APPENDIX K

Ohio EPA Comments and Responses

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Ohio Environmental Protection Agency

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

March 6, 2017

Re: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Project records
Remedial Response
Portage County
267000859030

Mr. Mark Leeper
Acting Chief
Army Nation Guard Directorate
ARNGD-ILE Clean Up
111 South George Mason
Arlington, VA 22203

Subject: Comments on the November 22, 2016 Draft Feasibility Study Addendum for Soil, Sediment, and Surface Water at Load Lines 1, 2, 3, 4 and 12" for the Former Ravenna Army Ammunition Plant (RVAAP)"

Dear Mr. Leeper:

The Ohio Environmental Protection Agency (Ohio EPA) received the draft feasibility study addendum for soil, sediment, and surface water at Load Lines 1, 2, 3, 4, and 12. Each of these Load Line areas of concern (AOCs) has undergone several investigations and remedial action decisions to characterize the nature and extent of contamination, as well as evaluate human and ecological health risks. Previous remediation activities focused only on the National Guard Trainee receptor. Additional evaluation of data gaps for the unrestricted land use and the sampling conducted were used to develop the draft feasibility study.

The Final Technical Memorandum: Land Uses and Revised Risk Assessment Process for the RVAAP Installation Restoration Program, or Technical Memorandum, states if an AOC fails to meet the unrestricted land use, then a Feasibility Study (FS) will be completed to evaluate cleanup options for all three land uses noted in the Technical Memorandum. Below are our comments on this Draft FS.

General Comments

Comment 1). The decision to identify Chemicals of Concern (COCs) for remediation in some samples was based on co-located ISM data. However, in some instances the co-located Incremental Sample Method (ISM) data was not collected from the same depth interval as the initial sample; the co-located ISM sample was collected from a depth interval of 0-0.5 feet bgs while the initial sample was collected from a depth interval is 0-1 feet bgs.

It is not clear if the co-located ISM data is representative of the initial data since the co-located sample does not bound the data to the lower depth:

- LL1, Building CB-4A, lead in discrete samples LL1-160, (454 mg/kg) LL1-161 (411 mg/kg), LL1-356 (636 mg/kg) and LL1-162 (1,430 mg/kg)
- LL1, Building CB-4, lead in discrete sample LL1-005 lead (1,110 mg/kg)
- LL1, lead in Isolated Discrete Sample LL1-252 (1,140 mg/kg)
- LL2, Building DA-6, TNT in discrete sample LL2-082 for TNT (1,100 mg/kg)
- LL2, Building DB-4A, TNT in ISM LL2ss-288M (66.6 mg/kg)

Action Item: Explanation is needed of how the co-located ISM sample exposure point concentration (EPC) is representative of the potential exposure, or the COCs in these areas should be identified for remediation for the appropriate land use(s).

Comment 2). Appendix H, Section H.2.2.2, Page 15, Lines 19-21
The report states samples collected in the off-AOC Channel were not included in the FS Addendum evaluation, due to their location and potential to be impacted by other AOCs.

Action Item: Identify the report(s)/AOC(s) that will include an evaluation of the off-AOC Channel, and provide an explanation as to why these AOCs are not considered to have impacted the off-AOC channel.

Comment 3). Appendix H, Section H.2.6.1, Page 18 Line 42 to Page 19 Line 7
Ranges of arsenic detections in a Vosnakis and Perry (2009) study and other studies are used in the report as arsenic background values. If property-specific and off-property background investigations are not available, peer-reviewed reports are another source for background data provided the investigation was conducted on soil that is representative of the soil type at the property and the investigations were conducted within the state of Ohio.

Action Item: Explain why the Ravenna background value for arsenic is not representative for the areas from which LL1-1987 and CB22-01 were collected and demonstrate the areas have a matching soil type to one evaluated in the study, and provide the background value in the study that corresponds to the soil type.

Comment 4). Proposal to use Ex Situ Thermal Treatment. The recommended alternative noted in Section 9.2 is Alternative 3: Commercial/Industrial Land Use – Ex Situ Thermal Treatment of Soil and Administrative LUCs. It is not clear in the FS if ex situ thermal treatment is effective for all the COCs that require remediation. Sampling of the treated soils will be necessary to ensure adequate reductions have been achieved to allow placement back in the AOCs or if other treatment or disposal is necessary.

Action Item: Summarize the evaluation and remediation of environmental media that are proposed to be treated with ex situ thermal treatment, what volume of material is treatable with ex situ thermal treatment, what volume of material may require other remedial actions, and what that other remedial action(s) may be.

Load Line 1 Human Health Risk Assessment (Appendix H)

Comment 5). Section H.2.8, Page 33, Building CB-4
The information (data and depth) for ISM sample LL1ss-520M needs to be included in the report since the sample is being used to explain why discrete sample LL1-005 is not recommended for remediation for lead (1,110 mg/kg at 0-1 feet bgs).

Action Item: Update section H.2.8, tables H.2-8 and H.2-9, and figure H.2-1 with the data from ISM sample LL1ss-520M.

Comment 6). Section H.2.8, Page 39, Building CB-3 and Vicinity
Concentrations of lead in discrete samples LL1-386 and LL1-387 in exceedance of the unrestricted RGO were not recommended for remediation, because data from a nearby ISM sample (LL1ss-506) met the unrestricted Remediation Goal Option (RGO). ISM sample LL1ss-506 does not encompass the exceedances and thus represents a different decision unit. Remedial decisions should be made on a decision unit by decision unit basis; therefore, co-located ISM samples collected within a matching depth interval rather than adjacent ISM samples need to be used to determine the remediation status of a discrete sample. The report also uses the rational that although the lead detection in LL1-410 (510 mg/kg) exceeds the RGO, "given the area will not likely be used for [children's] play, lead is not recommended for remediation at this location. The feasibility study needs to evaluate the remedial options for all exposure scenarios, including unrestricted, so that an informed decision can be made when choosing the remedial alternative.

Action Item: Revise text and tables (H.2-8) to state discrete samples LL1-386, LL1-387 and LL1-410 are recommended for remediation for lead.

Comment 7). Section H.2.8, Pages 40-41, Isolated Discrete Soil Locations.
Detections of antimony (1,180 mg/kg) and lead (1,210 mg/kg) in sample LL1-049 exceed both unrestricted and commercial/industrial RGOs in what the report calls a potential hot spot. While the area is recommended for remediation for unrestricted land use because of the magnitude of the exceedances (31 mg/kg and 400 mg/kg), the area is not recommended for remediation for commercial/industrial because of the lower magnitude of exceedances (470 mg/kg and 800 mg/kg) for commercial/industrial. This is not appropriate rationale for not remediating for commercial/industrial land use; the detections are still noticeably above the commercial/industrial RGOs.

Action Item: Revise text and table H.2-9 to state sample LL1-049 is recommended for remediation for antimony and lead.

Load Line 2 Human Health Risk Assessment (Appendix H)

Comment 8). Section H.3-8, Page 89-90, Building DB-4
The concentration of benzo(a)pyrene (3.8 mg/kg) in ISM sample LL2ss-407 exceeds the commercial/industrial RGO (2.9 mg/kg), but no explanation is provided as to why the location is given an NFA designation in Table H.3-9.

Action Item: Provide rationale for designating LL2ss-407 as NFA for commercial/industrial land use when the commercial/industrial RGO is exceeded.

Comment 9). Section H.3-8, Page 91, Building DB-4A
The concentration of PCB-1260 (2.8 mg/kg) in discrete sample LL2-146 exceeds the residential RGO (2.4 mg/kg). This location is not recommended for remediation because data from a nearby ISM sample (LL2ss-286M) meets residential RGOs. The nearby ISM sample (LL2ss-286M) did not encompass the area from which the discrete sample was collected. Remedial decisions should be made on a decision unit by decision unit basis; therefore, co-located ISM samples collected within a matching depth interval rather than adjacent ISM samples need to be used to determine the remediation status of a discrete sample.

Action Item: It appears from Figure H.3-5 that ISM sample LL2ss-417 may be co-located with discrete LL2-146; evaluate whether a demonstration can be made using the data from LL2ss-417.

Comment 10). Section H.3-8, Page 93, Building DB-13
The concentration of lead (1,530 mg/kg) at 1-3 feet bgs in discrete sample LL2-100 exceeds the residential soil RGO (400 mg/kg). While the lead detection (15.2 mg/kg) in co-located ISM sample LL2ss-300 met residential RGOs, the ISM was collected from a depth of 0-1 feet bgs, which is not representative of the 1-3 feet soil interval. Sample LL2-100 (1-3 feet bgs) must be considered for remediation for unrestricted and commercial/industrial land use.

Action Item: Revise text and tables (H.3-8 and H.3-9) to state sample LL2-100 (1-3 feet) is recommended for remediation for lead.

Load Line 3 Human Health Risk Assessment (Appendix H)

Comment 11). Section H.4-8, Page 151, Building EB-10
The concentration of PCB-1254 (20 mg/kg) at discrete sample LL3-092 exceeds the unrestricted (1.2 mg/kg) and commercial/industrial (9.7 mg/kg) RGOs. The location was not recommended for remediation based on data from adjacent ISM samples LL3ss-266M and LL3ss-267M. Remedial decisions should be made on a decision unit by decision unit basis; therefore, co-located ISM samples collected within a matching depth interval rather than adjacent ISM samples need to be used to determine the remediation

status of a discrete sample. While LL3-092 is included in an area being remediated for PAHs (LL3sb-414M), the use of this rationale will affect decisions in the composition of future FSs and remedial technology options.

Action Item: Revise text and tables (H.4-8 and H.4-9) to state sample LL3-092 is recommended for remediation for PCB-1254.

Comment 12). Section H.4.8, Page 157, Building EA-4A
The information (data and depth) for ISM sample LL3ss-358 needs to be included in the report since the sample is being used to explain why discrete sample LL3-117 is not recommended for remediation for lead, RDX, dieldrin, and PCB-1254 (Figure H.4-5 and Tables H.4-8 and H.4-9).

Action Item: Update section H.4.8, tables H.4-8 and H.4-9, and figures H.4-5 and H.4-6 with the data from ISM sample LL3ss-358.

Comment 13). Section H.4.8, Page 159, Building EA-6A
Soil in the former building EA-6A footprint was excavated to a depth of 4 feet bgs to address 2,4,6-TNT contamination, to meet Military Training Land Use. It is unclear if confirmation sampling took place at 4 feet. A confirmation ISM sample (LL3ss-261M) was collected at a depth of 5.3-6.3 feet, but no samples are recorded as being sampled from 4-5.3 feet bgs. Thus, it is unclear whether RGOs are being met in the 4-5.3 foot depth interval. While it is likely the excavation actually went to 5.3 feet deep, the report states 4 feet. Clarification is needed.

Action Item: Clarify whether the soil depth interval of 4-5.3 feet at the excavation site co-located with ISM sample LL3ss-261M meets RGOs.

Comment 14). Section H.4.8, Page 160, Isolated Discrete Samples
The text states TNT is recommended for remediation for unrestricted and commercial/industrial land use at discrete sample LL3-056 (500 mg/kg; 1-3 feet bgs). However, table H.4-9 lists the conclusion for LL3-056 as NFA for the commercial/industrial land use. Revision to table H.4-9 is needed.

Action Item: Revise table H.4-9 to state "remediate" for LL3-056 (1-3 feet) to match the text in section H.4.8, Page 160, Lines 17-18.

Ecological Risk Assessment (Appendix I)

Comment 15). Load Line 1, Outlet Channel A, Table I-8
Load Line 1: The evaluation provided explaining why lead detections in Outlet Channel A wet sediment are not recommended for remediation would benefit by including a discussion on and comparison to the MacDonald probable effect concentration (PEC) MacDonald, et al., revised 2000. While the sediment screening hierarchy in Ohio EPA

DERR Ecological Risk Assessment Guidance Document lists the threshold effect concentration (TEC), the PEC can be utilized as well.

Action Item: Add a discussion on the lead PEC to the qualitative assessment of lead at Channel A in Table I-8 and the text of the ecological risk assessment for Load Line 1.

If you have questions or need clarification regarding the comments, please feel free to contact me at (330) 963-1201 or e-mail at susan.netzly-watkins@epa.ohio.gov.

Sincerely,

Sue Netzly-Watkins
Site Coordinator
Division of Environmental Response and Revitalization

SN-W/nvr

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April 7, 2017

Ohio Environmental Protection Agency
DERR-NEDO
Attn: Ms. Sue Netzly-Watkins, Project Manager
2110 East Aurora Road
Twinsburg, OH 44087-1924

Subject: Responses to Comments on the Draft Feasibility Study Addendum for Soil, Sediment, and Surface Water at Load Lines 1, 2, 3, 4, and 12 for the Former Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Portage/Trumbull Counties (Work Activity No. 267-000859-030)

Dear Ms. Netzly-Watkins:

The Army received your additional comments (dated March 6, 2017) on the *Draft Feasibility Study Addendum for Soil, Sediment, and Surface Water at Load Lines 1, 2, 3, 4, and 12*. The attached includes responses to those comments. Should further discussion be required to achieve resolution, the Army would appreciate scheduling a teleconference at your earliest convenience.

Please contact the undersigned at (703) 607-7955 or Mark.S.Leeper.civ@mail.mil if there are issues or concerns with this request.

Sincerely,

Mark Leeper
RVAAP Restoration Program Manager
Army National Guard Directorate

cc: Rod Beals, Ohio EPA, NEDO-DERR
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Responses to Ohio EPA Comments (dated March 6, 2017)
Draft Feasibility Study
for Load Lines 1, 2, 3, 4 and 12
Former Ravenna Army Ammunition Plant (RVAAP), November 22, 2016
(Work Activity No. 267000859030)

General Comments

Comment 1). The decision to identify Chemicals of Concern (COCs) for remediation in some samples was based on co-located ISM data. However, in some instances the co-located Incremental Sample Method (ISM) data was not collected from the same depth interval as the initial sample; the co-located ISM sample was collected from a depth interval of 0-0.5 feet bgs while the initial sample was collected from a depth interval is 0- 1 feet bgs.

It is not clear if the co-located ISM data is representative of the initial data since the co-located sample does not bound the data to the lower depth:

- LL1, Building CB-4A, lead in discrete samples LL1-160, (454 mg/kg) LL1-161 (411 mg/kg), LL1-356 (636 mg/kg) and LL1-162 (1,430 mg/kg)
- LL1, Building CB-4, lead in discrete sample LL1-005 lead (1,110 mg/kg) LL1, lead in Isolated Discrete Sample LL1-252 (1,140 mg/kg)
- LL2, Building DA-6, TNT in discrete sample LL2-082 for TNT (1,100 mg/kg)
- LL2, Building DB-4A, TNT in ISM LL2ss-288M (66.6 mg/kg)

Action Item: Explanation is needed of how the co-located ISM sample exposure point concentration (EPC) is representative of the potential exposure, or the COCs in these areas should be identified for remediation for the appropriate land use(s).

Response*: Note – Where both discrete and ISM data are available, results from ISM samples are generally more representative of potential exposure (i.e., they better represent the concentration within an exposure unit). Individual discrete sample points are not generally representative of an exposure unit and are generally not treated as a separate decision unit but are evaluated in the context of delineating the nature and extent of contamination and potential exposure. For example, a ¼-acre exposure unit that includes LL1ss-162 would also include discrete samples LL1-013, LL1-161, LL1-350, and LL1-353 as well as ISM samples LL1ss-619 and LL1ss-523M. A single discrete sample may be used in cases where no other appropriate representative data are available for a potential decision unit.*

Where contamination is believed to be from a surface source (e.g., building washout), ISM samples collected from 0-0.5 ft bgs were considered representative of surface soil.

Revisions to the text in Sections H.2.8 and H.3.8 for each of the sample locations noted in the comment are provided below. Where remedial recommendations change, corresponding changes also will be made to the appropriate summary tables.

LL1, Building CB-4A, Lead in Discrete Samples LL1-160 (454 mg/kg), LL1-161 (411

mg/kg), LL1-356 (636 mg/kg), and LL1-162 (1,430 mg/kg)

Response: Sample locations LL1-160, LL1-161, and LL1-162 are recommended for remediation of TNT contamination for unrestricted (residential) land use in the Draft FS Addendum. Lead will be added as a COC for remediation and confirmation sampling will include evaluation of lead in this area. Sample location LL1-356 is not recommended for remediation because it is not included in the remedial area for TNT and the ISM data do not support remediation for lead as described in the revised text below. Text in Section H.2.8 will be revised for CB-4A on page 39 as:

- **Lead** was identified as a COC for Unrestricted (Residential) Land Use at four discrete surface soil locations sampled in 2000 on the northern portion (LL1-160, LL1-161, and LL1-162) and the southwestern corner (LL1-356) of Building CB-4A. Detected concentrations exceed the Resident Receptor (Adult and Child) RGO of 400 mg/kg and the Industrial Receptor RGO of 800 mg/kg (at LL1-162 only). Lead was detected at much lower concentrations, below the RGOs, in two ~~the co-located (LL1ss-619) and adjacent (LL1ss-523M)~~ ISM samples collected from this area in 2009: LL1ss-619 collected from 0-0.5 ft bgs (48.7 mg/kg) and LL1ss-523M collected from 0-1 ft bgs (19.7 mg/kg). The location of discrete sample LL1-160 is within the area covered by these ISM samples. The locations of discrete samples LL1-161 and LL1-162 are within the area of LL1ss-619 and the location of discrete sample LL1-356 is within the area of ISM sample LL1ss-523M. While ISM sample LL1ss-619 was collected from 0-0.5 ft bgs and discrete samples LL1-161 and LL1-162 were collected from 0-1 ft bgs, no subsurface source of contamination is present in this area and no elevated levels of lead (above RGOs) have been identified in the subsurface (> 1 ft bgs); therefore, LL1ss-619 is considered to be representative of lead concentrations in surface soil in this area along with LL1-523M. In addition to these more recent ISM samples, detected concentrations of lead in other discrete samples collected in 2000 in close proximity (i.e., within 10-15 ft) of the most elevated concentration of lead (at LL1-162) were below the Resident Receptor (Adult and Child) RGO. Based on the results of more recent ISM samples and the limited extent of lead in the older discrete samples, lead is not recommended as a COC for remediation. However, sample locations LL1-160, LL1-161, and LL1-162 are recommended for remediation of TNT contamination for unrestricted (residential) land use and confirmation sampling will include evaluation of lead in this area.

LL1, Building CB-4, Lead in Discrete Sample LL1-005 (1,110 mg/kg)

Response: Sample location LL1-005 is not recommended for remediation because remediation is not supported by the lead results in co-located ISM samples that better represent the exposure unit. Text in Section H.2-8 will be revised for CB-4 on page 37 as:

- **Lead** was identified as a COC for Unrestricted (Residential) and Commercial/Industrial Land Uses in surface soil at LL1-005. Although the detected concentration of lead in this discrete surface soil sample collected in 2000 on the southwestern edge of Building CB-4 exceeded the RGO for the Resident Receptor (Adult and Child) and Industrial Receptors, lead was well below the RGOs in the co-located ISM sample collected in 2009 from the footprint of former Building

CB-4 (21.9 mg/kg in LL1ss-520M collected from 0-1 ft bgs) and in the adjacent ISM sample around the perimeter of Building CB-4 (51.7 mg/kg in LL1ss-609M collected from 0-0.5 ft bgs). Lead was not detected in any other discrete or ISM surface soil or subsurface soil samples associated with Building CB-4 (including LL1SB-632M collected from 1-3, 3-5, and 5-7 ft bgs and which includes the location of LL1-005) above the Resident Receptor (Adult and Child) RGO of 400 mg/kg. Concentrations of lead in nearby discrete soil samples (LL1-342, LL1-153, and LL1-345) were also well below RGOs. As the co-located ISM concentration and surrounding samples were below the Resident Receptor (Adult and Child) RGOs, lead is not recommended for remediation at this location.

LL1, Lead in Isolated Discrete Sample LL1-252 (1,140 mg/kg)

Response: Sample location LL1-252 is recommended for remediation for Unrestricted (Residential) and Industrial land use to address the potential data gap for lead. Sample location LL1-252 is co-located with ISM LL1ss-009-cs (located outside the building footprint), not ISM LL1ss-538M (located within the building footprint), as previously stated in the text. LL1ss-009-cs was not analyzed for lead; therefore, the text in Section H.2.8 on page 44 will be revised as follows:

- The detected concentration of lead in LL1-252 (1,140 mg/kg) was above both the Resident Receptor (Adult and Child) and Industrial Receptor RGOs for lead. LL1-252 is a discrete sample collected in 2000 east of Building CB-13B. Building CB-13B was a non-production building used as the shipping warehouse annex. No other lead data are available at this location; therefore, ~~The detected concentration of lead in the co-located 0.75-acre ISM sample (12.4 mg/kg in LL1ss-538M) collected in 2009 is much lower, thus~~ lead is ~~not~~ recommended for remediation for Unrestricted (Residential) Land Use ~~or~~and Industrial Land Use at this location.

LL2, Building DA-6, TNT in Discrete Sample LL2-082 (1,100 mg/kg)

Response: Sample location LL2-082 will be included in remediation of underlying soil for Unrestricted (Residential) land use. Sample location LL2-082 is not recommended for remediation for Industrial land use because the ISM data do not support remediation as described in the revised text below. Text in Section H.3.8 on page 90 will be revised as:

"The reported concentration of TNT (1,100 mg/kg) exceeded the Resident Receptor (Adult and Child) (36 mg/kg) and Industrial Receptor (510 mg/kg) RGOs in discrete sample LL2-082 collected in 2001. The entire sampled area at Building DA-6 is approximately 0.15 acres. Two surface soil ISM samples cover this area: LL2ss-291M collected from 0-1 ft bgs within the footprint of Building DA-6 in 2008 and LL2ss-405 collected from 0-0.5 ft bgs from around the footprint of Building DA-6 in 2009. The reported TNT concentration in LL2ss-405 is 4.2 mg/kg, TNT was not detected in LL2ss-291M. LL2-082 is located on the south side of the former building within the area covered by LL2ss-405. The combined results of the ISM and discrete data indicate that surface soil in this 0.15-acre area does not require remediation for unrestricted

(residential) or industrial land use; however, because the subsurface soil in this area is recommended for remediation for unrestricted (residential) land use, surface soil containing TNT will also be removed under this scenario. ~~Because the TNT concentration in co-located ISM sample LL2ss-405 (4.2 mg/kg) collected in 2009 is less than the RGO, TNT is not recommended for remediation in this area.~~ The reported concentrations of TNT (77.6 and 230 mg/kg) exceeded the Resident Receptor (Adult and Child) RGO in subsurface ISM samples LL2-050-cs (2-3 ft bgs) collected in 2007 and LL2SB-508M (1-3 ft bgs) collected in 2010. These areas are recommended for remediation of TNT for Unrestricted (Residential) Land Use."

LL2, Building DB-4A, TNT in ISM LL2ss-288M (66.6 mg/kg)

Response: Sample location LL2ww-288M is not recommended for remediation because adequate ISM data are available to characterize the exposure unit and the ISM data do not support remediation as described in the revised text below. Text in Section H.3.8 on page 91 will be revised as:

"The reported concentration of TNT (66.6 mg/kg) exceeded the Resident Receptor (Adult and Child) RGO (36 mg/kg) in ISM sample LL2ss-288M (0-1 ft bgs) collected in 2008. Although ISM LL2ss-288M, collected in 2008 over the north washout annex, indicates a residential RGO exceedance for TNT, the concentration (32 mg/kg) in an overlapping ISM (LL2ss-417, 0-0.5 ft bgs) collected in 2009 is below the residential RGO across a larger exposure area that encompassed both the north washout annex and northern half of the building perimeter. The 2009 sample is more representative of exposure in this area. Note, Figure H.3-5 was developed using GPS coordinates and polygon shapes that do not always line up. Due to liberties required to manipulate sample polygons, occasionally figures have spaces between samples that that lie immediately adjacent to each other. According to the description of ISM LL2ss-417 in *Final Sampling Report of Surface and Subsurface Incremental Sampling Methodology at Load Lines 1, 2, 3, and 4 (RVAAP-08, 09, 10, and* 11 (*Prudent 2011)*, sample LL2ss-417 was collected over DB-4A/DB-4AWN (inclusive of both the washout and perimeter and overlapping sample LL2ss-288M). While sample LL2-288M was collect from 0-1 ft bgs and sample LL2ss-417 was collected only to 0.5 ft bgs, the low TNT concentration (1.8 mg/kg) in a deeper ISM sample (LL2SB-509M) collected from 1-3 feet bgs indicates that the TNT contamination is limited to the surface and this difference in depth does not impact the conclusion. Because the TNT concentration in the more recent co-located ISM sample LL2ss-417 (32 mg/kg) collected in 2009 is less than the RGO, TNT is not recommended for remediation in this area."

Comment 2). Appendix H, Section H.2.2.2, Page 15, Lines 19-21

The report states samples collected in the off-AOC Channel were not included in the FS Addendum evaluation, due to their location and potential to be impacted by other AOCs.

Action Item: Identify the report(s)/AOC(s) that will include an evaluation of the off-AOC Channel, and provide an explanation as to why these AOCs are not considered to have impacted the off-AOC channel.

***Response**: Ohio EPA and USACE investigated several streams and ponds at Camp Ravenna in the Facility-wide Biological and Water Quality Study (FWBWQS) using a network of biological/water quality sampling stations (USACE 2005). The purpose of the investigation was to document ecological effects of contamination at AOCs on stream or pond biota and conditions. The FWBWQS included an evaluation of the off-AOC Channel. The FWBWQS renamed the off-AOC Channel as the Tributary to West Branch Mahoning River (@RM 0.01).*

Overall for RVAAP, the FWBWQS concluded that "The facility-wide surface water sampling and assessment effort revealed that in general, surface water quality in the streams was good to excellent with few exceedances of Ohio Water Quality Standards criteria. The streams in RVAAP are mostly undisturbed and are a good quality resource for aquatic biota…..Monitoring of stream biology did not indicate impaired conditions associated with chemical contaminants." Specifically for the off-AOC Channel, the FWBWQS concluded that while there was some biological impairment, it was attributed to habitat limitations such as lack of riffles or shallow pool depths rather than chemical contamination. Based on the results of the FWBWQS, any AOCs draining into the off-AOC Channel are not considered to have impacted the off-AOC-Channel, however, the tributaries upstream of the FWBWQS sample stations where impacts from Load Line 1 process operations would be expected (Outlet A and B Channels, Outlet C Channel and Charlie's Pond, and Outlets D, E, F Channels and Criggy's Pond) are evaluated further in the FS Addendum.

Edits have been made throughout the FS including Figure 2-1 and text in Section 2.1.3 to provide clarification that the off-AOC Channel aggregate is addressed in the FWBWQS. In addition, the following new section has been added to Appendix A, page 3 line 28 to provide an overview of the FWBWQS results for the off-AOC Channel:

"A.1.7 Facility-Wide Biological and Water Quality Study

In 2003 USACE collected surface water and ISM sediment samples from four locations in the Off-AOC Channel for the Facility-Wide Biological and Water Quality Study (USACE 2005a), evaluated as the Tributary to West Branch Mahoning River (@RM 0.01). Sampling locations were identified as NN#3-1 through NN#3-4 and flow direction is from NN3#-1 located downstream of the Erie Burning Ground Pond through NN3#-4 located at State Route 534. As noted in the FWBWQS, besides the Erie Burning Grounds and Load Line #1, there are no other AOCs from the main production at Ravenna Army Ammunition Plant that could affect the Tributary to West Branch Mahoning River off-AOC Channel aggregate). The Off-AOC channel is downstream to many of the channels draining Load Line 1 which are evaluated in this FS (including Outlet A and B Channels, Outlet C Channel and Charlie's Pond, and Outlets D, E, F Channels and Criggy's Pond), where impacts from Load Line 1 process operations would be expected. In addition to chemical data, the FWBWQS sampling also included the collection of biological (i.e., fish and macroinvertebrates) and habitat quality data.

Surface water and sediment quality were both rated "good" at all four locations in the off-

AOC Channel. In surface water, only pH exceeded Ohio criteria. Only two organics were detected and metals were at low levels. In sediment, the furthest upstream location contained slightly elevated levels of PAHs, while the three downstream locations had no detections of organic compounds, reflecting a lack of contamination. Metals were below Ohio sediment reference values.

For all four locations in the off-AOC Channel, the fish community was rated "poor" or fair," the benthic community was rated "fair" or "good," and the habitat was rated "very poor," "fair" or "good." Thus, the study found some biological impairment, but attributed it to habitat limitations such as lack of riffles or shallow pool depths, ephemeral nature of stream segment, and soft bottom substrates rather than chemical contamination (as surface water and sediment quality were both rated "good"). This suggests that chemical contamination from the Erie Burning Ground and Load Line 1 is not a concern in the off-AOC Channel. Based on these results, chemical data from the off-AOC channel were not evaluated further in this FS."

Comment 3). Appendix H, Section H.2.6.1, Page 18 Line 42 to Page 19 Line 7

Ranges of arsenic detections in a Vosnakis and Perry (2009) study and other studies are used in the report as arsenic background values. If property-specific and off-property background investigations are not available, peer-reviewed reports are another source for background data provided the investigation was conducted on soil that is representative of the soil type at the property and the investigations were conducted within the state of Ohio.

Action Item: Explain why the Ravenna background value for arsenic is not representative for the areas from which LL1-1987 and CB22-01 were collected and demonstrate the areas have a matching soil type to one evaluated in the study, and provide the background value in the study that corresponds to the soil type.

***Response**: Clarification. Natural arsenic concentrations in Ohio soils are known to be elevated compared to risk-based screening levels. In addition to natural sources, agricultural use prior to 1940 may have contributed arsenic to RVAAP soils. The range of Ohio background values are provided as part of a weight of evidence that concludes the arsenic detected at Load Line 1 is not site-related. The Ohio values are not used as stand-alone screening values. Adequate data are not available in these studies to identify specific arsenic concentrations by soil type. Extensive soil movement and use of fill at RVAAP from a variety of approved locations over the years would preclude such a comparison even if the background studies included adequate information.*

No site-related source of arsenic can be identified for the locations of the two discrete samples in question. LL1-189 is located outside the AOC boundary west of the former production area. The nearest building is a change house (CB-12 more than 300 ft to the east). CB22-01 is located near former change house CB-22 in an area used to store clean hard fill. Samples collected within the production areas of Load Line 1 had lower arsenic concentrations.

Based on this weight of evidence, the concentrations of arsenic at LL1-189 and CB22-01 are

likely naturally occurring, and arsenic is not identified as a COC at these isolated locations. Referenced text will be revised in Section H.2.6.1 on pages 18 and19, as noted below.

> **"LL1-189 and CB22-01.** LL1-189 is a discrete surface soil sample collected some distance west of the former production area of Load Line 1 and west of Building CB-12 (a former change house). CB22-01 is a discrete surface soil sample collected from a former change house building and from an area used to store clean hard fill from RVAAP building demolition and removal in the southwestern portion of the former production area of Load Line 1. The concentrations of arsenic (24.6 and 27.8 mg/kg) exceeded the RGO (6.8 mg/kg) and the facility-wide surface soil background concentration (15.4 mg/kg) and subsurface soil background concentration (19.8 mg/kg). Other studies indicate arsenic may be naturally occurring in northeastern Ohio soils at greater than 20 mg/kg (e.g., Vosnakis and Perry 2009, Ohio EPA 1996, USGS 2004). Uncertainty associated with screening against a single background value results from statistical limitations and natural variation in background concentrations. Because of this variation, inorganic chemical concentrations below the RVAAP-specific background screening level are likely representative of background conditions while concentrations slightly above this value may be above background concentrations or may reflect natural variation. ~~Vosnakis and Perry (2009) recently published the results of arsenic background studies that included 313 samples of Ohio soil. Naturally occurring arsenic in these samples ranged from 1.6 to 71.3 mg/kg, with 95th percentiles of 21.7 mg/kg in surface soil, 25.5 mg/kg in subsurface soil, and UTLs of 22.8 mg/kg and 29.6 mg/kg for surface and subsurface soil, respectively. In other studies, native soil concentrations of arsenic in Ohio have been reported as ranging from 0.5–56 mg/kg (Ohio EPA 1996), and the U.S. Geological Survey's(USGS's) Certificate of Analysis of the Devonian Ohio Shale estimates arsenic concentrations of 68.5 mg/kg are naturally present in bedrock shales (USGS 2004).~~ There is no site-related source of arsenic at these sample locations, and the concentration of arsenic reported at the production areas of Load Line 1 are below the RVAAP background screening values. Thus, the concentrations of arsenic at LL1-189 and CB22-01 are likely naturally occurring, and arsenic is not identified as a COC at these isolated locations."

Comment 4). Proposal to use Ex Situ Thermal Treatment.

The recommended alternative noted in Section 9.2 is Alternative 3: Commercial/Industrial Land Use – Ex Situ Thermal Treatment of Soil and Administrative LUCs. It is not clear in the FS if ex situ thermal treatment is effective for all the COCs that require remediation. Sampling of the treated soils will be necessary to ensure adequate reductions have been achieved to allow placement back in the AOCs or if other treatment or disposal is necessary.

Action Item: Summarize the evaluation and remediation of environmental media that are proposed to be treated with ex situ thermal treatment, what volume of material is treatable with ex situ thermal treatment, what volume of material may require other remedial actions, and what that other remedial action(s) may be.

***Response**: The COCs requiring remediation in soil at Load Lines 1 through 4 and 12 include PAHs, explosives, PCBs, and metals. Although suitable for PAHs, explosives, and PCBs, thermal treatment is not considered a viable remedy to treat inorganics (metals). Section 6.3 (Alternative 3) and Section 6.5 (Alternative 5) detail the thermal treatment option for PAHs, explosives, and PCBs to be conducted in conjunction with off-site disposal for metals-contaminated soil and provide a specified volume for each element. Section 6.3, page 6-4, lines 11-12 indicate Alternative 3 (the recommended alternative) would result in thermal*

treatment of approximately 5,640 cubic yards of soil and off-site disposal of approximately 90 cubic yards of soil from Load Lines 1 through 4 and 12 to achieve Industrial/Commercial Land Use. Appendix J further presents the volume of soil to be excavated along with the respective COCs upon which the thermal/offsite volumes were determined.

Soil that undergoes thermal treatment is expected to be stockpiled and sampled post treatment to ensure cleanup goals have been met. For additional clarity about the technology effectiveness related to site COCs, the suitability of thermal treatment for the COCs will be cited in the Effectiveness column for Thermal Treatment in the Detailed Screening of Technologies (Section 5, Table 5-2) as follows:

"Effective. PAH concentrations can be reduced to low levels meeting unrestricted use criteria. It is a green and sustainable technology that minimizes secondary waste generation and reduces carbon footprint. Thermal treatment is a demonstrated remedial technology for the treatment of PCBs in soil (USEPA 1993) and effective for soil impacted by explosives (FRTR table). Thermal treatment is not effective for inorganics."

Load Line 1 Human Health Risk Assessment (Appendix H)

Comment 5). Section H.2.8, Page 33, Building CB-4

The information (data and depth) for ISM sample LL1ss-520M needs to be included in the report since the sample is being used to explain why discrete sample LL1-005 is not recommended for remediation for lead (1,110 mg/kg at 0-1 feet bgs).

Action Item: Update section H.2.8, tables H.2-8 and H.2-9, and figure H.2-1with the data from ISM sample LL1ss-520M.

***Response**: Tables H.2-8 and H.2-9 and Figure H.2-1 will not be revised to include the data and depth of ISM sample LL1ss-520M; however, clarifying text will be added. These tables only show sample locations where COCs were identified. Likewise, the figures only show data for sample locations with COIs that exceeded RGOs. Although Tables H.2-8 and H.2-9 and Figure H.2-1 will not be revised, the data and depth for sample location LL1ss-520 is provided in Attachment H.2, Table H.2-2. Sample LL1ss-520M was collected from 0-1 ft bgs. The detected concentration of lead (21.9 mg/kg) does not exceed the RGOs for the Resident Receptor (Adult and Child) or Industrial Receptor. Clarifying text will be added to Section H.2.8 as noted in Response to Comment 1 for LL1, Building CB-4 addressing lead.*

Comment 6). Section H.2.8, Page 39, Building CB-3 and Vicinity

Concentrations of lead in discrete samples LL1-386 and LL1-387 in exceedance of the unrestricted RGO were not recommended for remediation because data from a nearby ISM sample (LL1ss-506) met the unrestricted Remediation Goal Option (RGO). ISM sample LL1ss-506 does not encompass the exceedances and thus represents a different decision unit. Remedial decisions should be made on a decision unit by decision unit basis; therefore, co-located ISM samples collected within a matching depth interval rather than adjacent ISM samples need to be used to determine the remediation status of a discrete sample. The report also uses the rational that although the lead detection in LL1-410 (510 mg/kg) exceeds the RGO, "given the area will not likely be used for [children's] play, lead is not recommended for remediation at this location". The feasibility study needs

to evaluate the remedial options for all exposure scenarios, including unrestricted, so that an informed decision can be made when choosing the remedial alternative.

Action Item: Revise text and tables (H.2-8) to state discrete samples LL1-386, LL1-387 and LL1-410 are recommended for remediation for lead.

***Response**: Additional remediation will be recommended as requested because the co-located ISM sample was not analyzed for lead. Text in Section H.2.8 page 39 will be revised as shown below. Table H.2-8 will also be revised accordingly.*

- **"Lead** was identified as a COC for Unrestricted (Residential) Land Use in surface soil at discrete sample locations LL1-386 and LL1-387 collected in 2000 along the western perimeter of Building CB-3. Detected concentrations of lead (550 and 639 mg/kg) exceeded the Resident Receptor (Adult and Child) RGO of 400 mg/kg. The co-located ISM sample collected at LL1ss-626 in 2009 was not analyzed for lead; however, ISM sample LL1ss-506 also collected in 2009 had a lead concentration of 17 mg/kg, well below the RGO. Therefore, if elevated lead is present, its extent is limited. ~~this area is not recommended for remediation.~~ Lead was also identified as a COC for Unrestricted (Residential) Land Use in surface soil at discrete sample LL1-410 (510 mg/kg) collected in 2000 south of Building CB-3. USEPA's standard for lead in bare soil for areas where children play is 400 mg/kg and an average of 1,200 mg/kg for the rest of the yard (outside of play areas) (USEPA 2001). Despite that, ~~Given~~ the area will not likely be used for play and the relatively low magnitude of exceedances of the 400 mg/kg standard in these ~~a single~~ discrete samples, lead is ~~not~~ recommended for remediation for Unrestricted (Residential) Land Use at this location."

Comment 7). Section H.2.8, Pages 40-41, Isolated Discrete Soil Locations.

Detections of antimony (1,180 mg/kg) and lead (1,210 mg/kg) in sample LL1-049 exceed both unrestricted and commercial/industrial RGOs in what the report calls a potential hot spot. While the area is recommended for remediation for unrestricted land use because of the magnitude of the exceedances (31 mg/kg and 400 mg/kg), the area is not recommended for remediation for commercial/industrial because of the lower magnitude of exceedances (470 mg/kg and 800 mg/kg) for commercial/industrial. This is not appropriate rationale for not remediating for commercial/industrial land use; the detections are still noticeably above the commercial/industrial RGOs.

Action Item: Revise text and table H.2-9 to state sample LL1-049 is recommended for remediation for antimony and lead.

***Response**: Additional remediation will be recommended as requested because the concentrations in this area exceed RGOs. Text in Section H.2.8 page 40-41 will be revised as shown. Table H.2-9 will also be revised accordingly.*

- **"Antimony and lead** were identified as COCs for both Unrestricted (Residential) Land Use and Industrial Land Use in LL1-049. LL1-049 is a discrete surface soil sample collected at the east perimeter of Load Line 1 south of the Outlet D Channel, immediately adjacent to the railroad.

The detected concentrations of antimony (1,180 mg/kg) and lead (1,210 mg/kg) exceeded the Resident Receptor (Adult and Child) (31 and 470 mg/kg) and Industrial Receptor (470 and 800 mg/kg) RGOs. The sample is a considerable distance from former production areas and is not located in a ditch. Given the magnitude of the antimony and lead exceedance, this area is recommended for remediation of a potential hot spot for lead and antimony for Unrestricted (Residential) Land Use~~. Antimony and lead are not recommended for remediation for~~ and Industrial Land Use ~~at this location because the magnitude of exceedance is much lower and it represents a hot spot adjacent to a rail line~~."

Load Line 2 Human Health Risk Assessment (Appendix H)

Comment 8). Section H.3-8, Page 89-90, Building DB-4

The concentration of benzo(a)pyrene (3.8 mg/kg) in ISM sample LL2ss-407 exceeds the commercial/industrial RGO (2.9 mg/kg), but no explanation is provided as to why the location is given an NFA designation in Table H.3-9.

Action Item: Provide rationale for designating LL2ss-407 as NFA for commercial/industrial land use when the commercial/industrial RGO is exceeded.

***Response**: USEPA published new toxicity criteria for benzo(a)pyrene on IRIS on January 19, 2017. While revised RSL tables have not yet been published using these new toxicity criteria, the new criteria have been loaded into the RSL calculator and result in residential and industrial RSLs of 1.2 and 21.1 mg/kg, respectively, at a target risk of 1E-05. USEPA anticipates publishing these revised RSLs this spring. This information will be included in the uncertainty assessment and conclusions, as shown below.*

H.3.7.2 Uncertainty in Use of RGOs

"Sources of uncertainty in the RGOs used to identify COCs include selecting appropriate receptors and exposure parameters, exposure models, and toxicity values used in calculating RGOs, as described in Section H.1.5.2."

"Toxicity values are constantly being evaluated by USEPA as new information becomes available. The HHRA utilized the most up-to-date RSL values available at the time it was prepared. USEPA published new toxicity criteria for benzo(a)pyrene on IRIS on January 19, 2017. While revised RSL tables have not yet been published using these new toxicity criteria, the new criteria have been loaded into the RSL calculator and result in revised residential and industrial RSLs of 1.2 and 21.1 mg/kg, respectively, at a target risk of 1E-05. USEPA anticipates publishing these revised RSLs in the spring of 2017. Because these revised values are approximately an order of magnitude larger than the previous (May 2016) RSLs, this change could have a significant impact on the conclusions of the risk assessment."

H.3.8 Identification of Chemicals of Concern for Potential Remediation

"The reported concentrations of PCB-1254 and the PAHs benzo(a)pyrene, benz(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene exceeded Resident Receptor (Adult and Child) RGOs in ISM sample LL2ss-407 collected around almost the

entire footprint of Building DB-4 in 2009. This area is recommended for remediation of TNT, PCB-1254, and the PAHs for Unrestricted (Residential) Land Use. The concentration of benzo(a)pyrene (3.8 mg/kg) also exceeded the RGO (2.9 mg/kg) for the Industrial receptor. The RGO is the industrial RSL published in May 2016 adjusted for a target risk of 1E-05. As noted previously, USEPA has recently re-evaluated the potential toxicity of benzo(a)pyrene. As a result of this re-evaluation, the RGO is anticipated to increase to 21 mg/kg for the Industrial receptor. Therefore, this location is not recommended for remediation for Industrial Land Use."

Comment 9). Section H.3-8, Page 91, Building DB-4A

The concentration of PCB-1260 (2.8 mg/kg) in discrete sample LL2-146 exceeds the residential RGO (2.4 mg/kg). This location is not recommended for remediation because data from a nearby ISM sample (LL2ss-286M) meets residential RGOs. The nearby ISM sample (LL2ss-286M) did not encompass the area from which the discrete sample was collected. Remedial decisions should be made on a decision unit by decision unit basis; therefore, co-located ISM samples collected within a matching depth interval rather than adjacent ISM samples need to be used to determine the remediation status of a discrete sample.

Action Item: It appears from Figure H.3-5 that ISM sample LL2ss-417 may be co-located with discrete LL2-146; evaluate whether a demonstration can be made using the data from LL2ss-417.

***Response**: Remediation at LL2-146 is not recommended as discrete sample LL2-146 falls within LL2ss-286M. The figure was developed using GPS coordinates and polygon shapes that do not always line up. Due to liberties required to manipulate sample polygons, occasionally figures have spaces between samples that adjoin. ISM LL2ss-286M encompasses the entirety of the Building DB-4A footprint. ISM LL2ss-417 cannot be used to evaluate the PCBs at the LL2-146 location as LL2ss-417 was not analyzed for PCBs. As noted in the response to Comment 1, a single discrete sample is generally not treated as an exposure unit or a decision unit and therefore should not be utilized alone to drive remediation.*

Referenced text on page 91 in Section H.3-8 will be modified as noted below:

"The reported concentration of PCB-1260 (2.8 mg/kg) slightly exceeded the Resident Receptor (Adult and Child) RGO (2.4 mg/kg) in discrete sample LL2-146 collected in 2001. The PCB-1260 concentration in nearby and overlying ISM sample LL2ss-286M (0.0396 mg/kg) collected in 2008 is less than the RGO; therefore, PCB-1260 is not recommended for remediation in this area. Note that Figure H.3-5 was developed using GPS coordinates and polygon shapes that do not always line up. Due to liberties required to manipulate sample polygons, occasionally figures have spaces between samples that lie immediately adjacent to each other. ISM LL2ss-286M encompasses the entirety of the Building DB-4A footprint, including discrete sample LL2-146."

Comment 10). Section H.3-8, Page 93, Building DB-13

The concentration of lead (1,530 mg/kg) at 1-3 feet bgs in discrete sample LL2-100 exceeds the residential soil RGO (400 mg/kg). While the lead detection (15.2 mg/kg) in co-located ISM sample LL2ss-300 met residential RGOs, the ISM was collected from a depth

of 0-1 feet bgs, which is not representative of the 1-3 feet soil interval. Sample LL2-100 (1-3 feet bgs) must be considered for remediation for unrestricted and commercial/industrial land use.

Action Item: Revise text and tables (H.3-8 and H.3-9) to state sample LL2-100 (1-3 feet) is recommended for remediation for lead.

***Response**: Remediation at LL2-100 is not recommended as the concentration of lead (1,220 mg/kg) at the surface 0-1 ft bgs in discrete sample LL2-100 corresponds with lead at 15.2 mg/kg in the overlapping ISM LL2ss-300M when collected over the larger exposure area. Therefore, it is reasonable to assume the contaminant distribution at greater depth (1-3 ft bgs) when collected as an ISM over an exposure area is likely to be similar in magnitude as the surface ISM and lesser than the discrete sample in the same location. It is recommended the entirety of the building-specific site data be used to create a conceptual site model and discrete samples not be utilized to drive remedial decisions.*

The referenced text on page 93 in Section H.3-8 will be modified to include this additional weight of evidence, as noted below:

> "The former Packing and Shipping Building was used for packing and shipping of completed munitions. The reported concentrations of lead (1,220 and 1,530 mg/kg) in discrete soil sample LL2-100 collected in 2001 at 0-1 ft bgs and 1-3 ft bgs exceeded both the Resident Receptor (Adult and Child) (400 mg/kg) and Industrial Receptor (800 mg/kg) RGOs. The reported concentration of thallium (0.99 mg/kg) in the discrete surface soil (0-1 ft bgs) sample at LL2-100 exceeded the Resident Receptor (Adult and Child) RGO (0.78 mg/kg) and the background concentration (0.91 mg/kg). Because lead (15.2 mg/kg) and thallium (0.103 mg/kg) concentrations in co-located surface soil (0-1 ft bgs) ISM sample LL2ss-300 collected in 2008 are less than the RGOs, lead and thallium are not recommended for remediation in surface soil in this area. Because of the difference between the concentrations of lead and thallium in the older (2001) discrete sample LL2-100 and the more recent ISM sample LL2ss-300 in the 0-1 ft interval, it is reasonable to assume the contaminant distribution at depth (i.e., 1-3 feet bgs) would be similar in magnitude lesser than the discrete sample in the same location; therefore, remediation is not recommended for subsurface soil at this location."

Load Line 3 Human Health Risk Assessment (Appendix H)

Comment 11). Section H.4-8, Page 151, Building EB-10

The concentration of PCB-1254 (20 mg/kg) at discrete sample LL3-092 exceeds the unrestricted (1.2 mg/kg) and commercial/industrial (9.7 mg/kg) RGOs. The location was not recommended for remediation based on data from adjacent ISM samples LL3ss-266M and LL3ss-267M. Remedial decisions should be made on a decision unit by decision unit basis; therefore, co-located ISM samples collected within a matching depth interval rather than adjacent ISM samples need to be used to determine the remediation status of a discrete sample. While LL3-092 is included in an area being remediated for PAHs (LL3sb-414M), the use of this rationale will affect decisions in the composition of future FSs and remedial technology options.

Action Item: Revise text and tables (H.4-8 and H.4-9) to state sample LL3-092 is

recommended for remediation for PCB-1254.

***Response**: The subsurface soil in this area is recommended for remediation for PAHs; therefore, sample LL3-092 will be recommended for remediation for PCB-1254 as a COC for both Unrestricted (Residential) and Industrial land use as requested. Tables H.4-8 and H.4-9 will be revised to recommend LL3-092 for remediation for PCB-1254. The text on page 151 in Section H.4-8 will be revised as follows:*

- **"PCB-1254** was identified as a COC for both Unrestricted (Residential) Land Use and Commercial/Industrial Land Use in the surface soil for discrete sample LL3-092 and as a COC for Unrestricted (Residential) Land Use in the surface soil at discrete surface soil sample locations LL3-085 and LL3-088. All of these discrete samples were collected in 2001 from around the footprint of Building EB-10. Detected concentrations of PCB-1254 in other discrete samples collected around Building EB-10 were lower (0.12 mg/kg in LL3-084, 0.0075 mg/kg in LL3-091, and 0.17 mg/kg in LL3-083) and concentrations in ISM samples collected in 2008 within the former building footprint adjacent to LL3-092, LL3-085, and LL3-088 were also low (0.0424 in LL3ss-266M and 0.169 mg/kg in LL3ss-267M). Although the PCB-1254 concentration of a likely exposure unit would be low, LL3-092, LL3-085, and LL3-088 ~~– there was no source of PCBs from within Building EB-10. Given the low concentration of PCBs in the ISM samples collected at Building EB-10 in 2008, PCBs are not recommended for remediation. However; these samples~~ are within the area recommended for remediation of PAHs, as described above. As a result, PCB-1254 is identified as a COC for remediation for both Unrestricted (Residential) Land Use and Commercial/Industrial Land Use in the surface soil for discrete sample LL3-092 and as a COC for remediation for Unrestricted (Residential) Land Use in the surface soil at discrete surface soil sample locations LL3-085 and LL3-088."

Comment 12). Section H.4.8, Page 157, Building EA-4A

The information (data and depth) for ISM sample LL3ss-358 needs to be included in the report since the sample is being used to explain why discrete sample LL3-117 is not recommended for remediation for lead, RDX, dieldrin, and PCB-1254 (Figure H.4-5 and Tables H.4-8 and H.4-9).

Action Item: Update section H4.8, tables H.4-8 and H.4-9, and figures H.4-5 and H.4-6 with the data from ISM sample LL3ss-358.

***Response**: Clarification EB-4A Tables H.4-8 and H.4-9 and Figures H.4-5 and H.4-6 will not be revised to include the data and depth of ISM samples LL3ss-358, LL3ss-255M, and LL3ss-402M; however, clarifying text will be added. These tables only show sample locations where COCs were identified. Likewise, the figures only show the data for sample locations with COIs that exceeded RGOs. Although Tables H.4-8 and H.4-9 and Figures H.4-5 and H.4-6 will not be revised, the data and depths for sample locations LL3ss-358, LL3ss-255M, and LL3ss-402M are provided in Attachment H.4, Table H.4-2.*

The text will be revised to include the data and depth of LL3ss-358 and LL3ss-255M. Although the discrete sample was collected from a depth of 0-1 ft and the more recent co-located ISM sample (LL3ss-358) was collected from a depth of 0-0.5 ft, the results of the ISM and an adjacent ISM (LL3ss-255M collected from a depth of 0-1 ft) indicate contamination is not widespread. Discrete sample LL3-117 does not represent an exposure area and it is recommended that the entirely of the ISMs co-located and adjacent to LL3-117 be

considered to drive remedial decisions. The text in Section H.4.8 will be revised as follows:

- **"Lead, RDX, dieldrin, and PCB-1254** were identified as COCs for Unrestricted (Residential) and Commercial/Industrial (PCB-1254 only) Land Uses at LL3-117. LL3-117 is a discrete surface soil sample collected in 2001 at the northwestern corner of former Building EB-4A along the railroad. The detected concentrations of lead (432 mg/kg), dieldrin (1.2 mg/kg), and PCB-1254 (15 mg/kg) exceeded RGOs, while RDX contributes to an SOR greater than 1 for this sample. The concentrations of these COIs in the more recent (2009) co-located ISM sample LL3ss-358 collected from the 0-0.5 ft interval were less than RGOs (30.7 mg/kg for lead, 0.27 mg/kg for PCB-1254, and non-detect for both RDX and dieldrin.) In addition, the concentrations for the analyzed COIs in ~~other~~ adjacent ISM sample covering the western portion of Building EB-4A (LL3ss-255M collected from the 0-1 ft interval) ~~and the subsurface soil of Building EB-4A (LL3ss-402M collected from the 1 – 3 ft interval)~~ are also below RGOs (33.9 mg/kg for lead and non-detect for RDX). Given the COC concentrations were below RGOs in the ISM samples that represent a likely exposure unit (co-located ISM sample from the 0-5 ft interval and the adjacent ISM from the 0-1 ft interval from the most likely source of contamination (Building EB-4A), lead, RDX, dieldrin, and PCB-1254 are not recommended for remediation at LL3-117."

Comment 13). Section H.4.8, Page 159, Building EA-6A

Soil in the former building EA-6A footprint was excavated to a depth of 4 feet bgs to address 2,4,6-TNT contamination, to meet Military Training Land Use. It is unclear if confirmation sampling took place at 4 feet. A confirmation ISM sample (LL3ss-261 M) was collected at a depth of 5.3-6.3 feet, but no samples are recorded as being sampled from 4-5.3 feet bgs. Thus, it is unclear whether RGOs are being met in the 4-5.3 foot depth interval. While it is likely the excavation actually went to 5.3 feet deep, the report states 4 feet. Clarification is needed.

Action Item: Clarify whether the soil depth interval of 4-5.3 feet at the excavation site co-located with ISM sample LL3ss-261M meets RGOs.

***Response**: The depths of the excavations vary by building due to bedrock or confirmation sample results. As shown in Figure D-5 – Remediation of Sub-Slab Soils Field Sketch Excavation Areas Building EA-6 and EA-6A, Load Line 3 (URS 2010), the average depth of the excavation at Building EA-6A was to 5.3 ft. Soils from the 4-5.3 ft depth interval were excavated and removed (URS 2010). The confirmation ISM sample (LL3ss-261M) was collected from the base of the excavation. Text will be revised in Section H.4.8, Page 159, Building EA-6A to state:*

> "As a result of past activities, the soil at the former building EA-6A footprint was excavated to ~~a depth of 4 ft bgs~~ an average depth of 5.3 ft bgs to address 2,4,6-TNT contamination (URS 2010):"

Comment 14). Section H.4.8, Page 160, Isolated Discrete Samples

The text states TNT is recommended for remediation for unrestricted and commercial/industrial land use at discrete sample LL3-056 (500 mg/kg; 1-3 feet bgs). However, table H.4-9 lists the conclusion for LL3-056 as NFA for the commercial/industrial land use. Revision to table H.4-9 is needed.

Action Item: Revise table H.4-9 to state "remediate" for LL3-056 (1-3 feet) to match the text

in section H.4.8, Page 160, Lines 17-18.

***Response**: Text will be revised in Section H.4.8, Page 160, Isolated Discrete Sample. Although the text indicates TNT was recommended for remediation for both unrestricted and commercial/industrial land use at discrete sample location LL3-056 (500 mg/kg; 1-3 ft bgs), the concentration is below the industrial remedial goal (510 mg/kg) and does not contribute to an SOR above 1. The text will be revised to reflect NFA for the commercial/industrial land use as follows:*

- **2,4,6-TNT** was identified as a COC for Unrestricted (Residential) Land Use in the surface soil at discrete sample LL3sd/sw-048(d) and ~~for both Unrestricted (Residential) and Commercial/Industrial Land Use~~ in the subsurface soil at discrete sample LL3-056:
  - LL3sd/sw-048(d) was collected from the west perimeter of Load Line 3 west of former Building EB-4A. The concentration of TNT (110 mg/kg) in LL3sd/sw-048(d) exceeded the Resident Receptor (Adult and Child) RGO (36 mg/kg). There are no samples in the vicinity of LL3sd/sw-048 analyzed for TNT. TNT is recommended for remediation for Unrestricted (Residential) Land Use.
  - LL3-056 was collected just north of the former DLA Storage Tanks Area at the former AN Service Building (Building EA-5). The concentration of TNT (500 mg/kg) in LL3-13 056 exceeded the Resident Receptor (Adult and Child) RGO (36 mg/kg) in the subsurface soil (1-3 ft bgs soil interval). TNT was not detected in the surface soil (0-1 ft 15 bgs) in LL3-056 in the overlying surface soil ISM sample (LL3ss-259M). TNT is recommended for remediation for Unrestricted (Residential) ~~and Commercial/Industrial~~ Land Use.

Ecological Risk Assessment (Appendix I)

Comment 15). Load Line 1, Outlet Channel A, Table 1-8

Load Line 1: The evaluation provided explaining why lead detections in Outlet Channel A wet sediment are not recommended for remediation would benefit by including a discussion on and comparison to the MacDonald probable effect concentration (PEC) MacDonald, et al., revised 2000. While the sediment screening hierarchy in Ohio EPA DERR Ecological Risk Assessment Guidance Document lists the threshold effect concentration (TEC), the PEC can be utilized as well.

Action Item: Add a discussion on the lead PEC to the qualitative assessment of lead at Channel A in Table 1-8 and the text of the ecological risk assessment for Load Line 1.

***Response**: Additional support for an NFA of lead in sediment of Outlet A&B Channels will be provided by using the PEC (above which harmful effects are likely to be observed). The Army will modify Table I-8 to include discussion of the PEC for all three COPECs in the table (cadmium, copper, and lead) for consistency and add corresponding discussion on Page 21 of the LL1 Ecological Risk Assessment to the Magnitude of ESV Exceedance discussion:*

> "Table I-8 discusses the magnitude of the exceedances. In addition, other information is presented concerning previous evaluations to support dismissal of the chemicals as COECs. This includes consideration of the probable effect concentration (PEC) from the preferred source of sediment ESVs (MacDonald et al. 2000). Although Ohio EPA guidance specifies a preference for use of the threshold effect concentration (TEC), below which adverse effects are not expected to

occur, the PEC is a less conservative option derived in the same manner as the TEC. The PEC is defined as the concentration above which adverse effects are expected to occur more often than not. When comparing the average concentration to the PEC, ratios for all three remaining COIs are below 1. After the evaluation in Table I-8, no sediment COIs warrant further evaluation. Thus, discussion of ESVs and exposure are not needed; however, ESVs are discussed for PBT compounds (i.e., mercury) below."

Ohio Environmental Protection Agency

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

May 19, 2017

Re: US Army Ravenna Ammunition Plt RVAAP
Remediation Response
Project records
Remedial Response
Portage County
267000859030

Mr. Mark Leeper
Army Nation Guard Directorate
ARNGD-ILE Clean Up
111 South George Mason
Arlington, VA 22203

Subject: No Additional Comments to the April 7, 2017 "Responses to Comments on the Draft Feasibility Study Addendum for Soil, Sediment, and Surface Water at Load Lines 1, 2, 3, 4 and 12" for the Former Ravenna Army Ammunition Plant (RVAAP)"

Dear Mr. Leeper:

The Ohio Environmental Protection Agency (Ohio EPA) received the April 7, 2017 "Responses to Comments on the Draft Feasibility Study Addendum for Soil, Sediment, and Surface Water at Load Lines 1, 2, 3, 4 and 12".

We have no comments regarding your responses to our March 6, 2017 comment letter.

Each of these Load Line areas of concern (AOCs) has undergone several investigations and remedial action decisions to characterize the nature and extent of contamination, as well as evaluate human and ecological health risks. Previous remediation activities focused only on the National Guard Trainee receptor. Additional evaluation of data gaps for the unrestricted land use and the sampling conducted were used to develop the draft feasibility study.

The Final Technical Memorandum: Land Uses and Revised Risk Assessment Process for the RVAAP Installation Restoration Program, or Technical Memorandum, states if an AOC fails to meet the Unrestricted Land Use, then a Feasibility Study (FS) will be completed to evaluate cleanup options for all three land uses noted in the Technical Memorandum.

Northeast District Office • 2110 East Aurora Road • Twinsburg, OH 44087-1924
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We anticipate the receipt of your final FS for this project upon completion of the proposed revisions.

If you have questions or need clarification regarding the comments, please feel free to contact me at (330) 963-1201 or e-mail at susan.netzly-watkins@epa.ohio.gov.

Sincerely,

Sue Netzly-Watkins
Site Coordinator
Division of Environmental Response and Revitalization

SN-W/nvr

cc: Kevin Sedlak, ARNG-ILE, Camp Ravenna
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