



DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

<http://www.lrl.usace.army.mil/>

19 APRIL 2012

Engineering Environmental Branch

Mr. Mark Patterson
Base Realignment and Closure Division; Ravenna Army Ammunition Plant
Building 1037
8451 State Route 5
Ravenna, OH 44266-9297

SUBJECT: FINAL Results for Initial Assessment of CC-RVAAP-79 DLA Group 2
Ammunition Storage Area

Dear Mr. Patterson:

This letter presents the analytical results from sampling conducted by the United States Army Corps of Engineers (USACE) on 8 March 2011 for the initial assessment of CC-RVAAP-79 DLA Group 2 Ammunition Storage Area in accordance with the approved Technical Memorandum Work Plan with Subject: Initial Assessment of DLA Area 2 Ore Storage Area dated 28 February 2011.

One primary incremental sample was collected within each sampling area as shown on Figure 1. One primary Volatile Organic Compound (VOC) discrete sample was collected from the center of sample area DL2ss-001. Quality Control and Quality Assurance samples were collected from sample area DL2ss-001 and were analyzed for the Ravenna Army Ammunition Plant full suite of chemicals.

Various ores were historically stored (stock-piled) at the Ravenna facility for the General Services Administration (GSA). The Defense Logistics Agency (DLA), Defense National Stockpile Center (DNSC) leased space at the Ravenna facility for the storage of the ore materials. Many of the ores were allowed to make direct contact with the underlying soils. Historical records indicate that brass ingots were historically stored on the ground surface in the Group 2 Ammunition Storage Area. The DLA Group 2 Ammunition Storage Area was located immediately east of the Group 2 magazine buildings. More specifically, the former ore storage piles were located east of Magazines AC-162, AC-163, AC-165 and AC-166.

Detected chemicals are screened against National Guard Trainee Facility-Wide Cleanup Goals (FWCUG) or other levels as applicable such as background values and Regional Screening Levels (RSL) in accordance with the Final Position Paper for the Application and Use of Facility-Wide Human Health Cleanup Goals (USACE, 1 June 2009). The most stringent screening level of the non-carcinogenic risk value (hazard quotient = 1) and carcinogenic risk

(10^{-5}) are used. Screening of the detected chemicals is presented in Table 1. Table 2 summarizes the list of sample analyses.

There is only one detected sample result that exceeds the applicable screening criteria. This sample was collected east of building AC-165. This exceedance occurs in sample DL2ss-001M-0002-SO where the analytical result for Manganese of 1520 mg/kg exceeds the surface soil background concentration of 1450 mg/kg. This sample is a field duplicate of sample DL2ss-001M-0001-SO which has a Manganese concentration of 803 mg/kg, which is well below the background value. This is likely attributed to the variation of naturally occurring manganese in the soil. The analytical result concentration of 1520 mg/kg is only slightly greater than the surface soil background concentration of 1450 mg/kg, and is well below the subsurface soil background concentration of 3030 mg/kg. Therefore, the concentrations of chemicals detected in the soils do not pose unacceptable risks for the Ohio Army National Guard personnel who are currently utilizing this site.

The results of this initial assessment will be included in the next phase of work for CC-RVAAP-79. A new contract to complete a Remedial Investigation at this site was awarded on 15 August 2011.

Please find Tables, Figures, Field Sampling Reports, and Analytical Laboratory reports attached.

If you have any questions, please contact Derek Kinder at 502-315-6393.

Sincerely,

Derek Kinder, P.E.
Civil/Environmental Engineer

Enclosures

Figure 1



CC-RVAAP-79 DLA Group 2
Ammunition Storage Area Sample Areas
Ravenna, OH

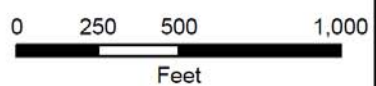


Table 1 Screening of Detected Chemicals

	Sample Description	Analyte	Result	DL	Units	Qualifiers	National Guard Trainee FWCUG	Background Value (if > FWCUG)	RSL	Applicable Screening Value Note	
Metals	DL2SS-001M-0003-SO	Manganese	1200000	41,000	µg/Kg		351000	1450000		BG	
	DL2SS-001M-0003-SO	Magnesium	1600000	53,000	µg/Kg					EN	
	DL2SS-001M-0003-SO	Cobalt	10000	46	µg/Kg		70030			CR	
	DL2SS-001M-0003-SO	Barium	100000	920	µg/Kg		3506000			HI	
	DL2SS-001M-0003-SO	Nickel	11000	130	µg/Kg		126391000			HI	
	DL2SS-001M-0003-SO	Aluminum	11000000	20,000	µg/Kg		34960000			HI	
	DL2SS-001M-0003-SO	Chromium	12000	76	µg/Kg		1000000000			HI	
	DL2SS-001M-0003-SO	Calcium	2300000	11,000	µg/Kg					EN	
	DL2SS-001M-0003-SO	Lead	20000	31	µg/Kg				400000	RSL HI	
	DL2SS-001M-0003-SO	Vanadium	21000	48	µg/Kg		23045000			HI	
	DL2SS-001M-0003-SO	Thallium	210	48	µg/Kg		477000			HI	
	DL2SS-001M-0003-SO	Iron	2300000	280,000	µg/Kg		1000000000			HI	
	DL2SS-001M-0003-SO	Antimony	310	23	µg/Kg		1753000			HI	
	DL2SS-001M-0003-SO	Zinc	330000	3,800	µg/Kg		1000000000			HI	
	DL2SS-001M-0003-SO	Cadmium	380	34	µg/Kg		109000			CR	
	DL2SS-001M-0003-SO	Copper	410000	1,100	µg/Kg		253680000			HI	
	DL2SS-001M-0003-SO	Beryllium	470	74	µg/Kg				160000	RSL HI	
	DL2SS-001M-0003-SO	Selenium	620	150	µg/Kg				390000	RSL HI	
	DL2SS-001M-0003-SO	Potassium	770000	28,000	µg/Kg					EN	
	DL2SS-001M-0003-SO	Arsenic	8200	40	µg/Kg		27800			BG	
	DL2SS-001M-0003-SO	Silver	35	36	µg/Kg		31049000			HI	
	DL2SS-001M-0003-SO	Sodium	39000	9,100	µg/Kg	J				EN	
	DL2SS-001M-0003-SO	Mercury	35	1.2	µg/Kg		1722			HI	
	SVOCs	DL2SS-001M-0003-SO	Di-n-butyl phthalate	10	6.4	µg/Kg	J			6100000	RSL HI
		DL2SS-001M-0003-SO	Anthracene	12	4.9	µg/Kg	J			17000000	RSL HI
		DL2SS-001M-0003-SO	Phenanthrene	17	3.4	µg/Kg	J			17000000	RSL HI for Anthracene ¹
		DL2SS-001M-0003-SO	Bis(2-ethylhexyl) phthalate	21	8.9	µg/Kg	J			3500	RSL CR
		DL2SS-001M-0003-SO	Benzo(g,h,i)perylene	21	9.2	µg/Kg	J	38151000			HI for Pyrene
DL2SS-001M-0003-SO		Butylbenzyl phthalate	22	7.3	µg/Kg	J			12000000	RSL CR	
DL2SS-001M-0003-SO		Benzo(a)pyrene	34	4.9	µg/Kg	J	4770			CR	
DL2SS-001M-0003-SO		Benzo(a)anthracene	35	4.8	µg/Kg	J	47700			CR	
DL2SS-001M-0003-SO		Chrysene	44	5.1	µg/Kg	J	4774000			CR	
DL2SS-001M-0003-SO		Pyrene	45	8.7	µg/Kg	J	38151000			HI	
DL2SS-001M-0003-SO		Fluoranthene	52	4.8	µg/Kg	J	50868000			HI	
DL2SS-001M-0003-SO		Acenaphthylene	9.3	3.1	µg/Kg	J			3400000	RSL HI for Acenaphthene ¹	
DL2SS-001M-0003-SO		Benzo(k)fluoranthene	24	9.9	µg/Kg	Jm	477000			CR	
DL2SS-001M-0003-SO		Benzo(b)fluoranthene	60	5.7	µg/Kg	Jm	47700			CR	
		J Estimated concentration									
	M Manual integration used to determine area response										
	HI = National Guard Trainee FWCUG Hazard Index = 1										
	CR = National Guard Trainee FWCUG Cancer Risk 10 ⁻⁵										
	BG = Background Value										
	EN = Essential Nutrient										
	RSL HI = Regional Screening Level Hazard Index = 1										
	RSL CR = Regional Screening Level Cancer Risk 10 ⁻⁵										
	¹ = Surrogate Chemical										
	Highlighted = Result > Screening Criteria										
	DL = Detection Limit										

	Sample Description	Analyte	Result	DL	Units	Qualifiers	National Guard Trainee FWCUG	Background Value (if > FWCUG)	RSL	Applicable Screening Value Note
Metals	DL2SS-002M-0001-SO	Aluminum	12400	0.04	mg/kg		34960			HI
	DL2SS-002M-0001-SO	Antimony	0.46	0.081	mg/kg		1753			HI
	DL2SS-002M-0001-SO	Arsenic	8.7	0.13	mg/kg		27.8			CR
	DL2SS-002M-0001-SO	Barium	115	0.0081	mg/kg	B	3506			HI
	DL2SS-002M-0001-SO	Beryllium	0.66	0.04	mg/kg				160	RSL HI
	DL2SS-002M-0001-SO	Cadmium	0.28	0.0061	mg/kg		109			CR
	DL2SS-002M-0001-SO	Calcium	11700	0.061	mg/kg					EN
	DL2SS-002M-0001-SO	Chromium	66.7	0.019	mg/kg		1000000			HI
	DL2SS-002M-0001-SO	Cobalt	7.2	0.015	mg/kg		70.03			CR
	DL2SS-002M-0001-SO	Copper	722	0.61	mg/kg		253680			HI
	DL2SS-002M-0001-SO	Hexavalent Chromium	4.9	2.6	mg/kg	J	16.4			HI
	DL2SS-002M-0001-SO	Iron	21000	3	mg/kg		1000000			HI
	DL2SS-002M-0001-SO	Lead	36.4	0.04	mg/kg				400	RSL HI
	DL2SS-002M-0001-SO	Magnesium	1750	0.12	mg/kg					EN
	DL2SS-002M-0001-SO	Manganese	886	0.16	mg/kg		351	1450		BG
	DL2SS-002M-0001-SO	Mercury	0.029	0.0024	mg/kg		1722			HI
	DL2SS-002M-0001-SO	Nickel	10.8	0.018	mg/kg		126391			HI
	DL2SS-002M-0001-SO	Potassium	859	11	mg/kg					EN
	DL2SS-002M-0001-SO	Sodium	60.9	4	mg/kg					EN
	DL2SS-002M-0001-SO	Thallium	0.73	0.04	mg/kg		477			HI
DL2SS-002M-0001-SO	Vanadium	15.6	0.011	mg/kg		23045			HI	
DL2SS-002M-0001-SO	Zinc	508	0.04	mg/kg		1000000			HI	
	J Estimated value									
	B Analyte detected in associated Method Blank									
	HI = National Guard Trainee FWCUG Hazard Index = 1									
	CR = National Guard Trainee FWCUG Cancer Risk 10 ⁻⁵									
	BG = Background Value									
	EN = Essential Nutrient									
	RSL HI = Regional Screening Level Hazard Index = 1									
	RSL CR = Regional Screening Level Cancer Risk 10 ⁻⁵									
	DL = Detection Limit									

Table 1 Screening of Detected Chemicals

	Sample Description	Analyte	Result	DL	Units	Qualifiers	National Guard Trainee FWCUG	Background Value (if > FWCUG)	RSL	Applicable Screening Value Note	
Metals	DL2SS-003M-0001-SO	Aluminum	13300	0.04	mg/kg		34960			HI	
	DL2SS-003M-0001-SO	Antimony	0.73	0.081	mg/kg		1753			HI	
	DL2SS-003M-0001-SO	Arsenic	9.3	0.13	mg/kg		27.8			CR	
	DL2SS-003M-0001-SO	Barium	73.1	0.0081	mg/kg	B	3506			HI	
	DL2SS-003M-0001-SO	Beryllium	0.47	0.04	mg/kg				160	RSL HI	
	DL2SS-003M-0001-SO	Cadmium	0.17	0.006	mg/kg		109			CR	
	DL2SS-003M-0001-SO	Calcium	4690	0.06	mg/kg					EN	
	DL2SS-003M-0001-SO	Chromium	89.7	0.019	mg/kg		1000000			HI	
	DL2SS-003M-0001-SO	Cobalt	7	0.015	mg/kg		70.03			CR	
	DL2SS-003M-0001-SO	Copper	159	0.06	mg/kg		253680			HI	
	DL2SS-003M-0001-SO	Iron	20500	3	mg/kg		1000000			HI	
	DL2SS-003M-0001-SO	Lead	35.8	0.04	mg/kg				400	RSL HI	
	DL2SS-003M-0001-SO	Magnesium	2010	0.12	mg/kg					EN	
	DL2SS-003M-0001-SO	Manganese	628	0.16	mg/kg		351	1450		BG	
	DL2SS-003M-0001-SO	Mercury	0.024	0.0024	mg/kg		1722			HI	
	DL2SS-003M-0001-SO	Nickel	12.9	0.018	mg/kg		126391			HI	
	DL2SS-003M-0001-SO	Potassium	731	11	mg/kg					EN	
	DL2SS-003M-0001-SO	Sodium	42.6	4	mg/kg					EN	
	DL2SS-003M-0001-SO	Thallium	0.6	0.04	mg/kg		477			HI	
	DL2SS-003M-0001-SO	Vanadium	16.9	0.011	mg/kg		23045			HI	
	DL2SS-003M-0001-SO	Zinc	128	0.04	mg/kg		1000000			HI	
	B Analyte detected in associated Method Blank										
	HI = National Guard Trainee FWCUG Hazard Index = 1										
	CR = National Guard Trainee FWCUG Cancer Risk 10 ⁻⁵										
	BG = Background Value										
	EN = Essential Nutrient										
	RSL HI = Regional Screening Level Hazard Index = 1										
	RSL CR = Regional Screening Level Cancer Risk 10 ⁻⁵										
	DL = Detection Limit										

	Sample Description	Analyte	Result	DL	Units	Qualifiers	National Guard Trainee FWCUG	Background Value (if > FWCUG)	RSL	Applicable Screening Value Note	
Metals	DL2SS-004M-0001-SO	Aluminum	12300	0.04	mg/kg		34960			HI	
	DL2SS-004M-0001-SO	Antimony	0.82	0.081	mg/kg		1753			HI	
	DL2SS-004M-0001-SO	Arsenic	8.5	0.13	mg/kg		27.8			CR	
	DL2SS-004M-0001-SO	Barium	80.3	0.0081	mg/kg	B	3506			HI	
	DL2SS-004M-0001-SO	Beryllium	0.49	0.04	mg/kg				160	RSL HI	
	DL2SS-004M-0001-SO	Cadmium	0.25	0.006	mg/kg		109			CR	
	DL2SS-004M-0001-SO	Calcium	5740	0.06	mg/kg					EN	
	DL2SS-004M-0001-SO	Chromium	95.4	0.019	mg/kg		1000000			HI	
	DL2SS-004M-0001-SO	Cobalt	7.3	0.015	mg/kg		70.03			CR	
	DL2SS-004M-0001-SO	Copper	72.5	0.06	mg/kg		253680			HI	
	DL2SS-004M-0001-SO	Hexavalent Chromium	4.9	2.6	mg/kg	J	16.4			HI	
	DL2SS-004M-0001-SO	Iron	18500	3	mg/kg		1000000			HI	
	DL2SS-004M-0001-SO	Lead	32.2	0.04	mg/kg				400	RSL HI	
	DL2SS-004M-0001-SO	Magnesium	2040	0.12	mg/kg					EN	
	DL2SS-004M-0001-SO	Manganese	748	0.16	mg/kg		351	1450		BG	
	DL2SS-004M-0001-SO	Mercury	0.028	0.0024	mg/kg		1722			HI	
	DL2SS-004M-0001-SO	Nickel	14.5	0.018	mg/kg		126391			HI	
	DL2SS-004M-0001-SO	Potassium	937	11	mg/kg					EN	
	DL2SS-004M-0001-SO	Sodium	56.6	4	mg/kg					EN	
	DL2SS-004M-0001-SO	Thallium	0.64	0.04	mg/kg		477			HI	
	DL2SS-004M-0001-SO	Vanadium	14.9	0.011	mg/kg		23045			HI	
	DL2SS-004M-0001-SO	Zinc	116	0.04	mg/kg		1000000			HI	
	J Estimated value										
	B Analyte detected in associated Method Blank										
	HI = National Guard Trainee FWCUG Hazard Index = 1										
	CR = National Guard Trainee FWCUG Cancer Risk 10 ⁻⁵										
	BG = Background Value										
	EN = Essential Nutrient										
	RSL HI = Regional Screening Level Hazard Index = 1										
	RSL CR = Regional Screening Level Cancer Risk 10 ⁻⁵										
	DL = Detection Limit										

Table 1 Screening of Detected Chemicals

	Sample Description	Analyte	Result	DL	Units	Qualifiers	National Guard Trainee FWCUG	Background Value (if > FWCUG)	RSL	Applicable Screening Value Note
Metals	DL2SS-005M-0001-SO	Aluminum	12900	0.04	mg/kg		34960			HI
	DL2SS-005M-0001-SO	Antimony	0.32	0.08	mg/kg		1753			HI
	DL2SS-005M-0001-SO	Arsenic	9.7	0.13	mg/kg		27.8			CR
	DL2SS-005M-0001-SO	Barium	62.4	0.008	mg/kg	B	3506			HI
	DL2SS-005M-0001-SO	Beryllium	0.46	0.04	mg/kg				160	RSL HI
	DL2SS-005M-0001-SO	Cadmium	0.21	0.006	mg/kg		109			CR
	DL2SS-005M-0001-SO	Calcium	1870	0.06	mg/kg					EN
	DL2SS-005M-0001-SO	Chromium	38.2	0.019	mg/kg		1000000			HI
	DL2SS-005M-0001-SO	Cobalt	7.5	0.015	mg/kg		70.03			CR
	DL2SS-005M-0001-SO	Copper	194	0.06	mg/kg		253680			HI
	DL2SS-005M-0001-SO	Iron	20100	3	mg/kg		1000000			HI
	DL2SS-005M-0001-SO	Lead	31.4	0.04	mg/kg				400	RSL HI
	DL2SS-005M-0001-SO	Magnesium	1900	0.12	mg/kg					EN
	DL2SS-005M-0001-SO	Manganese	782	0.16	mg/kg		351	1450		BG
	DL2SS-005M-0001-SO	Mercury	0.028	0.0024	mg/kg		1722			HI
	DL2SS-005M-0001-SO	Nickel	12.7	0.018	mg/kg		126391			HI
	DL2SS-005M-0001-SO	Potassium	578	11	mg/kg					EN
	DL2SS-005M-0001-SO	Sodium	25	4	mg/kg					EN
	DL2SS-005M-0001-SO	Thallium	0.68	0.04	mg/kg		477			HI
	DL2SS-005M-0001-SO	Vanadium	17	0.011	mg/kg		23045			HI
DL2SS-005M-0001-SO	Zinc	180	0.04	mg/kg		1000000			HI	
B Analyte detected in associated Method Blank										
HI = National Guard Trainee FWCUG Hazard Index = 1										
CR = National Guard Trainee FWCUG Cancer Risk 10 ⁻⁵										
BG = Background Value										
EN = Essential Nutrient										
RSL HI = Regional Screening Level Hazard Index = 1										
RSL CR = Regional Screening Level Cancer Risk 10 ⁻⁵										
DL = Detection Limit										

	Sample Description	Analyte	Result	DL	Units	Qualifiers	RSL	Applicable Screening Value Note
VOCs	DLSS-006-0003-SO	Acetone	110	0.39	µg/Kg-dry		61000000	RSL HI
	DLSS-006-0003-SO	2-Butanone	8.2	0.49	µg/Kg-dry		28000000	RSL HI
HI = National Guard Trainee FWCUG Hazard Index = 1								
CR = National Guard Trainee FWCUG Cancer Risk 10 ⁻⁵								
BG = Background Value								
EN = Essential Nutrient								
RSL HI = Regional Screening Level Hazard Index = 1								
RSL CR = Regional Screening Level Cancer Risk 10 ⁻⁵								
DL = Detection Limit								

Table 2 Summary List of Samples and Analysis

Description			Analysis							
Location	Sample Type	Sample ID	EXPL	PROP	MET	PCP	SVOC	PCB	PEST	VOC
Group 2	Primary	DL2ss-001M-0001-SO	x	x	x	x	x	x	x	
Group 2	Blind Duplicate	DL2ss-001M-0002-SO	x	x	x	x	x	x	x	
Group 2	Field Duplicate	DL2ss-001M-0003-SO	x	x	x	x	x	x	x	
Group 2	MS		x	x	x	x	x	x	x	
Group 2	MSD		x	x	x	x	x	x	x	
Group 2	VOC	DL2ss-006-0001-SO								x
Group 2	VOC Blind Duplicate	DL2ss-006-0002-SO								x
Group 2	VOC Field Duplicate	DL2ss-006-0003-SO								x
Group 2	VOC MS									x
Group 2	VOC MSD									x
Group 2	Primary	DL2ss-002M-0001-SO			x					
Group 2	Primary	DL2ss-003M-0001-SO			x					
Group 2	Primary	DL2ss-004M-0001-SO			x					
Group 2	Primary	DL2ss-005M-0001-SO			x					

Field Sampling Report

Project Name: RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO SAMPLING AT GROUP 2 ORE STORAGE AREAS

Location ID: DL 255 - 01 M - 001 - 50, 002 - 50, 003 - 50

Date: 3/8/11 Weather Conditions Clear, Cool Temperature 33°F

Sampling Information

Source	Groundwater / Product	Surface Water	Soils / Sediments / Sludge		
Method	Bailer	Sample Bottle	Scoop		Trowel
	Pump	Bacon Bomb	Bowl		Hand Auger
	Micro-purge		Push Probe	X	Plastic Liner
Type/Construction			Mattocks		
Miscellaneous	Well Purging Form Yes - No				

Sample Collection: 10:0 hrs Sample Type: Composite - (MI) - Grab 30 Location: Plotted on Map (Skipped in Field)
 If MI, # of increments taken: _____ Estimated _____
 Measured - (Survey)
 Sample Depth: 0-1 FT (below surface) Decon: Dedicated - Each Day (Each Location)

Field Parameters (at time of sample)	Analytical Parameters			Other Parameters		
PID / FID Readings: Background: ppm	VOC		TPH GRO	Corrosivity		
	SVOC	X	TPH DRO	Reactivity Sulfide/Cyanide		
	Explosives	X	Chromium +6	Ignitability		
Sample: ppm	Propellants	X	Nitrate			
	Water Level FT	TAL Metals + Hg	Asbestos	QA Samples		
Temperature °C	Pesticides/PCBs	X	Pentachlorophenol	MS/MSD	<u>(Yes)</u> / No <u>0001</u>	NA
Sp. Conductance: uMHOs	Cyanides			Duplicate ID	<u>(Yes)</u> / No	NA
pH units	TOC			Equipment Rinse ID	Yes / No	NA
Turbidity N.T.U.	Grain Size			Trip Blank ID	Yes / No	NA

Sample Description

Color: _____ Col _____

Odor: _____

Staining: _____

Texture: _____

Sorting: _____

Plasticity: _____

Moisture: _____

0-1" dark organic material
1'-5" gray cohesive clay + silt
5"-12" light brown to reddish cohesive
dry clay w/ silt + sand

Soil sample description should include:
 Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:
 Color Odor Sheen Turbidity

Split Sample

Split Sample ID: _____

Name: _____

Agency/Company: _____

Address: _____

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
 Parameters: Same as Above - As Listed

Logged By: Derek Kinder / Eric Cheng (Please Print)

Signature: [Signature]

Reviewed by: ERIC CHENG (Please Print)

Signature: [Signature] Date: 3/14/11

Field Sampling Report

Project Name: RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO SAMPLING AT GROUP 2 ORE STORAGE AREAS

Location ID: DL255-002 M-0001-50

Date: 3/18/11 Weather Conditions Partly Cloudy, Cool Temperature 37°F

Sampling Information

Source	Groundwater / Product	Surface Water	Soils / Sediments / Sludge		
Method	Bailer	Sample Bottle	Scoop		Trowel
	Pump	Bacon Bomb	Bowl		Hand Auger
	Micro-purge		Push Probe	X	Plastic Liner
Type/Construction			Mattocks		
Miscellaneous	Well Purging Form Yes - No				

Sample Collection: 11:30 hrs Sample Type: Composite - (M) - Grab 30 Location: Plotted on Map - Staked in Field
 Measured Surveyed If MI, # of increments taken: 30 Estimated -
 Sample Depth: 0-1 FT (below surface) Decon: Surveyed Dedicated - Each Day Each Location

Field Parameters (at time of sample)	Analytical Parameters			Other Parameters		
PID / FID Readings: Background: ppm	VOC		TPH GRO	Corrosivity		
	SVOC		TPH DRO	Reactivity Sulfide/Cyanide		
	Explosives		Chromium +6	Ignitability		
Sample: ppm	Propellants		Nitrate			
Water Level FT	TAL Metals <u>44g</u> X		Asbestos	QA Samples		
Temperature °C	Pesticides/PCBs		Pentachlorophenol	MS/MSD	Yes / No	NA
Sp. Conductance: uMHOs	Cyanides			Duplicate ID	Yes / No	NA
pH units	TOC			Equipment Rinse ID	Yes / No	NA
Turbidity N.T.U.	Grain Size			Trip Blank ID	Yes / No	NA

<p style="text-align: center;">Sample Description</p> <p>Color: _____ Col</p> <p>Odor: _____</p> <p>Staining: _____</p> <p>Texture: _____</p> <p>Sorting: _____</p> <p>Plasticity: _____</p> <p>Moisture: _____</p> <p><u>2-1" dark organic topsoil</u> <u>1-5" brown silty clay</u> <u>5-6" light brown to light red cohesive</u> <u>12" clay</u></p> <p><i>Soil sample description should include:</i> Munsell Color Odor Staining Texture Sorting Plasticity Moisture</p> <p><i>Water sample description should include:</i> Color Odor Sheen Turbidity</p>	<p style="text-align: center;">Split Sample</p> <p>Split Sample ID: _____</p> <p>Name: _____</p> <p>Agency/Company: _____</p> <p>Address: _____</p> <p>_____</p> <p>_____</p> <p>QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks Parameters: Same as Above - As Listed</p>
--	--

Logged By: Eric Cheng (Please Print) Reviewed by: Derek Kinder (Please Print)
 Signature: [Signature] Signature: [Signature] Date: 3/10/11

Field Sampling Report

Project Name: RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO SAMPLING AT GROUP 2 ORE STORAGE AREAS

Location ID: DL2 55-003M-0001-50 *partly cloudy*
 Date: 3/8/11 Weather Conditions: clear, cool Temperature: 37°F

Sampling Information

Source	Groundwater / Product	Surface Water	Soils / Sediments / Sludge		
Method	Bailer	Sample Bottle	Scoop		Trowel
	Pump	Bacon Bomb	Bowl		Hand Auger
	Micro-purge		Push Probe	X	Plastic Liner
Type/Construction			Mattocks		
Miscellaneous	Well Purging Form Yes - No				

Sample Collection: 11:10 hrs Sample Type: Composite - (M) - Grab 30 Location: Plotted on Map Staked in Field
 If MI, # of increments taken: 30 Estimated -
 Sample Depth: 0-1 FT (below surface) Measured Surveyed Decon: Dedicated - Each Day - Each Location

Field Parameters (at time of sample)	Analytical Parameters			Other Parameters		
PID / FID Readings: Background: ppm	VOC		TPH GRO		Corrosivity	
	SVOC		TPH DRO		Reactivity Sulfide/Cyanide	
	Explosives		Chromium +6	X	Ignitability	
Sample: ppm	Propellants		Nitrate			
Water Level: FT	TAL Metals <u>+Hg</u>	X	Asbestos		QA Samples	
Temperature: °C	Pesticides/PCBs		Pentachlorophenol	MS/MSD	Yes / No	NA
Sp. Conductance: uMHOs	Cyanides			Duplicate ID	Yes / No	NA
pH: units	TOC			Equipment Rinse ID	Yes / No	NA
Turbidity: N.T.U.	Grain Size			Trip Blank ID	Yes / No	NA

<p style="text-align: center;">Sample Description</p> <p>or: _____ Col _____ Odor: _____ Staining: _____ Texture: _____ Sorting: _____ Plasticity: _____ Moisture: _____</p> <p><i>0-1" dark organic material 1"-5" grey cohesive clay+silt 5"-12" light brown to redish cohesive dry clay w/silt + sand</i></p> <p><i>Soil sample description should include: Munsell Color Odor Staining Texture Sorting Plasticity Moisture</i></p> <p><i>Water sample description should include: Color Odor Sheen Turbidity</i></p>	<p style="text-align: center;">Split Sample</p> <p>Split Sample ID: _____ Name: _____ Agency/Company: _____ Address: _____</p> <p>QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks Parameters: Same as Above - As Listed</p>
---	---

Logged By: Derek Kinder (Please Print) Reviewed by: ERIC CHENG (Please Print)
 Signature: [Signature] Signature: [Signature] Date: 3/14/11

Field Sampling Report

Project Name: RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO SAMPLING AT GROUP 2 ORE STORAGE AREAS

Location ID: DL655-004M-0001-50

Date: 3/8/11 Weather Conditions Clear, Cool

Temperature 30°F

Sampling Information

Source	Groundwater / Product	Surface Water	Soils / Sediments / Sludge		
Method	Bailer	Sample Bottle	Scoop		Trowel
	Pump	Bacon Bomb	Bowl		Hand Auger
	Micro-purge		Push Probe	X	Plastic Liner
Type/Construction			Mattocks		
Miscellaneous	Well Purging Form Yes - No				

Sample Collection: 0930 hrs Sample Type: Composite - (M) - Grab Location: Plotted on Map (Staked in Field)
 If MI, # of increments taken: 30 Estimated -
 Sample Depth: 0-1 FT (below surface) Measured: (Surveyed)
 Decon: Dedicated - Each Day (Each Location)

Field Parameters (at time of sample)	Analytical Parameters			Other Parameters		
PID / FID Readings: Background: ppm	VOC		TPH GRO		Corrosivity	
	SVOC		TPH DRO		Reactivity Sulfide/Cyanide	
	Explosives		Chromium +6	X	Ignitability	
Sample: ppm	Propellants		Nitrate			
	Water Level: FT	TAL Metals <u>+H6</u> X	Asbestos		QA Samples	
Temperature: °C	Pesticides/PCBs		Pentachlorophenol	MS/MSD	Yes / No	NA
Sp. Conductance: uMHOs	Cyanides			Duplicate ID	Yes / No	NA
pH: units	TOC			Equipment Rinse ID	Yes / No	NA
Turbidity: N.T.U.	Grain Size			Trip Blank ID	Yes / No	NA

Sample Description

Color: _____ Odor: _____ Staining: _____
 Texture: _____ Sorting: _____
 Plasticity: _____
 Moisture: _____

Dark Brown Monolithic fill
Loose silty clay

*Soil sample description should include:
 Munsell Color Odor Staining Texture Sorting Plasticity Moisture*

*Water sample description should include:
 Color Odor Sheen Turbidity*

Split Sample

Split Sample ID: _____
 Name: _____
 Agency/Company: _____
 Address: _____

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
 Parameters: Same as Above - As Listed

Logged By: Derek Kinder (Please Print) Reviewed by: ERIC CHENG (Please Print)
 Signature: _____ Signature: _____ Date: 3/8/11

Field Sampling Report

Project Name: RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO SAMPLING AT GROUP 2 ORE STORAGE AREAS

Location ID: DL 2 S-005 M-0001-50

Date: 3/5/11

Weather Conditions: Clear, Cool

Temperature: 33°F

Sampling Information

Source	Groundwater / Product	Surface Water	Soils / Sediments / Sludge	
Method	Bailer	Sample Bottle	Scoop	Trowel
	Pump	Bacon Bomb	Bowl	Hand Auger
	Micro-purge		Push Probe	X Plastic Liner
Type/Construction			Mattocks	
Miscellaneous	Well Purging Form Yes - No			

Sample Collection: 1010 hrs Sample Type: Composite - (M) - Grab Location: Plotted on Map - (Staked in Field)
 If MI, # of increments taken: 30 Estimated -
 Sample Depth: 0-1 FT (below surface) Measured - (Surveyed) Decon: (Dedicated - Each Day - Each Location)

Field Parameters (at time of sample)	Analytical Parameters			Other Parameters		
PID / FID Readings: Background: ppm	VOC	TPH GRO		Corrosivity		
	SVOC	TPH DRO		Reactivity Sulfide/Cyanide		
	Explosives	Chromium +6	X	Ignitability		
Sample: ppm	Propellants	Nitrate				
Water Level: FT	TAL Metals + Hg	X Asbestos		QA Samples		
Temperature: °C	Pesticides/PCBs	Pentachlorophenol		MS/MSD	Yes / No	NA
Sp. Conductance: uMHOs	Cyanides			Duplicate ID	Yes / No	NA
pH: units	TOC			Equipment Rinse ID	Yes / No	NA
Turbidity: N.T.U.	Grain Size			Trip Blank ID	Yes / No	NA

Sample Description

Color: _____ Odor: _____ Staining: _____
 Texture: _____ Sorting: _____
 Plasticity: _____
 Moisture: _____

*Light Brown to yellowish clay
 Moisture - w/ silt*

*Soil sample description should include:
 Munsell Color Odor Staining Texture Sorting Plasticity Moisture*

*Water sample description should include:
 Color Odor Sheen Turbidity*

Split Sample

Split Sample ID: _____
 Name: _____
 Agency/Company: _____
 Address: _____

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
 Parameters: Same as Above - As Listed

Logged By: Derek King - 10m Chgo (Please Print)
 Signature: _____

Reviewed by: ERIC CHENG (Please Print)
 Signature: _____ Date: 3/14/11

VOCs

Field Sampling Report

Project Name: RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO SAMPLING AT GROUP 2 ORE STORAGE AREAS
 Location ID: DL2ss-006-0001-50, DL2ss-006-0002-50, DL2ss-0003-50 *Triplicate*
 Date: 3/8/11 Weather Conditions: Partly Cloudy (w) Temperature: 37°F

Sampling Information					
Source	Groundwater / Product	Surface Water		Soils / Sediments / Sludge	
Method	Bailer		Sample Bottle	Scoop	Trowel
	Pump		Bacon Bomb	Bowl	Hand Auger
	Micro-purge			Push Probe <i>OSK</i> X	Plastic Liner
Type/Construction			Mattocks		Terra Core <i>X</i>
Miscellaneous	Well Purging Form Yes - No				

Sample Collection: 115 hrs Sample Type: Composite - MI - Grab Location: Plotted on Map - Staked in Field
 If MI, # of increments taken: _____ Estimated
 Sample Depth: 0-1' FT (below surface) Measured: Surveyed Taken from approx middle of sampling area.
 Decou: Dedicated - Each Day - Each Location

Field Parameters (at time of sample)	Analytical Parameters			Other Parameters		
PID / FID Readings: Background: ppm	VOC	<i>X</i>	TPH GRO	Corrosivity		
	SVOC		TPH DRO	Reactivity Sulfide/Cyanide		
	Explosives		Chromium +6	Ignitability		
Sample: ppm	Propellants		Nitrate			
Water Level: FT	TAL Metals		Asbestos	QA Samples		
Temperature: °C	Pesticides/PCBs		Pentachlorophenol	MS/MSD	<i>Yes</i> / No <i>0001</i>	NA
Sp. Conductance: uMHOs	Cyanides			Duplicate ID	<i>Yes</i> / No	NA
pH: units	TOC			Equipment Rinse ID	Yes / No	NA
Turbidity: N.T.U.	Grain Size			Trip Blank ID	Yes / No	NA

<p style="text-align: center;">Sample Description</p> <p>Color: _____</p> <p>Odor: _____</p> <p>Staining: _____</p> <p>Texture: _____</p> <p>Sorting: _____</p> <p>Plasticity: _____</p> <p>Moisture: _____</p> <p><i>light brown to red and grey cohesive wet clay w/ silt + sand</i></p> <p><small>Soil sample description should include: Munsell Color Odor Staining Texture Sorting Plasticity Moisture</small></p> <p><small>Water sample description should include: Color Odor Sheen Turbidity</small></p>	<p style="text-align: center;">Split Sample</p> <p>Split Sample ID: _____</p> <p>Name: _____</p> <p>Agency/Company: _____</p> <p>Address: _____</p> <p>_____</p> <p>_____</p> <p>QA/QC Provided: MS/MSD - Duplicate Trip Blanks - Field Blanks Parameters: Same as Above - As Listed</p>
--	---

Logged By: Derek Kinder (Please Print) Reviewed by: ERIC CHENG (Please Print)
 Signature: [Signature] Signature: [Signature] Date: 3/14/11