.
48 This soil has a moderately deep root zone and
49 low available water capacity. Permeability is

50 very slow in this soil type and is seasonally
51 saturated with water. The average permeability
52 of the Hornell Silt Loam with a 3 to 8 percent
53 slope is also 9.1×10^{-5} centimeters per second
54 (cm/s) (U.S. Department of Agriculture
55 [USDA] et al., 1978).

56
57 The Orville Silt Loam soil type is situated at
58 the lowland portions of the MRS along Sand
59 Creek. This soil type is characterized with
60 deep, somewhat poorly drained, nearly level
61 soils that formed in loamy alluvium on flood
62 plains. Orville soils have a deep root zone in
63 summer when the water table is low and in
64 drained areas. The available water capacity is
65 high, and permeability is moderate. These soils
66 are subject to occasional flooding, and they
67 have a water table near the surface late in
68 winter and in spring. The average permeability
69 of the Orville Silt Loam is 1.31×10^{-3} cm/s
70 (USDA et al., 1978).

71
72 The Sand Creek Dump MRS straddles two
73 bedrock formations, the Sharon Sandstone
74 Conglomerate Unit and the Berea Sandstone.
75 The Berea Sandstone consists of isolated
76 deposits beneath the facility and is the primary
77 formation beneath the MRS (AMEC, 2008). No
78 bedrock formations were observed at the MRS,
79 and bedrock was not encountered in the borings
80 advanced to 20 feet bgs during the Phase I RI at
81 the collocated AOC (Shaw, 2012).

82
83 There are various depressions and several areas
84 of standing water at the top of the embankment,
85 which is indicative of the silt-clay soils that are
86 present in the surface and subsurface soils at
87 the site. However, in general, surface water
88 runoff follows the topography of the site and
89 flows in a westerly direction where it enters
90 Sand Creek.

91
92 Typical wetlands located within the facility
93 consist of seasonally saturated wetlands, wet
94 fields, and forested wetlands (MKM Engineers,
95 Inc., 2007). No wetlands were identified at the
96 Sand Creek Dump MRS; however, the lower
97 portions of the embankments for the MRS run

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

3
4 No groundwater monitoring wells have been
5 specifically installed for the Sand Creek Dump
6 MRS. Throughout the facility, average depth to
7 groundwater is as deep as 50 feet bgs with
8 static water levels occurring between 958 and
9 1,184 feet amsl (Kammer, 1982). However,
10 groundwater has been encountered at much
11 shallower depths in the upper unconsolidated
12 aquifer across the facility. The latter is most
13 likely the case at the Sand Creek site where the
14 top of the embankment ranges from 15 to
15 25 feet above the surface of Sand Creek, and
16 saturated soil was encountered in the soil
17 borings at the northern portion of the AOC
18 during the Phase I RI in 2010 where the
19 embankment is the shortest, at depths of
20 approximately 13 feet bgs (Shaw, 2012).

21
22 The vegetation community present at the Sand
23 Creek Dump MRS is categorized as a "Mixed
24 Swamp Forest Community." The vegetation
25 formation in this community is typically
26 associated with floodplains near streams and
27 rivers and other temporarily flooded areas. The
28 dominant species consist of green ash,
29 American elm, hackberry, and red maple. Black
30 walnut, white ash, swamp white oak,
31 cottonwood, and black willow are also present
32 (AMEC, 2008).

33
34 Biological inventories have not occurred
35 specifically within the MRS boundary,
36 although no confirmed sightings of federal- or
37 state-listed species have been reported.
38 Although there is the potential for federal,
39 state-listed, or rare species to be within the
40 MRS boundary, the potential is unlikely due to
41 the minimal size of the MRS (Camp
42 Ravenna, 2010).

43
44 Current activities at the Sand Creek Dump
45 MRS include maintenance and natural resource
46 management activities.

47 **2.5 Remedial Investigation Results**

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

60
61 Sampling for MC at the MRS was not proposed
62 during development of the RI field work unless
63 MEC or concentrated areas of MD were found
64 (Shaw, 2011). No MEC or MD were identified
65 at the Sand Creek Dump MRS during RI field
66 work, and sampling for MC was not warranted.

67
68 To date, no confirmed MEC have been found at
69 the Sand Creek Dump MRS. Two demilitarized
70 75mm projectiles were found following the
71 2003 Removal Action at the collocated AOC
72 and were considered MD. A 105mm projectile
73 was observed in Sand Creek during the SI field
74 work; however, it is not known from where the
75 projectile originated. The projectile appeared to
76 be empty, but it was not inspected to determine
77 the explosive safety status as either "safe" or
78 "hazardous." The projectile was not observed
79 in the creek during the RI field work, and the
80 disposition of this projectile is unknown. The
81 RI field work confirmed the results of previous
82 investigations at and outside the MRS where no
83 MEC have ever been found; therefore, it is not
84 expected that an explosive safety hazard is
85 present at the Sand Creek Dump MRS. Based
86 on the results of MEC investigation, it was
87 determined that no potential source of MC was
88 present at the Sand Creek Dump MRS.
89 Chemical contamination identified as COCs in
90 the Phase I RI will continue to be addressed at
91 the collocated AOC under the IRP (e²M, 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

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

6 **5.0 CONCLUSIONS AND** 7 **RECOMMENDATIONS**

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

25 **6.0 COMMUNITY PARTICIPATION**

26 Public participation is an important component
27 of the remedy selection. The U.S. Army, in
28 coordination with Ohio EPA, is soliciting input
29 from the community on the preferred
30 alternative. The comment period extends from
31 May XX, 2015, to June XX, 2015. This period
32 includes a public meeting at which the U.S.
33 Army will present this NFA Proposed Plan.
34 The U.S. Army will accept oral and written
35 comments at this meeting.

36 **6.1 Public Comment Period**

37 The 30-day comment period is from May XX,
38 2015, to June XX, 2015, and provides an
39 opportunity for public involvement in the
40 decision-making process for the proposed
41 action. The public is encouraged to review and
42 comment on this NFA Proposed Plan. All
43 public comments will be considered by the U.S.
44 Army and Ohio EPA before selecting a
45 remedy. During the comment period, the public

46 is encouraged to review documents pertinent to
47 the Sand Creek Dump MRS. This information
48 is available at the Information Repositories and
49 online at www.rvaap.org. To obtain further
50 information, contact the Camp Ravenna
51 Environmental Office.

52 **6.2 Public Meeting**

53 The U.S. Army will hold an open house and
54 public meeting on this NFA Proposed Plan on
55 May XX, 2015, at 6:00 p.m., at LOCATION
56 TBD to accept comments. This meeting will
57 provide an opportunity for the public to
58 comment on the proposed action. Comments
59 made at the meeting will be transcribed.

60 **6.3 Written Comments**

61 If the public would like to comment in writing
62 on this NFA Proposed Plan or other relevant
63 issues, please deliver comments to the U.S.
64 Army at the public meeting or mail written
65 comments (postmarked no later than June XX,
66 2015).

POINT OF CONTACT FOR WRITTEN COMMENTS

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

68 **6.4 U.S. Army Review of Public** 69 **Comments**

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

82

1
2

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GLOSSARY OF TERMS

- 1 **Administrative Record:** This is a collection of
2 documents, typically reports and
3 correspondence, generated during site
4 investigation and remedial activities.
5 Information in the Administrative Record is
6 used to select the preferred alternative. It is
7 available for public review at the Camp
8 Ravenna Environmental Office; call
9 (330) 872-8003 for an appointment.
- 10 **Comprehensive Environmental Response,**
11 **Compensation, and Liability Act of 1980**
12 **(CERCLA):** This federal law was passed in
13 1980 and is commonly referred to as the
14 Superfund Program. It provides for liability,
15 compensation, cleanup, and emergency
16 response in connection with the cleanup of
17 inactive hazardous waste release sites that
18 endanger public health or the environment.
- 19 **Complete Pathway:** Complete pathways imply
20 potential risks or hazards that may exist and
21 need to be addressed by managing the
22 pathway.
- 23 **Discarded Military Munitions (DMM):**
24 Military munitions that have been abandoned
25 without proper disposal or removed from
26 storage in a military magazine or other
27 storage area for the purpose of disposal. The
28 term does not include unexploded ordnance
29 (UXO), military munitions that are being held
30 for future use or planned disposal, or military
31 munitions that have been properly disposed
32 of consistent with applicable environmental
33 laws and regulations.
- 34 **Incomplete Pathway:** No risk or hazard
35 associated with the pathway. No further data
36 required to confirm the pathway is
37 incomplete.
- 38 **Military Munitions Response Program**
39 **(MMRP):** A Department of Defense program
40 consisting of actions necessary to ensure
41 protection of human health, welfare, and the
42 environment from the hazards associated with
43 MEC and MC at locations impacted by
44 historical military activities.
- 45 **Munitions Constituents (MC):** Any material
46 originating from UXO, DMM, or other
47 military munitions, including explosive and
48 nonexplosive materials, and emission,
49 degradation, or breakdown elements of such
50 ordnance or munitions.
- 51 **Munitions Debris (MD):** Remnants of military
52 munitions (e.g., fragments, penetrators,
53 projectiles, shell casings, links, fins)
54 remaining after munitions use,
55 demilitarization, or disposal.
- 56 **Munitions and Explosives of Concern**
57 **(MEC):** A munitions or explosive that may
58 pose an explosive safety risk because it either
59 did not function as designed, was discharged
60 and/or abandoned, or is an explosive
61 constituent. MEC includes UXO, DMM, and
62 explosive constituents of munitions present in
63 high enough concentrations to pose an
64 explosive hazard.
- 65 **Munitions Response Site (MRS):** Any area on
66 a defense site that is known or suspected to
67 contain MEC or MC.
- 68 **National Contingency Plan:** The National Oil
69 and Hazardous Substances Pollution
70 Contingency Plan. These CERCLA
71 regulations provide the federal government
72 the authority to respond to the problems of
73 abandoned or uncontrolled hazardous waste
74 disposal sites as well as to certain incidents
75 involving hazardous wastes (e.g., spills).
- 76 **Potentially Complete Pathway:** Data needs
77 determine if the pathway is complete. If the
78 pathway is determined to be incomplete,
79 there is no risk or hazard. If the pathway is
80 determined to be complete, a potential risk or
81 hazard exists.
- 82 **Proposed Plan:** This CERCLA document
83 provides the public with information
84 necessary to participate in the selection of a
85 remedy. It is designed to solicit public
86 comment on a preferred alternative before a
87 ROD is established.
- 88 **Record of Decision (ROD):** A legal record
89 signed by the U.S. Army following
90 coordination and concurrence with the Ohio
91 EPA as per a June 10, 2004, agreement
92 between the two parties. It describes the
93 cleanup action or remedy selected for a site,
94 the basis for selecting that remedy, public
95 comments, responses to comments, and the
96 estimated cost of the remedy.

GLOSSARY OF TERMS

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

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

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

21

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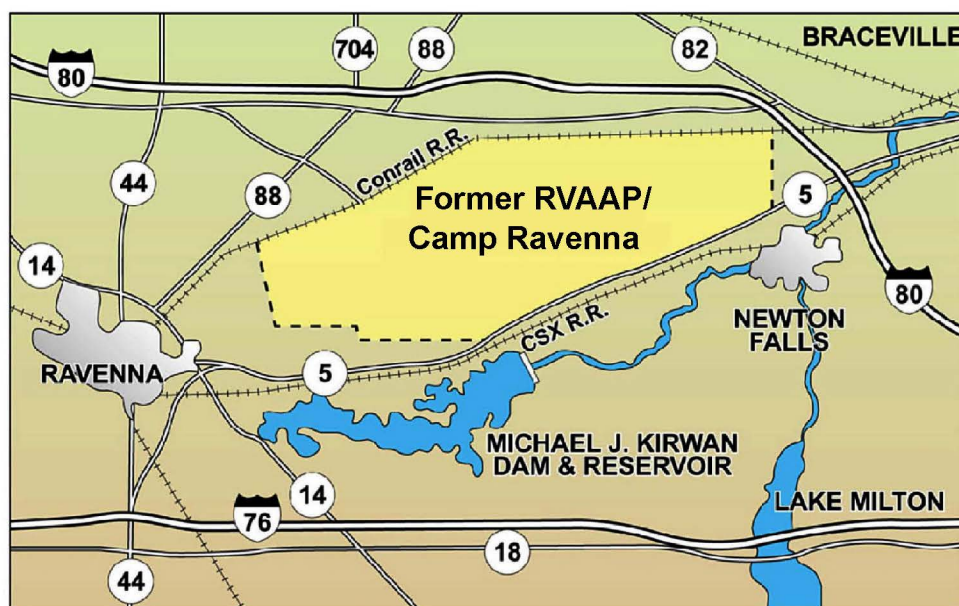
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FIGURES

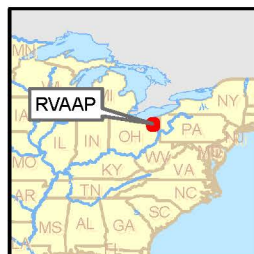
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H:\MAMMS\Ravenna\GIS Documents\Project Maps\MAMMRP\IRIS\IRIS WW4 001 Fig1 1 SiteLoc r1.mxd Analyst: gwt Date: 9/18/2014 1:28:21 PM



0 3 6 Miles

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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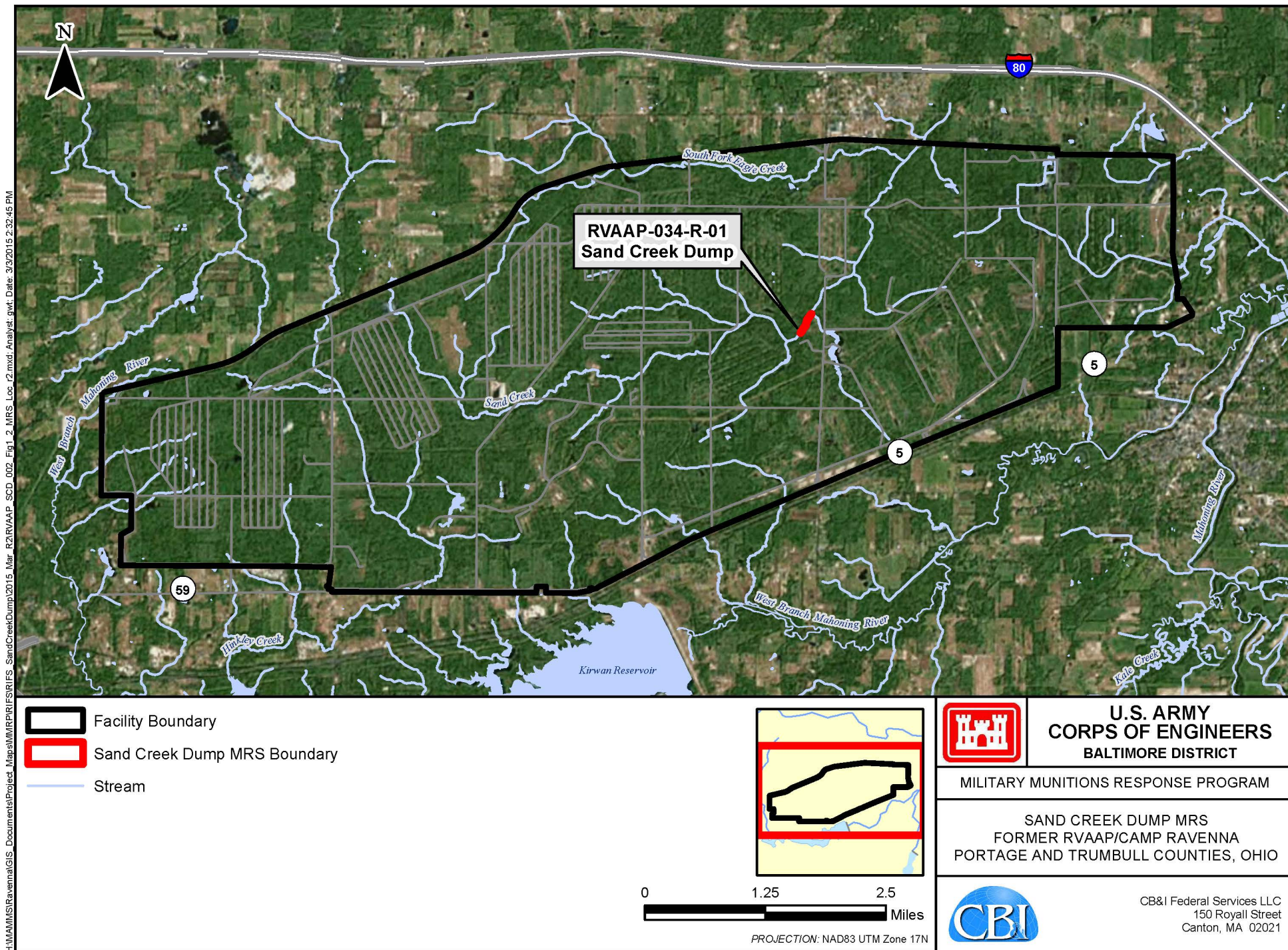
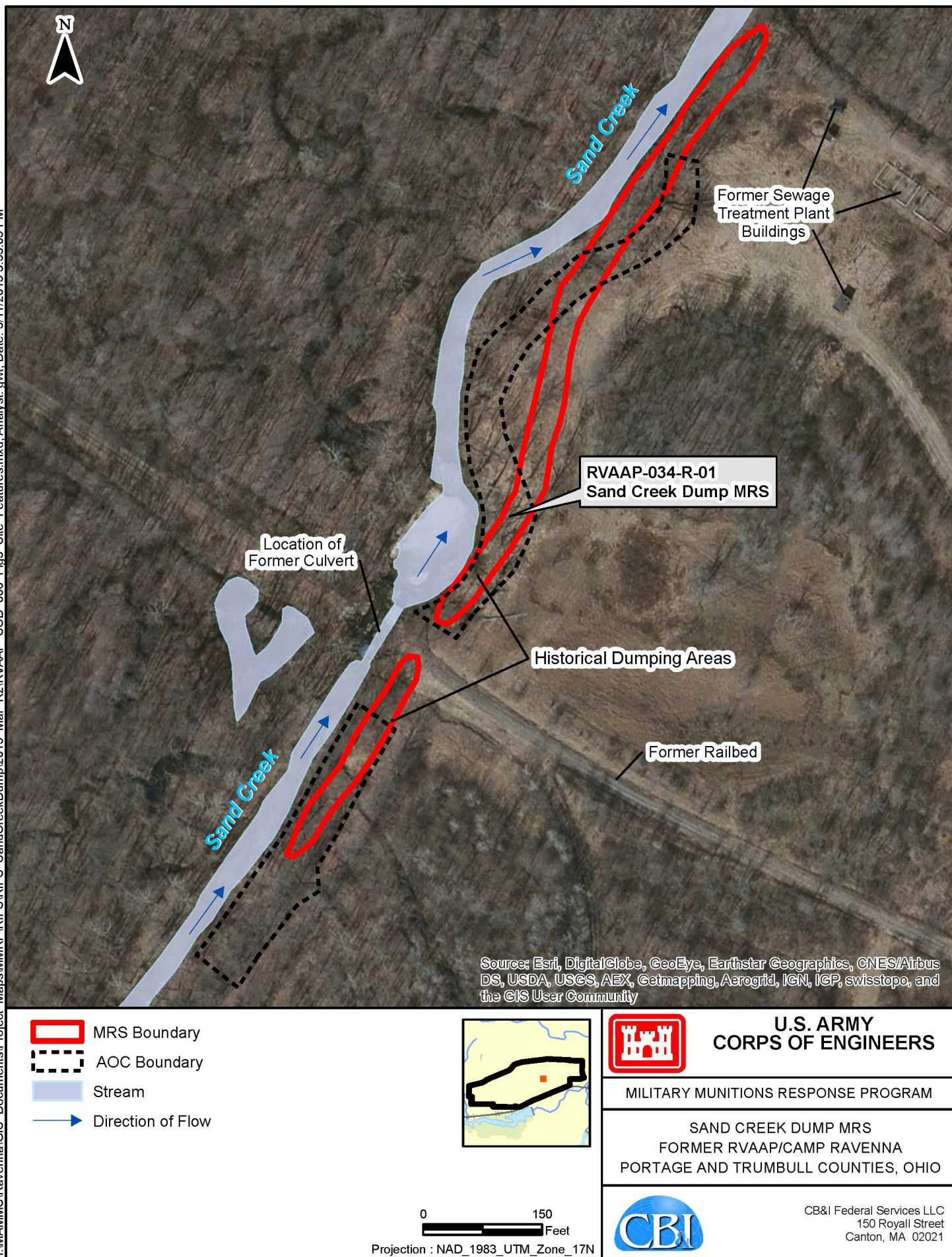


FIGURE 2 MRS LOCATION MAP

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COMMENT RESPONSE TABLE

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