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14. ABSTRACT This document presents an addendum to the Facility-Wide Groundwater Monitoring Program for additional metals analysis. Included in the report are: <ul style="list-style-type: none">• Wells requiring filtered and unfiltered metals analysis• List of required metals to be sampled					
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DRAFT
FACILITY-WIDE GROUNDWATER MONITORING PROGRAM

METALS ANALYSIS ADDENDUM

**RAVENNA ARMY AMMUNITION PLANT,
RAVENNA, OHIO**

**MARC Contract Number W912QR-04-D-0036
Delivery Order 0006**

Prepared for

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**FWGWMP Draft Metals Analysis Addendum
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RVAAP – Ravenna Army Ammunition Plant

USACE – U.S. Army Corps of Engineers

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**METALS ANALYSIS ADDENDUM
FACILITY-WIDE GROUNDWATER MONITORING PROGRAM
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO
SEPTEMBER 2009**

Background

The US Army Corps of Engineers (USACE), Louisville District (CELRL) is performing CERCLA closure at the former Ravenna Army Ammunition Plant (RVAAP) located near Ravenna, Ohio. CERCLA closure is occurring under the Installation Restoration Program (IRP). Activities include monitoring of an extensive network of ground water monitoring wells. During the time period of 2005 through 2007, the USACE has developed a database of ground water quality information based on the sampling of approximately 36 monitoring wells. Beginning in FY 2008, the USACE expanded the Facility-Wide Groundwater Monitoring Program (FWGWMP) to include the characterization of ground water from all monitoring wells at the facility, which includes those wells monitored prior to 2005.

The USACE recently determined that a specialized geochemical study is needed to better characterize the background ground water quality at the site. The geochemical study is also necessary for optimization of the FWGWMP. This addendum presents the additional sampling and analysis activities to be conducted in support of the geochemical study.

Scope of Work for the Additional Metals Analysis

During the quarterly monitoring event in October 2009 the 51 wells scheduled for regular groundwater sampling and analysis for filtered metals analysis will also be sampled and analyzed for unfiltered metals. The 51 wells already scheduled for the October 2009 FWGWMP event are listed in Attachment A (highlighted yellow).

In conjunction with the October 2009 groundwater monitoring event, metals sampling will also be conducted at the remaining 186 additional wells at the facility. These additional wells are also listed in Attachment A.

The methodology for the additional metals analysis will be as follows:

1. Each well will be sampled for filtered metals and unfiltered metals. The list of metals to be analyzed is summarized in Attachment B, and is consistent with Table 3.8 of the *Quality Assurance Project Plan for Environmental Investigations at the Ravenna Army Ammunition Plant March 2001*. Sampling and analysis procedures will follow the *Facility-Wide Sampling and Analysis Plan for Environmental Investigations at the Ravenna Army Ammunition Plant March 2001* and the 7 December 2006 Scope of Work for the groundwater monitoring

program. A 0.45 micron filter will be used to filter samples. Acidification of the filtered samples will be performed after filtration of the sample.

2. Prior to sampling each of the above-described wells (237 wells total), each well will be purged following those procedures specified in the *Facility-Wide Sampling and Analysis Plan for Environmental Investigations at the Ravenna Army Ammunition Plant March 2001*. Field measurements for pH, conductivity, dissolved oxygen (DO), oxidation reduction potential (ORP), turbidity and temperature shall be obtained and monitored in each well during well purging activities. Each parameter is consistent with the requirements of the *Facility-Wide Sampling and Analysis Plan for Environmental Investigations at the Ravenna Army Ammunition Plant March 2001*, with the exception of ORP and turbidity. ORP and turbidity are required as additional field parameters to assist in the geochemical study for groundwater.
3. Quality assurance/quality control (QA/QC) samples will be collected as per the current *Facility-Wide Sampling and Analysis Plan for Environmental Investigations at the Ravenna Army Ammunition Plant March 2001*. This includes the collection of duplicate samples, split samples, and matrix spike/matrix spike duplicate samples which be collected at a frequency of 10% of the total number of samples. Daily equipment rinseate samples will also be collected.

Following the sampling and analysis, including data validation, a report presenting the data shall be prepared. The report will consist of a stand-alone submittal documenting the activities and results of the filtered and unfiltered metals groundwater sampling event (include all 237 wells in report). In addition, the analytical results and sampling procedures will be presented as an appendix or attachment to the October 2009 Facility-Wide Groundwater Monitoring Program Report. The additional analytical data obtained from the metals only sampling event will also be incorporated into the RVAAP FWGWMPP electronic groundwater database (along with data obtained during the standard October 2009 sampling event).

Well Redevelopment Activities

During the January 2009 water level monitoring event additional wells were identified for possible redevelopment based on apparent elevated sediment accumulation in the wells. The additional wells requiring redevelopment in order to proceed with the expanded October 2009 groundwater sampling is as follows:

CBLmw-001 (1.90 ft of sediment)	CBLmw-003 (1.09 ft)
CBPmw-001 (2.22 ft of sediment)	CPmw-001 (0.56 ft of sediment)
DA2mw-106 (1.32 ft of sediment)	DETmw-001 (2.02 ft of sediment)
FBQmw-073 (1.25 ft of sediment)	FBQmw-174 3.36 ft of sediment)
LL1mw-065 (0.39 ft of sediment)	LL1mw-082 (0.32 ft of sediment)

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LL1mw-084 (0.45 ft of sediment)	LL10mw-003 (0.41 ft of sediment)
LL11mw-001 (2.65 ft of sediment)	LL2mw-263 (0.47 ft of sediment)
LL4mw-198 (1.58 ft of sediment)	LL5mw-002 (0.86 ft of sediment)
MBSmw-001 (0.58 ft of sediment)	MBSmw-002 (0.37 ft of sediment)
MBSmw-004 (0.48 ft of sediment)	NTAmw-113 (1.30 ft of sediment)
RQLmw-014 (0.45 ft of sediment)	WBGmw-012 (0.45 ft of sediment)
CPmw-006 (no accumulated sediment but water is very turbid)	

These wells are scheduled to be redeveloped during the week of 21 September 2009. Redevelopment will be completed by surging and pumping using a surge block, and a centrifugal and/or submersible pump. This will be performed to remove fines accumulating as sediment in the bottom well cap. Each well will be developed by at least two methods (surge and pump) with the attempt to reach stability of hydraulic conditions according to the *Technical Guidance Manual for Hydraulic Investigations and Groundwater Monitoring OEPA*, February 1995. The results of the redevelopment activities will be presented in the metals report and the October 2009 groundwater report.

ATTACHMENT A
LIST OF WELLS TO BE SAMPLED

Metals Sampling October 2009

October 2009 Quarterly Sampling Wells	Wells Sampled For Metals Only	Wells Sampled For Metals Only	Wells Sampled For Metals Only	Wells Sampled For Metals Only
ASYmw-001	B12mw-010	EBGmw-127	LL2mw-261	NTAmw-114
ASYmw-002	B12mw-011	EBGmw-128	LL2mw-262	NTAmw-115
ASYmw-003	B12mw-012	EBGmw-129	LL2mw-263	NTAmw-116
ASYmw-004	BKGmw-004	EBGmw-130	LL2mw-264	NTAmw-117
ASYmw-005	BKGmw-005	FBQmw-166	LL2mw-265	NTAmw-118
ASYmw-006	BKGmw-006	FBQmw-167	LL2mw-266	RQLmw-006
ASYmw-007	BKGmw-008	FBQmw-168	LL2mw-267	RQLmw-010
ASYmw-008	BKGmw-010	FBQmw-169	LL2mw-268	RQLmw-011
ASYmw-009	BKGmw-012	FBQmw-170	LL2mw-269	RQLmw-012
ASYmw-010	BKGmw-013	FBQmw-171	LL2mw-270	RQLmw-013
DETmw-003	BKGmw-015	FBQmw-172	LL3mw-232	RQLmw-014
DETmw-004	BKGmw-016	FBQmw-173	LL3mw-233	RQLmw-015
LL10mw-001	BKGmw-017	FBQmw-174	LL3mw-234	RQLmw-016
LL10mw-002	BKGmw-018	FBQmw-175	LL3mw-235	RQLmw-017
LL10mw-003	BKGmw-019	FBQmw-176	LL3mw-236	WBGmw-005
LL10mw-004	BKGmw-020	FBQmw-177	LL3mw-237	WBGmw-006
LL10mw-005	BKGmw-021	LL11mw-002	LL3mw-238	WBGmw-007
LL10mw-006	CBLmw-001	LL11mw-007	LL3mw-239	WBGmw-008
LL11mw-001	CBLmw-002	LL12mw-088	LL3mw-240	WBGmw-009
LL11mw-003	CBLmw-003	LL12mw-107	LL3mw-241	WBGmw-010
LL11mw-004	CBLmw-004	LL12mw-113	LL3mw-242	WBGmw-011
LL11mw-005	CBPmw-001	LL12mw-128	LL3mw-243	WBGmw-012
LL11mw-006	CBPmw-002	LL12mw-153	LL4mw-193	WBGmw-013
LL11mw-008	CBPmw-003	LL12mw-154	LL4mw-194	WBGmw-014
LL11mw-009	CBPmw-004	LL12mw-182	LL4mw-195	WBGmw-015
LL11mw-010	CBPmw-005	LL12mw-183	LL4mw-196	WBGmw-016
LL6mw-005	CBPmw-006	LL12mw-184	LL4mw-197	WBGmw-017
LL6mw-006	CBPmw-007	LL12mw-185	LL4mw-198	MBSmw-001
LL6mw-007	CBPmw-008	LL12mw-186	LL4mw-199	MBSmw-002
LL7mw-001	CPmw-001	LL12mw-187	LL4mw-200	MBSmw-003
LL7mw-002	CPmw-002	LL12mw-188	LL5mw-001	MBSmw-004
LL7mw-003	CPmw-003	LL12mw-189	LL5mw-002	MBSmw-005
LL7mw-004	CPmw-004	LL12mw-242	LL5mw-003	MBSmw-006
LL7mw-005	CPmw-005	LL12mw-243	LL5mw-004	
LL7mw-006	CPmw-006	LL12mw-244	LL5mw-005	
LL8mw-001	DA2mw-104	LL12mw-245	LL5mw-006	
LL8mw-002	DA2mw-105	LL12mw-246	LL6mw-001	
LL8mw-003	DA2mw-106	LL1mw-063	LL6mw-002	
LL8mw-004	DA2mw-107	LL1mw-064	LL6mw-003	
LL8mw-005	DA2mw-108	LL1mw-065	LL6mw-004	
LL8mw-006	DA2mw-109	LL1mw-067	LNWmw-024	
LL9mw-001	DA2mw-110	LL1mw-078	LNWmw-025	
LL9mw-002	DA2mw-111	LL1mw-079	LNWmw-026	
LL9mw-003	DA2mw-112	LL1mw-080	LNWmw-027	
LL9mw-004	DA2mw-113	LL1mw-081	NTAmw-107	
LL9mw-005	DETmw-001	LL1mw-082	NTAmw-108	
LL9mw-006	DETmw-002	LL1mw-083	NTAmw-109	
LL9mw-007	EBGmw-123	LL1mw-084	NTAmw-110	
RQLmw-007	EBGmw-124	LL1mw-085	NTAmw-111	
RQLmw-008	EBGmw-125	LL2mw-059	NTAmw-112	
RQLmw-009	EBGmw-126	LL2mw-060	NTAmw-113	

ATTACHMENT B

LIST OF METALS FOR FILTERED & UNFILTERED ANALYSES

List of Metals for Filtered & Unfiltered Analyses

Compound	Project Quantitation Level Water (ug/l)
Aluminum	10
Antimony	0.5
Arsenic	0.5
Barium	1
Beryllium	0.1
Cadmium	0.1
Calcium	10
Chromium	0.5
Cobalt	0.5
Copper	0.5
Iron	10
Lead	0.3
Magnesium	10
Manganese	1
Mercury	0.1
Nickel	1
Potassium	20
Selenium	0.5
Silver	0.5
Sodium	20
Thallium	0.2
Vanadium	1
Zinc	1