

**FINAL**

**PHASE I REMEDIAL INVESTIGATION  
DECEMBER 2004 FOLLOW-ON  
GROUNDWATER SAMPLING**

*AT THE*

**RAMSDELL QUARRY LANDFILL  
AT THE  
RAVENNA ARMY AMMUNITION PLANT  
RAVENNA, OHIO**

*Prepared for*



**US Army Corps  
of Engineers®**

**U.S. Army Corps of Engineers, Louisville District  
Contract No. F44650-D-99-0007  
DELIVERY ORDER CY11**

**June 2005**



**SCIENCE APPLICATIONS INTERNATIONAL CORPORATION**

contributed to the preparation of this document and should not  
be considered an eligible contractor for its review.

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U. S. Army Corps of Engineers  
Louisville District  
Under Contract F44650-D-99-0007  
Delivery Order Number CY11

Prepared by  
Science Applications International Corporation  
151 Lafayette Drive  
Oak Ridge, Tennessee 37831


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## CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

Science Applications International Corporation (SAIC) has completed the Phase I Remedial Investigation December 2004 Follow-On Groundwater Sampling at the Ramsdell Quarry Landfill at the Ravenna Army Ammunition Plant Ravenna, Ohio. Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of data quality objectives; technical assumptions; methods, procedures, and materials to be used; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing Corps policy.

  
\_\_\_\_\_  
Sally Absher, SAIC  
Study/Design Team Leader

6-13-05  
Date

  
\_\_\_\_\_  
Kevin Jago, SAIC  
Independent Technical Review Team Leader

6-13-05  
Date

Significant concerns and the explanation of the resolution are as follows:

Independent technical review comments are recorded on an SAIC Document Review Record, per SAIC quality assurance procedure QAAP 3.1. This Document Review Record is maintained in the project file. Changes to the report addressing the comments have been verified by the Study/Design Team Leader.

As noted above, all concerns resulting from independent technical review of the project have been considered.

  
\_\_\_\_\_  
Principal w/ A-E firm

6-13-05  
Date

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## ACRONYMS

AOC	area of concern
COPC	constituent of potential concern
JMC	Joint Munitions Command
MCL	maximum contaminant level
PCB	polychlorinated biphenyl
PRG	preliminary remediation goal
RI	remedial investigation
RQL	Ramsdell Quarry Landfill
RVAAP	Ravenna Army Ammunition Plant
SRC	site-related contaminant
SVOC	semivolatile organic compound
TAL	target analyte list
VOC	volatile organic compound

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# 1.0 INTRODUCTION

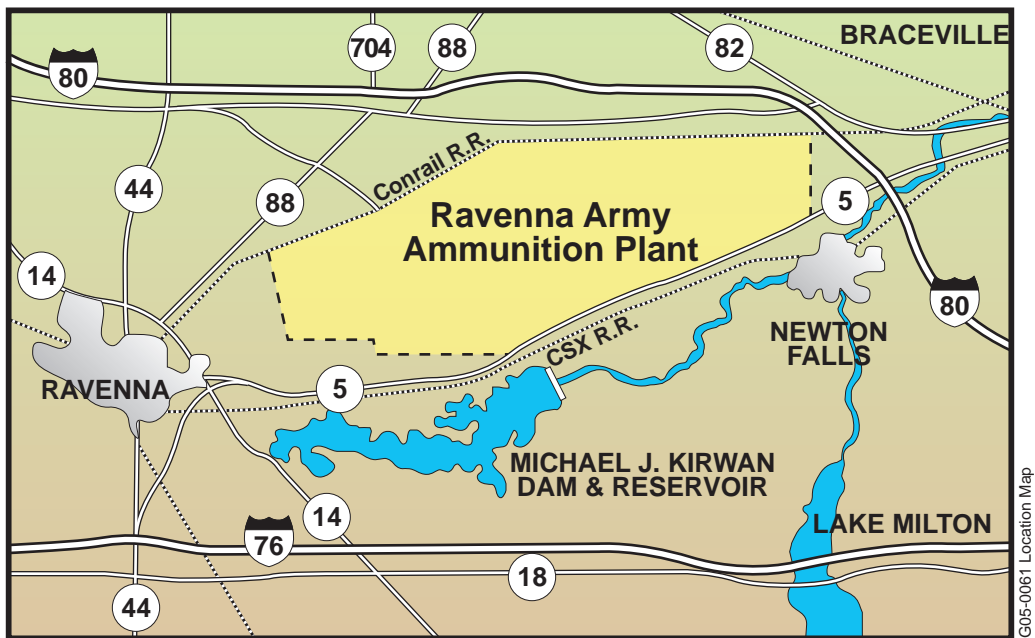
This report documents the results of the third round (dry season) of groundwater sampling at the Ramsdell Quarry Landfill (RQL) at the U. S. Army Joint Munitions Command (JMC) at the Ravenna Army Ammunition Plant, (RVAAP), Ravenna, Ohio (Figures 1-1 and 1-2). The third round of groundwater sampling was conducted in December 2004, and represents the second follow-on sampling after the Phase I Remedial Investigation (RI). Both the Phase I RI and subsequent follow-on sampling were conducted under the U. S. Department of Defense Installation Restoration Program by Science Applications International Corporation and its subcontractors, under contract number F44650-D-99-0007, Delivery Order CY11, with the U. S. Army Corps of Engineers, Louisville District. This investigation was conducted in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 following work plans reviewed and commented on by the Ohio Environmental Protection Agency.

The reader is referred to the Phase I RI (USACE 2004) for additional details regarding the field program, environmental setting, nature and extent of contamination, and conceptual site model.

## 1.1 PURPOSE AND SCOPE

During the Phase I RI, six new monitoring wells were installed both downgradient (north-northwest) and upgradient (south-southeast) of the area of concern (AOC). The downgradient wells were installed to bound the extent of contamination observed in groundwater adjacent to the quarry and to further evaluate potentiometric gradient reversals, observed previously adjacent to the quarry. Two groundwater wells (RQLmw-013 and RQLmw-014) were installed in a configuration along the north side of Ramsdell Road to provide data on general hydrogeologic characteristics and groundwater flow patterns. One monitoring well (RQLmw-012) was installed east of Ramsdell Quarry to provide data on general hydrogeologic characteristics and groundwater flow patterns, and to provide closure for the monitoring network in the sidegradient direction. One monitoring well (RQLmw-015) was installed to the west of RQL to fill a data gap in this portion of the AOC. Two upgradient wells were installed to identify if any potential migration of contaminants from Load Line 1 is occurring, which might account for contaminants observed in an upgradient well (RQLmw-006). One upgradient monitoring well (RQLmw-016) was installed southwest of the quarry to fill a data gap in this portion of the AOC and to monitor for potential northward contaminant transport from Load Line 1. The other upgradient monitoring well (RQLmw-017) was installed due south of the AOC between RQL and Load Line 1; this location was selected to determine whether contaminants observed in the upgradient well at RQL (RQLmw-006) are sourced from Load Line 1. Multiple sampling rounds of newly installed wells, and water level measurements of both newly installed and existing wells under both base flow/dry season conditions and high flow/wet season conditions, were planned to determine if transport of contaminants is occurring under certain hydrologic conditions.

High flow/wet season conditions are represented by the samples collected in May of 2004, and the results are documented in the *Revised Final Phase I Remedial Investigation May 2004 Follow-On Groundwater Sampling at the Ramsdell Quarry Landfill* (USACE 2005). Low flow/dry season conditions are represented by the samples collected in December 2004, and the results are documented in this report.



G05-0061 Location Map



SCALE IN MILES

LOCATION MAP



Figure 1-1. General Location and Orientation of RVAAP

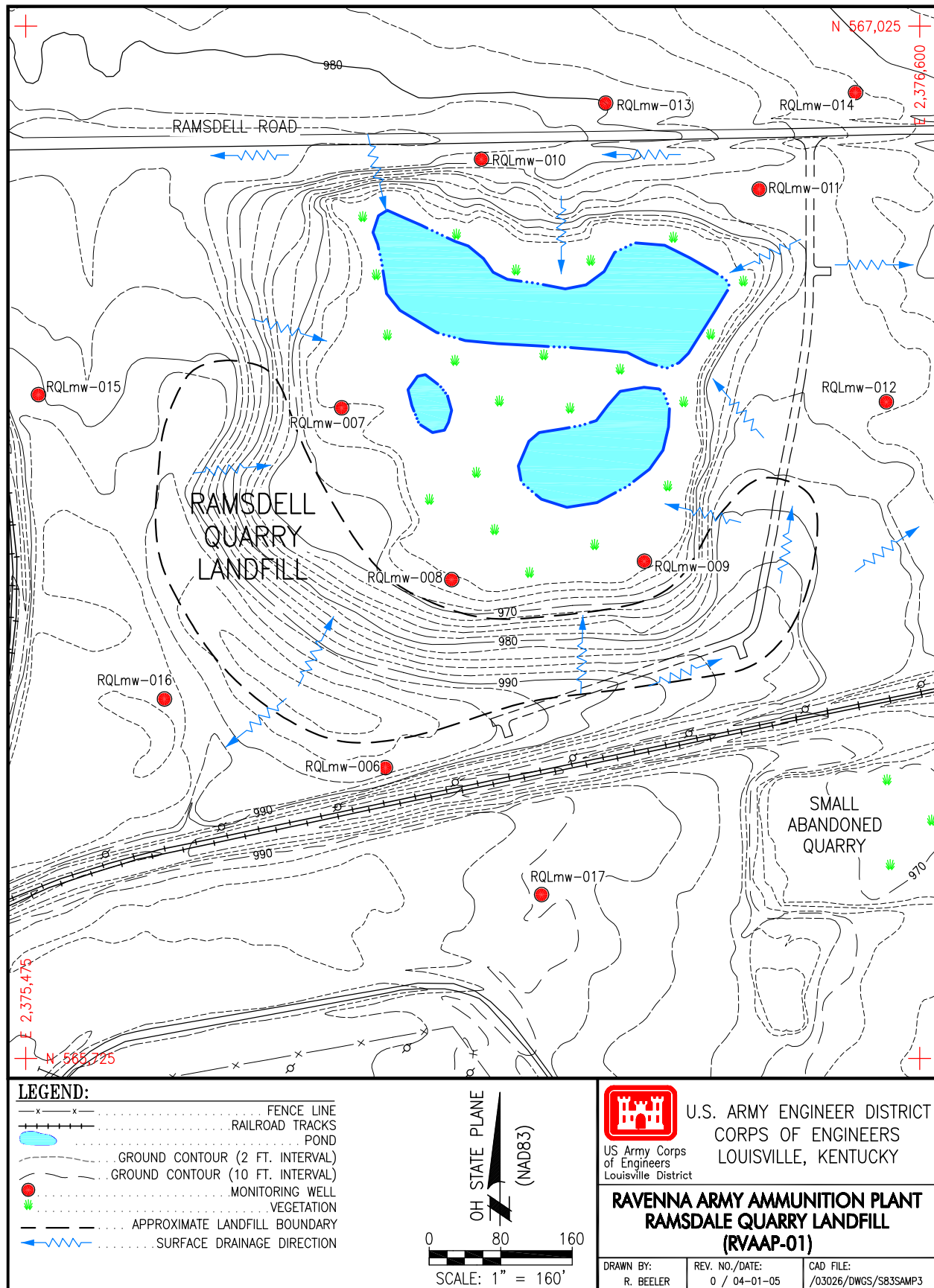


Figure 1-2. Ramsdell Quarry Site Map and Groundwater Monitoring Well Locations

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## 2.0 SITE HISTORY AND PREVIOUS INVESTIGATIONS

### 2.1 SITE HISTORY

RVAAP is located in northeastern Ohio in Portage and Trumbull counties and lies about 16 km (10 miles) east of Ravenna, Ohio (Figure 1-1). Operations at the facility began in September 1941 and included the storage, handling, and packing of military ammunition and explosives. The facility encompasses 8,668 ha (21,419 acres) and is jointly operated by the JMC of the U. S. Army and the National Guard Bureau. The JMC controls environmental AOCs and active mission areas. A detailed history of process operations and waste disposal processes for each AOC at RVAAP is presented in the *Preliminary Assessment for the Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 1996).

Ramsdell Quarry is located in the northeastern portion of RVAAP and encompasses about 14 acres (Figure 1-2). The quarry was excavated about 9 to 12 m (30 to 40 ft) below existing grade into the Sharon Member of the Pottsville Formation. The original unconsolidated glacial material overlying the sandstone was only a few meters (<10 ft) thick and appears to have been entirely removed. The excavated material, consisting of sandstone and quartz pebble conglomerate, was used for road and construction ballast. Quarry operations were discontinued in about 1941.

The western and southern portions of the abandoned quarry were subsequently used for landfill operations (RQL) between 1941 and 1989 (Figure 1-2). No information is available regarding landfill disposal activities between 1941 and 1976. From 1976 until the landfill was closed in 1989, only non-hazardous solid waste was deposited in RQL. In 1978, a portion of the abandoned quarry was permitted as a sanitary landfill by the state of Ohio. The permit required a 30-m (100-ft) buffer be maintained between the landfill and the pond; the extent of the pond prior to this time is not known. Closure of the permitted sanitary landfill was completed in May 1990 under state of Ohio solid waste regulations (Ohio Administrative Code 3745-27-10). A requirement of closure was installation and semiannual monitoring of five monitoring wells.

In addition, from 1946 to the 1950s, the bottom of the quarry was used to burn waste explosives from Load Line 1. Approximately 18,000 225-kg (500-lb) incendiary or napalm bombs were reported to have been burned in the abandoned quarry. Liquid residues from annealing operations were also dumped in the quarry. No additional historical information currently is available on how the quarry was used, other than for landfill operations, from the 1950s until 1976, when operational records show that non-hazardous solid wastes were placed in RQL.

Based upon available information and past uses of the abandoned quarry, wastes may include domestic, commercial, and industrial solid and liquid wastes, including explosives (e.g., trinitrotoluene; hexahydro-1,3,5-trinitro-1,3,5-triazine; and Composition B), napalm, gasoline, acid dip liquor, annealing residue (e.g., sulfuric acid, shell casings, sodium orthosilicate, chromic acid, and alkali), aluminum chloride, and inert material. Interviews with former RVAAP personnel have indicated that much of the landfilled wastes and debris at the abandoned quarry were removed in the 1980s.

A much smaller quarry (also abandoned) was located directly southeast of RQL (Figure 1-2). Although no standing water was observed in the smaller quarry during earlier investigations, it was water filled in late August 2003 as a result of above average rainfall during the summer of 2003. No documentation of waste disposal or treatment exists for this quarry.

## 2.2 PREVIOUS SITE INVESTIGATIONS

Previous investigations at Ramsdell Quarry include monitoring related to post-closure of RQL, a Groundwater Investigation to evaluate the suitability of the post-closure groundwater monitoring network for RQL and to investigate general groundwater/surface water interactions in the quarry (USACE 1999, 2000), and the Phase I RI completed in the fall of 2003 (USACE 2004). The Groundwater Investigation was designed to: (1) evaluate whether the closed landfill is in compliance with Ohio solid waste post-closure requirements, (2) to close data gaps in the RQL post-closure monitoring program, and (3) to address potential impacts upon groundwater related to historical operations at Ramsdell Quarry prior to use of the site for landfill operations.

The initial phase, conducted in July 1998, involved: (1) the installation and sampling of six monitoring wells, (2) sampling of the existing RQL post-closure monitoring well system, (3) sampling of sediment and surface water within the quarry, and (4) construction of a staff gauge within the main quarry pond. Results of the initial phase of the investigation were presented in the *Initial Phase Report, Groundwater Investigation Ramsdell Quarry Landfill, Ravenna Army Ammunition plant, Ravenna, Ohio* (USACE 1999).

The follow-on phase of the investigation, which extended until July 15, 1999, included: (1) quarterly, dry season, and wet season (storm event) sampling of the new monitoring well network and quarry pond surface water; (2) collection of long-term water levels from new monitoring well network and quarry pond; (3) monthly manual water level measurements from all wells and the pond staff gauge; and (4) collection of precipitation data. Results of the follow-on phase of the investigation were presented in the *Final Phase Report, Groundwater Investigation Ramsdell Quarry Landfill, Ravenna Army Ammunition plant, Ravenna, Ohio* (USACE 2000).

Groundwater samples from the Groundwater Investigation contained low, but consistently detectable, concentrations of nine explosive compounds and associated degradation products and nitroglycerin. Multiple trace metals were present above facility-wide background criteria, as well as Ohio drinking water standards in both unfiltered and filtered samples. The most prevalent of these were aluminum, arsenic, cobalt, manganese, mercury, nickel, and zinc. Sporadic detections of bis(2-ethylhexyl)phthalate and volatile organic compounds (VOCs) were noted. Toluene and methylene chloride were the most persistent VOCs detected. No VOC results exceeded Ohio primary maximum contaminant levels (MCLs). The upgradient well (RQLmw-006) and two wells (RQLmw-007 and -008), located at the toe of the landfill, typically had the highest percentages of detected contaminants. The furthest downgradient well (RQLmw-011) also had a comparatively high frequency of metals above background criteria.

Potentiometric data collected during the period of the Groundwater Investigation showed that horizontal potentiometric gradients are consistently to the northeast across the site during dry periods of the year. During these periods, the quarry pond is a static representation of the water table and may even function as a sink through evapotranspiration processes. During the wet season of the year, a sufficient reservoir of water exists in the quarry pond to act as a recharge point to groundwater. As a result, potentiometric surface elevations in upgradient well RQLmw-006 and those at the toe of the landfill are essentially equal. Rainfall events during the wet period of the year adds additional volume to the quarry pond, which results in sufficient hydraulic head to produce slight, localized flow gradient reversals between the pond and well RQLmw-006 for short periods of time. Wells RQLmw-010 and RQLmw-011 remain consistently downgradient of RQL throughout the year.

The distribution of contaminants in wells at RQL observed during the Groundwater Investigation are consistent with the observed hydraulic characteristics. Considering that the horizontal potentiometric gradient during the wet season is flat and exhibits short-term reversals, RQL is the likely source of

observed contaminants in well RQLmw-006. For a majority of the year, groundwater flow is consistently to the north-northeast providing the mechanism for contaminant migration to wells located at the toe of RQL and to RQLmw-011.

The groundwater characterization effort during the Phase I RI included: (1) the installation of six additional monitoring wells both downgradient (north-northwest) and upgradient (south-southeast) of the AOC, and (2) sampling rounds of existing wells and water level measurements of existing and newly installed wells. Five landfill monitoring wells (MW-1 through MW-5) no longer meet the data quality objectives for post-closure monitoring of RQL and are scheduled to be plugged and abandoned.

Potentiometric data collected for both the Phase I RI (April 2004) baseline and the May 2004 follow-on groundwater sampling showed that horizontal potentiometric gradients are consistently to the northeast across the site, which was consistent with results of the Groundwater Investigation in 1998 and 1999 (Figure 2-1).

### **2.3 PHASE I REMEDIAL INVESTIGATION CONSTITUENTS OF POTENTIAL CONCERN**

Explosives, propellants, semivolatile organic compounds (SVOCs), pesticides, and polychlorinated biphenyls (PCBs) were not detected in Phase I RI (baseline) groundwater samples (Tables 2-1 and 2-2). Phase I RI samples contained low concentrations of 18 metals, 12 of which were considered to be site-related contaminants (SRCs) (maximum concentrations greater than site background criteria for filtered groundwater). Of these, arsenic, lead, and manganese were determined to be constituents of potential concern (COPCs) based on exposure concentrations above filtered site background criteria and/or Region 9 tap water criteria. One VOC, carbon disulfide, was detected in all six wells, but the maximum concentration was well below the Region 9 tap water criteria (USACE 2004). Samples collected during the wet season event (May 2004) showed similar results, with a total of 11 inorganic and 2 organic compounds identified as SRCs (Table 2-3). Arsenic, lead, and manganese were determined to be COPCs based on exposure concentrations above site background criteria and/or Region 9 tap water criteria. Carbon disulfide was not detected in any well samples for analysis, but two phthalates were detected. The concentration of one of these, bis(2-ethylhexyl)phthalate, exceeded both the federal MCL and the Region 9 preliminary remediation goal (PRG), and it is considered to be a COPC. Monitoring well RQLmw-017, the most upgradient well, contained the maximum concentration of 10 of the 11 inorganic SRCs (Table 2-4). Explosives, pesticides, and PCBs were not detected during the May 2004 event.

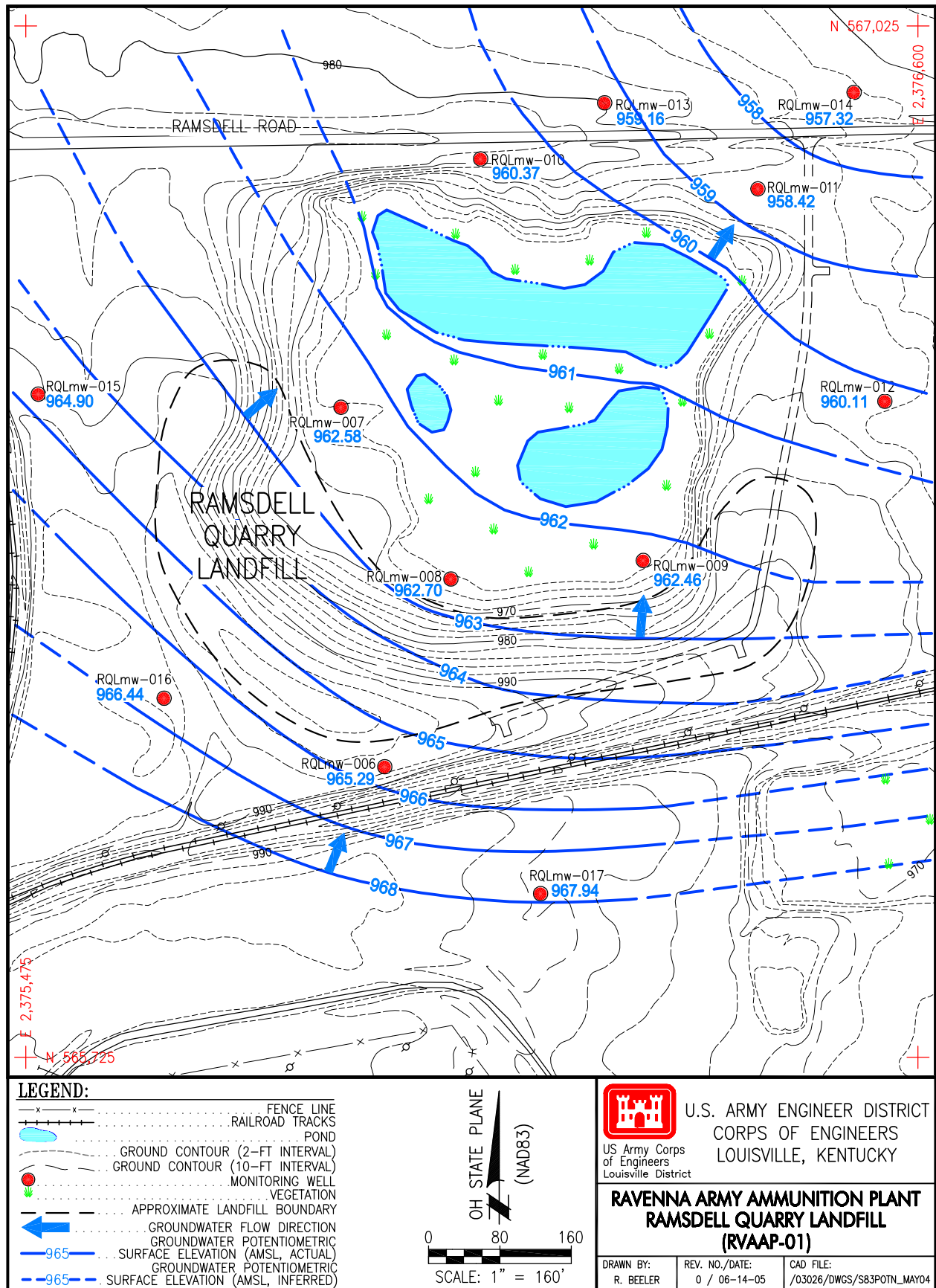


Figure 2-1. Ramsdell Quarry Potentiometric Surface, Wet Season Sampling Event, May 2004

Table 2-1. Summary of COPC Screening for RQL Groundwater, Phase I RI (December 2003)

Analyte (mg/L)	Results >Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	MCL	Max. Det.> MCL?	Site Background Criteria	Region 9 Tap Water Criteria	Max Detect > Tap Water Criteria	COPC	Site Related?
<i>Metals</i>													
Aluminum	3/ 6	1.27E+00	7.88E-02	6.13E+00	6.98E+06	6.13E+00	2.00E-01	Yes <sup>a</sup>		3.65E+01	No	No	Yes
Antimony	1/ 6	2.34E-04	5.80E-04	5.80E-04	3.74E-04	3.74E-04	6.00E-03	No		1.46E-02	No	No	Yes
Arsenic	4/ 6	2.13E-03	9.50E-04	6.80E-03	7.64E-02	6.80E-03	5.00E-02	No		4.48E-05	Yes	Yes	Yes
Barium	6/ 6	2.17E-02	4.20E-03	4.54E-02	3.32E-02	3.32E-02	2.00E+00	No	2.56E-01	2.55E+00	No	No	No
Beryllium	4/ 6	1.49E-04	7.60E-05	5.70E-04	2.31E-02	5.70E-04	4.00E-03	No		7.30E-02	No	No	Yes
Cadmium	2/ 6	2.37E-04	4.80E-04	7.00E-04	4.69E-04	4.69E-04	5.00E-03	No		1.82E-02	No	No	Yes
Calcium	6/ 6	1.11E+02	1.98E+01	4.52E+02	1.45E+03	4.52E+02		N/A	5.31E+01		None	No	No
Cobalt	6/ 6	2.65E-02	6.70E-03	7.00E-02	1.58E-01	7.00E-02		N/A		7.30E-01	No	No	Yes
Copper	3/ 6	1.55E-03	2.00E-03	3.40E-03	2.55E-03	2.55E-03	1.30E+00	No		1.46E+00	No	No	Yes
Iron	4/ 6	2.56E+00	8.20E-03	7.25E+00	5.07E+00	5.07E+00	3.00E-01	Yes <sup>a</sup>	1.43E+00	1.09E+01	No	No	No
Lead	2/ 6	3.92E-04	5.10E-04	1.30E-03	7.80E-04	7.80E-04	1.50E-02	No			None	Yes	Yes
Magnesium	6/ 6	2.26E+01	8.97E+00	5.73E+01	5.89E+01	5.73E+01		N/A	1.50E+01		None	No	No
Manganese	6/ 6	2.32E+00	2.66E-01	6.17E+00	4.42E+01	6.17E+00	5.00E-02	Yes <sup>a</sup>	1.34E+00	8.76E-01	Yes	Yes	Yes
Nickel	6/ 6	8.98E-02	1.64E-02	3.06E-01	1.04E+00	3.06E-01	1.00E-01	Yes	8.34E-02	7.30E-01	No	No	Yes
Potassium	6/ 6	3.27E+00	1.77E+00	5.02E+00	4.88E+00	4.88E+00		N/A	5.77E+00		None	No	No
Sodium	6/ 6	7.34E+00	1.50E+00	2.32E+01	4.03E+01	2.32E+01		N/A	5.14E+01		None	No	No
Vanadium	1/ 6	7.67E-04	1.60E-03	1.60E-03	1.10E-03	1.10E-03		N/A		2.55E-01	No	No	Yes
Zinc	6/ 6	1.03E-01	8.20E-03	3.12E-01	2.10E+01	3.12E-01	5.00E+00	No <sup>a</sup>	5.23E-02	1.09E+01	No	No	Yes
<i>Organics-Volatile</i>													
Carbon Disulfide	6/ 6	2.67E-03	6.60E-04	7.90E-03	1.82E-02	7.90E-03		N/A		1.04E+00	No	No	Yes

<sup>a</sup> Secondary maximum contaminant level (MCL).

COPC = Constituent of potential concern.

N/A = Not applicable.

RI = Remedial investigation.

UCL = Upper confidence limit.

Table 2-2. Detected Analytes in RQL Phase I RI Wells, Baseline Sampling Event (December 2003)

Media		Groundwater Ramsdell Monitoring Well RQLmw-012 RQ0139 RQLmw-012-0139- GW	Groundwater Ramsdell Monitoring Well RQLmw-012 RQ0160 RQLmw-012-0160- GW	Groundwater Ramsdell Monitoring Well RQLmw-013 RQ0140 RQLmw-013-0140- GW	Groundwater Ramsdell Monitoring Well RQLmw-014 RQ0141 RQLmw-014-0141- GW	Groundwater Ramsdell Monitoring Well RQLmw-015 RQ0142 RQLmw-015-0142- GW	Groundwater Ramsdell Monitoring Well RQLmw-016 RQ0143 RQLmw-016-0143- GW	Groundwater Ramsdell Monitoring Well RQLmw-017 RQ0144 RQLmw-017-0144- GW
Location Station Sample ID								
Customer ID								
Date		12/02/2003	12/02/2003	12/02/2003	12/02/2003	12/04/2003	12/04/2003	12/01/2003
Field Type		Grab	Field Duplicate	Grab	Grab	Grab	Grab	Grab
Analyte (mg/L)	Units							
<i>Dissolved Metals</i>								
Aluminum	mg/L	1.38 = *	1.4 = *	6.13 = *	0.0105 U	0.0298 U	0.0413 U	0.0788 = *
Antimony	mg/L	0.00033 U	0.00033 U	0.00033 U	0.00033 U	0.00058 J *	0.00033 U	0.00033 U
Arsenic	mg/L	0.00055 U	0.00055 U	0.002 = *	0.00055 U	0.0068 = *	0.0025 = *	0.00095 J *
Barium	mg/L	0.0238 J	0.024 J	0.0454 J	0.0138 J	0.0042 =	0.0261 =	0.0167 J
Beryllium	mg/L	0.000076 J *	0.000083 = *	0.00057 = *	0.000021 U	0.000021 U	0.000076 J *	0.00015 = *
Cadmium	mg/L	0.0007 = *	0.00075 = *	0.00048 = *	0.00012 U	0.00012 U	0.00012 U	0.00012 U
Calcium	mg/L	50.6 =	51.1 =	19.8 =	40.2 =	20.4 =	452 = *	81.3 = *
Cobalt	mg/L	0.0084 = *	0.0085 = *	0.0452 = *	0.0067 = *	0.0141 = *	0.0143 = *	0.07 = *
Copper	mg/L	0.0034 J *	0.0037 J *	0.002 J *	0.001 UJ	0.0021 U	0.00024 U	0.0022 J *
Iron	mg/L	0.0082 J	0.0189 J	4.6 = *	3.47 = *	0.0134 U	7.25 = *	0.0065 U
Lead	mg/L	0.0013 = *	0.0014 = *	0.00051 J *	0.00018 U	0.00043 U	0.00029 U	0.00018 U
Magnesium	mg/L	13.6 =	13.8 =	11.9 =	17.3 = *	8.97 =	57.3 = *	26.3 = *
Manganese	mg/L	0.266 =	0.27 =	0.584 =	1.59 = *	0.682 =	6.17 = *	4.63 = *
Nickel	mg/L	0.0202 =	0.0205 =	0.0906 = *	0.0164 =	0.0437 =	0.062 =	0.306 = *
Potassium	mg/L	5.02 =	5.08 =	2.87 =	4.04 =	1.77 =	2.67 =	3.24 =
Sodium	mg/L	3.63 =	3.68 =	23.2 =	3.79 =	1.5 =	6.82 =	5.12 =
Vanadium	mg/L	0.0012 U	0.0012 U	0.0012 U	0.0016 J *	0.0012 U	0.0012 U	0.0012 U
Zinc	mg/L	0.0415 =	0.0433 =	0.235 = *	0.0111 =	0.0082 J	0.0097 J	0.312 = *
<i>Volatile Organics</i>								
Carbon Disulfide	mg/L	0.00066 J	0.0017 =	0.0025 =	0.00069 J	0.0033 =	0.0079 =	0.00095 J
Chloromethane	mg/L	0.001 U	0.0038 =	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U

ID = Identifier.

RI = Remedial investigation.

RQL = Ramsdell Quarry Landfill.

Qualifiers:

J = Estimated value less than reporting limits.

U = Non-detect.

"=" = Analyte present and concentration accurate.

\* = Value above facility-wide background.

Table 2-3. Summary of COPC Screening of RQL Groundwater, Wet Season Sampling Event, Phase I RI (May 2004)

Analyte (mg/L)	Results >Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	MCL	Max. Det.> MCL?	Site Background Criteria	Region 9 Tap Water Criteria	Max Detect > Tap Water Criteria	COPC	Site Related?
<i>Metals</i>													
Aluminum	3/ 6	2.77E+00	6.56E-01	1.14E+01	1.11E+10	1.14E+01	2.00E-01	Yes <sup>a</sup>		3.65E+01	No	No	Yes
Arsenic	2/ 6	4.73E-04	9.40E-04	1.20E-03	8.60E-04	8.60E-04	5.00E-02	No		4.48E-05	Yes	Yes	Yes
Barium	6/ 6	1.92E-02	2.00E-03	3.16E-02	2.92E-02	2.92E-02	2.00E+00	No	2.56E-01	2.55E+00	No	No	No
Beryllium	4/ 6	5.35E-04	3.10E-05	2.70E-03	7.22E+00	2.70E-03	4.00E-03	No		7.30E-02	No	No	Yes
Cadmium	3/ 6	3.85E-04	2.10E-04	1.50E-03	4.62E-03	1.50E-03	5.00E-03	No		1.82E-02	No	No	Yes
Calcium	6/ 6	4.34E+01	1.85E+01	1.26E+02	1.32E+02	1.26E+02		N/A	5.31E+01		None	No	No
Chromium	4/ 6	1.97E-03	1.80E-03	4.80E-03	9.02E-03	4.80E-03	1.00E-01	No			None	Yes	Yes
Cobalt	6/ 6	1.81E-02	8.80E-04	5.33E-02	1.24E+00	5.33E-02		N/A		7.30E-01	No	No	Yes
Iron	4/ 6	3.01E+00	3.06E+00	6.74E+00	5.20E+00	5.20E+00	3.00E-01	Yes <sup>a</sup>	1.43E+00	1.09E+01	No	No	No
Lead	6/ 6	9.60E-04	2.00E-04	3.60E-03	1.06E-02	3.60E-03	1.50E-02	No			None	Yes	Yes
Magnesium	6/ 6	1.21E+01	8.73E+00	1.96E+01	1.69E+01	1.69E+01		N/A	1.50E+01		None	No	No
Manganese	6/ 6	2.19E+00	2.14E-01	7.08E+00	7.36E+01	7.08E+00	5.00E-02	Yes	1.34E+00	8.76E-01	Yes	Yes	Yes
Nickel	6/ 6	4.56E-02	1.00E-02	1.36E-01	4.71E-01	1.36E-01	1.00E-01	Yes <sup>a</sup>	8.34E-02	7.30E-01	No	No	Yes
Potassium	6/ 6	2.92E+00	1.29E+00	3.93E+00	3.74E+00	3.74E+00		N/A	5.77E+00		None	No	No
Selenium	1/ 6	2.49E-04	4.70E-04	4.70E-04	3.38E-04	3.38E-04	5.00E-02	No		1.82E-01	No	No	Yes
Sodium	6/ 6	6.44E+00	9.15E-01	1.92E+01	7.12E+01	1.92E+01		N/A	5.14E+01		None	No	No
Zinc	6/ 6	1.96E-01	2.27E-02	7.81E-01	6.42E+00	7.81E-01	5.00E+00	No <sup>a</sup>	5.23E-02	1.09E+01	No	No	Yes
<i>Organics-Semivolatile</i>													
Bis(2-ethylhexyl)phthalate	6/ 6	9.48E-03	3.10E-03	2.20E-02	4.20E-02	2.20E-02	6.00E-03	Yes		4.80E-03	Yes	Yes	Yes
Di-n-butyl phthalate	5/ 6	2.45E-03	1.50E-03	2.00E-03	3.89E-03	2.00E-03		N/A		3.65E+00	No	No	Yes

<sup>a</sup> Secondary maximum contaminant level (MCL).

COPC = Constituent of potential concern.

N/A = Not applicable.

RI = Remedial investigation.

RQL = Ramsdell Quarry Landfill.

Table 2-4. Detected Analytes in RQL Phase I RI Wells, Wet Season Sampling Event (May 2004)

Media		Groundwater Ramsdell Monitoring Well	Groundwater Ramsdell Monitoring Well	Groundwater Ramsdell Monitoring Well	Groundwater Ramsdell Monitoring Well	Groundwater Ramsdell Monitoring Well	Groundwater Ramsdell Monitoring Well	Groundwater Ramsdell Monitoring Well
Location Station Sample ID		RQLmw-012 RQ0151	RQLmw-013 RQ0152	RQLmw-013 RQ0159	RQLmw-014 RQ0153	RQLmw-015 RQ0154	RQLmw-016 RQ0155	RQLmw-017 RQ0156
Customer ID		RQLmw-012- 0151-GW	RQLmw-013- 0152-GW	RQLmw-013- 0159-GW	RQLmw-014- 0153-GW	RQLmw-015- 0154-GW	RQLmw-016- 0155-GW	RQLmw-017- 0156-GW
Date		05/20/2004	05/19/2004	05/19/2004	05/19/2004	05/21/2004	05/21/2004	05/19/2004
Field Type		Grab	Grab	Field Duplicate	Grab	Grab	Grab	Grab
Analyte (mg/L)	Units							
<i>Dissolved Metals</i>								
Aluminum	mg/L	0.656 = *	4.53 = *	4.56 = *	0.0151 U	0.0245 U	0.0248 U	11.4 = *
Arsenic	mg/L	0.00035 U	0.0012 J *	0.0014 = *	0.00035 U	0.00035 U	0.00094 J *	0.00035 U
Barium	mg/L	0.0301 =	0.0316 =	0.0321 =	0.0276 =	0.002 =	0.0112 =	0.0125 =
Beryllium	mg/L	0.000061 J *	0.00039 = *	0.00037 = *	0.000025 U	0.000031 J *	0.000025 U	0.0027 = *
Cadmium	mg/L	0.00021 J *	0.00033 J *	0.00036 J *	0.00018 U	0.00018 U	0.00018 U	0.0015 = *
Calcium	mg/L	28.6 =	22.5 =	22.4 =	21 =	18.5 =	126 = *	43.5 =
Chromium	mg/L	0.0019 J *	0.0022 J *	0.0011 U	0.0018 J *	0.0011 U	0.0011 U	0.0048 = *
Cobalt	mg/L	0.0064 = *	0.0338 = *	0.0348 = *	0.0094 = *	0.00088 = *	0.0048 = *	0.0533 = *
Iron	mg/L	0.0186 U	3.33 = *	3.37 = *	6.74 = *	0.0232 U	4.88 = *	3.06 = *
Lead	mg/L	0.00095 = *	0.00033 J *	0.00041 J *	0.0002 J *	0.00043 J *	0.00025 J *	0.0036 = *
Magnesium	mg/L	8.73 =	11.9 =	11.7 =	10.3 =	8.77 =	19.6 = *	13.3 =
Manganese	mg/L	0.214 =	0.461 =	0.469 =	2.08 = *	0.854 =	2.44 = *	7.08 = *
Nickel	mg/L	0.0223 =	0.0724 =	0.0735 =	0.0193 =	0.0133 =	0.01 =	0.136 = *
Potassium	mg/L	3.93 =	2.46 =	2.44 =	2.67 =	1.29 =	3.89 =	3.27 =
Selenium	mg/L	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00047 J *
Sodium	mg/L	2.39 =	19.2 =	19.4 =	4.01 =	0.915 =	7.14 =	4.99 =
Zinc	mg/L	0.0399 J	0.179 J *	0.187 J *	0.0227 J	0.115 J *	0.0402 J	0.781 J *
<i>Semivolatile Organics</i>								
Bis(2-ethylhexyl)phthalate	mg/L	0.022 =	0.004 J	0.0033 J	0.0033 J	0.0031 J	0.015 =	0.0095 J
Di-n-butyl phthalate	mg/L	0.002 J	0.0015 J	0.0015 J	0.002 J	0.012 U	0.0015 J	0.0017 J

ID = Identifier.

RI = Remedial investigation.

RQL = Ramsdell Quarry Landfill.

Qualifiers:

J = Estimated value less than reporting limits.

U = Non-detect.

"=" = Analyte present and concentration accurate.

\* = Value above facility-wide background.



### 3.0 DECEMBER 2004 DRY SEASON SAMPLING

Prior to purging and sampling for the December 2004 follow-on sampling event of the Phase I RI groundwater monitoring wells, water level measurements were taken at each of the six newly installed groundwater wells (RQLmw-012 through RQLmw-017), as well as the existing groundwater wells (RQLmw-006 through RQLmw-011). Following AOC-wide water level measurements, wells RQLmw-012 through RQLmw-017 were also sampled for chemical analysis.

#### 3.1 WATER LEVEL MEASUREMENTS

Table 3-1 presents the results of December 2004 water level measurements under dry season conditions. Figure 3-1 shows the groundwater potentiometric surface based on the December 2004 water level measurements. The potentiometric map for the wet season event (May 2004) is shown on Figure 2-1.

**Table 3-1. Groundwater Elevations from the Dry Season Sampling Event (December 2004)**

Well ID	Elev. Top of PVC <sup>a</sup>	Depth to Water (ft)	Groundwater Elevation <sup>a</sup>
RQLmw-006	995.39	33.61	961.78
RQLmw-007	965.91	4.92	960.99
RQLmw-008	966.08	5.24	960.84
RQLmw-009	964.58	3.93	960.65
RQLmw-010	982.14	24.44	957.70
RQLmw-011	976.57	21.12	955.45
RQLmw-012	977.65	21.48	956.17
RQLmw-013	980.71	24.45	956.26
RQLmw-014	973.49	19.37	954.12
RQLmw-015	991.26	30.36	960.90
RQLmw-016	996.60	34.00	962.60
RQLmw-017	991.23	29.31	961.92

<sup>a</sup> Elevations in feet above mean sea level.

ID = Identifier.

PVC = Polyvinyl chloride.

Potentiometric data collected immediately before the December 2004 sampling event of the investigation show that horizontal potentiometric gradients are consistently to the northeast across the site. The water table is between 2 and 6 ft lower, as compared to measurements taken in May 2004, and a gradient of approximately 8 ft exists between the most upgradient well (RQLmw-017) and the most downgradient well (RQLmw-014). The difference between these two wells during the previous (wet season) event was nearly 11 ft.

#### 3.2 MONITORING WELL SAMPLING

Following AOC-wide water level measurements, groundwater samples were collected from each of the six Phase I RI monitoring wells.

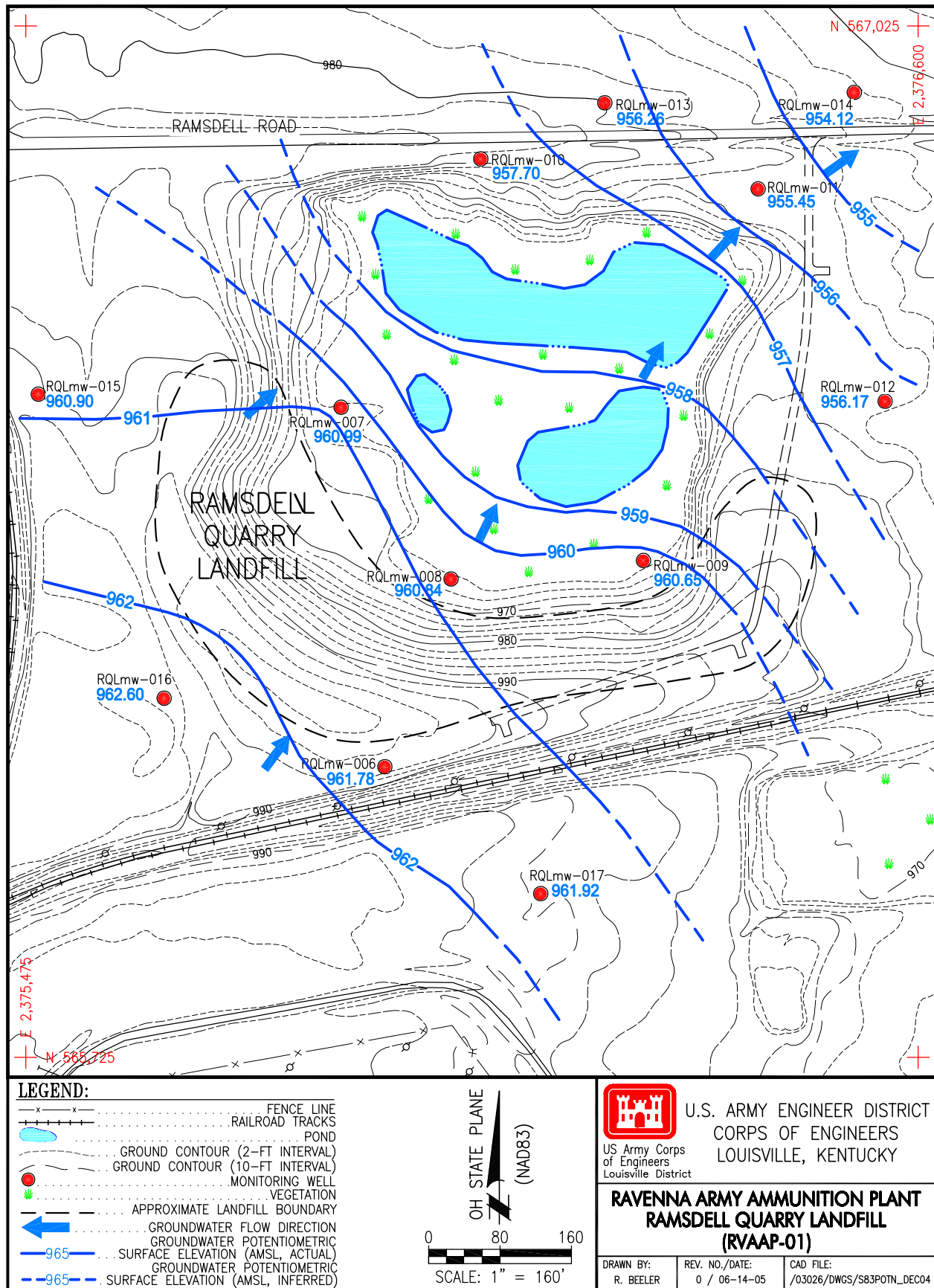


Figure 3-1. Ramsdell Quarry Potentiometric Surface, Dry Season Sampling Event, December 2004

The procedure for sampling is detailed in Section 4.3.4.2 of the Facility-wide Sampling and Analysis Plan (USACE 2001). All groundwater samples from RQL were analyzed for target analyte list (TAL) metals (filtered only), explosives, propellants, cyanide, VOCs, SVOCs, and pesticides/PCBs. Despite being developed in accordance with work plan specifications and using micropurging sampling methods, where possible, to obtain the lowest turbidity levels practicable, turbidity levels remained above 5 nephelometric turbidity units in most wells. Accordingly, only filtered metals samples were obtained. Groundwater samples analyzed for TAL metals were filtered during sample collection using an in-line, disposable barrel filter with 0.45-um pores. For those wells with slow recharge rates where micro-purge techniques were not applicable (RQLmw-016 and RQLmw-017), samples for TAL metals were filtered using a negative pressure, hand-operated vacuum pump and collection flask with a 0.45-um pore size filter. Analytical program overview for the dry season event sampling was consistent with that for the wet season (May 2004) and baseline sampling during the Phase I RI. Groundwater sampling logs are presented in [Appendix A](#); and complete analytical results for December 2004 are included in [Appendix B](#).

### 3.3 RESULTS

[Table 3-2](#) presents the summary statistics for the dry season sampling event. A total of 13 inorganic and 2 organic SRCs, 1 VOC, and 1 SVOC were detected in the dry season samples. Chromium, detected in well RQLmw-016 at a concentration of 0.0113, is considered to be a COPC, as there are no promulgated PRG or MCL values against which to compare. Arsenic, lead, and manganese exceeded the U. S. Environmental Protection Agency Region 9 tap water criteria, and are considered to be COPCs. However, it should be noted that while arsenic exceeded the PRG (in the case of lead, no Region 9 tap water criteria exist), the maximum concentration of this metal was below promulgated criteria. The federal and Ohio MCL for arsenic is 0.05 mg/L, and the maximum detected concentration in December 2004 was 0.0023 mg/L. Likewise, for lead, the federal treatment technique standard is 0.015 mg/L, and the maximum detected concentration in December 2004 was 0.0011 mg/L. Manganese (5.87 mg/L) exceeded the secondary MCL value of 0.05 mg/L, but the detected concentration was less than in May 2004 (7.08 mg/L). The phthalate, bis(2-ethylhexyl)phthalate, was detected in one well (RQLmw-015) during the December 2004 analysis at a concentration of 0.0043 mg/L, which is below the Region 9 tap water criteria (0.0048 mg/L). Therefore, it is not considered a COPC. Phthalate detections are sporadic at RQL, as all six wells had detections of phthalates during the May 2004 sampling event, and none were detected during the Phase I RI baseline event. The VOC, acetone, was detected in one well in the December 2004 event, but the detected concentration was also below the PRG ([Table 3-2](#)), and acetone is not considered to be a COPC.

As in May 2004, the December 2004 sample from well RQLmw-017 had the greatest number of SRCs detected (11). All SRCs present in this well were inorganics. Six of the metals considered to be SRCs were not detected in the background data set, and site background for these metals (aluminum, beryllium, cadmium, copper, and lead) was set to zero. Therefore, any detections of these metals would, by definition, exceed the background criteria, but may not indicate a site-related contamination problem. Of the five SRCs detected, which had background concentrations greater than zero, only manganese and zinc were detected at concentrations more than two times the background criteria. The maximum concentrations of SRCs from the December 2004 event were spread among several wells, with five maximum concentrations in well RQLms-016, maximum concentrations of four SRCs in RQLmw-017, and maximum concentrations of three SRCs in RQLmw-013 ([Table 3-3](#)). The explosives noted in groundwater during the 1998/1999 Groundwater Investigation were not detected in any Phase I RI groundwater well in the 2003 baseline or 2004 wet and dry season sample events. It can be concluded that the bounds of explosive contamination in groundwater have been adequately defined, and explosive contaminant migration is not occurring off the AOC. The continual low concentrations of metals detected are fairly indicative of landfill environments and, with the exception of manganese, concentrations continue to fall below applicable federal MCLs.

Table 3-2. Summary of COPC Screening for RQL Groundwater, Dry Season Sampling Event, Phase I RI (December 2004)

Analyte (mg/L)	Results >Detection Limit	Average Result	Minimum Detect	Maximum Detect	95% UCL of Mean	Exposure Concentration	MCL	Max. Det.> MCL?	Site Background Criteria	Region 9 Tap Water Criteria	Max Detect > Tap Water Criteria	COPC	Site Related?
<i>Metals</i>													
Aluminum	6/ 6	1.58E+00	1.19E-02	5.92E+00	1.67E+07	5.92E+00	2.00E-01	Yes <sup>a</sup>		3.65E+01	No	No	Yes
Antimony	1/ 6	8.25E-05	1.70E-04	1.70E-04	1.18E-04	1.18E-04	6.00E-03	No		1.46E-02	No	No	Yes
Arsenic	2/ 6	7.17E-04	1.30E-03	2.30E-03	1.45E-03	1.45E-03	5.00E-02	No		4.48E-05	Yes	Yes	Yes
Barium	6/ 6	1.71E-02	1.60E-03	4.12E-02	2.77E-01	4.12E-02	2.00E+00	No	2.56E-01	2.55E+00	No	No	No
Beryllium	4/ 6	3.33E-04	2.90E-05	1.10E-03	3.02E+00	1.10E-03	4.00E-03	No		7.30E-02	No	No	Yes
Cadmium	2/ 6	2.05E-04	4.30E-04	4.40E-04	3.52E-04	3.52E-04	5.00E-03	No		1.82E-02	No	No	Yes
Calcium	6/ 6	1.03E+02	2.32E+01	3.63E+02	1.14E+03	3.63E+02		N/A	5.31E+01		None	No	No
Chromium	1/ 6	2.34E-03	1.13E-02	1.13E-02	5.95E-03	5.95E-03	1.00E-01	No			None	Yes	Yes
Cobalt	6/ 6	1.60E-02	1.70E-03	4.21E-02	2.80E-01	4.21E-02		N/A		7.30E-01	No	No	Yes
Copper	4/ 6	1.57E-03	1.30E-03	3.40E-03	2.53E-03	2.53E-03	1.30E+00	No		1.46E+00	No	No	Yes
Iron	6/ 6	3.09E+00	1.05E-01	1.18E+01	4.24E+03	1.18E+01	3.00E-01	Yes <sup>a</sup>	1.43E+00	1.09E+01	Yes	No	No
Lead	5/ 6	5.03E-04	3.00E-04	1.10E-03	2.26E-03	1.10E-03	1.50E-02	No			None	Yes	Yes
Magnesium	6/ 6	2.27E+01	1.04E+01	5.15E+01	5.73E+01	5.15E+01		N/A	1.50E+01		None	No	No
Manganese	6/ 6	2.61E+00	4.05E-01	5.87E+00	3.45E+01	5.87E+00	5.00E-02	Yes <sup>a</sup>	1.34E+00	8.76E-01	Yes	Yes	Yes
Nickel	6/ 6	4.35E-02	1.08E-02	9.75E-02	2.52E-01	9.75E-02	1.00E-01	No	8.34E-02	7.30E-01	No	No	Yes
Potassium	6/ 6	3.44E+00	1.52E+00	6.43E+00	6.17E+00	6.17E+00		N/A	5.77E+00		None	No	No
Sodium	6/ 6	1.01E+01	2.49E+00	3.63E+01	5.54E+01	3.63E+01		N/A	5.14E+01		None	No	No
Thallium	1/ 6	3.88E-04	1.40E-03	1.40E-03	8.11E-04	8.11E-04		N/A		2.41E-03	No	No	Yes
Zinc	5/ 6	1.21E-01	1.70E-02	3.73E-01	2.99E+01	3.73E-01	5.00E+00	No <sup>a</sup>	5.23E-02	1.09E+01	No	No	Yes
<i>Organics-Semivolatile</i>													
Bis(2-ethylhexyl)phthalate	1/ 6	6.13E-03	4.30E-03	4.30E-03	6.87E-03	4.30E-03	6.00E-03	No		4.80E-03	No	No	Yes
<i>Organics-Volatile</i>													
Acetone	1/ 6	4.42E-03	9.00E-03	9.00E-03	6.52E-03	6.52E-03		N/A		6.08E-01	No	No	Yes

<sup>a</sup> Secondary maximum contaminant level (MCL).

COPC = Constituent of potential concern.

N/A = Not applicable.

RI = Remedial Investigation.

UCL = Upper confidence limit.

Table 3-3. Detected Analytes in RQL Phase I RI Wells, Dry Season Sampling Event (December 2004)

Media		Groundwater Ramsdell Monitoring Well RQLmw-012 RQ0145 RQLmw-012- 0145-GW 12/03/2004 Grab	Groundwater Ramsdell Monitoring Well RQLmw-012 RQ0161 RQLmw-012- 0161-GW 12/03/2004 Field Duplicate	Groundwater Ramsdell Monitoring Well RQLmw-013 RQ0146 RQLmw-013- 0146-GW 12/03/2004 Grab	Groundwater Ramsdell Monitoring Well RQLmw-014 RQ0147 RQLmw-014- 0147-GW 12/03/2004 Grab	Groundwater Ramsdell Monitoring Well RQLmw-015 RQ0148 RQLmw-015- 0148-GW 12/02/2004 Grab	Groundwater Ramsdell Monitoring Well RQLmw-016 RQ0149 RQLmw-016- 0149-GW 12/03/2004 Grab	Groundwater Ramsdell Monitoring Well RQLmw-017 RQ0150 RQLmw-017- 0150-GW 12/02/2004 Grab
Location Station Sample ID	Units							
Customer ID								
Date								
Field Type								
Analyte (mg/L)								
<i>Inorganics</i>								
Aluminum	mg/L	1.11 = *	1.24 = *	5.92 = *	0.0123 J *	0.0119 J *	0.0366 = *	2.4 = *
Antimony	mg/L	0.00013 U	0.00013 U	0.00013 U	0.00013 U	0.00013 U	0.00017 J *	0.00013 U
Arsenic	mg/L	0.00035 U	0.00035 U	0.0023 = *	0.00035 U	0.0013 J *	0.00035 U	0.00035 U
Barium	mg/L	0.0207 =	0.0216 =	0.0412 =	0.0204 =	0.0016 =	0.0118 =	0.0067 =
Beryllium	mg/L	0.000063 J *	0.00007 J *	0.00078 = *	0.000025 U	0.000029 J *	0.000025 U	0.0011 = *
Cadmium	mg/L	0.00044 J *	0.00049 J *	0.00018 U	0.00018 U	0.00018 U	0.00018 U	0.00043 J *
Calcium	mg/L	100 = *	104 = *	25.8 =	29 =	23.2 =	363 = *	73.7 = *
Chromium	mg/L	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0113 = *	0.0011 U
Cobalt	mg/L	0.0055 = *	0.006 = *	0.0421 = *	0.0093 = *	0.0017 = *	0.0056 = *	0.0319 = *
Copper	mg/L	0.0034 = *	0.0034 = *	0.00072 U	0.00077 U	0.0018 = *	0.0013 = *	0.0022 = *
Iron	mg/L	0.105 =	0.116 =	4.83 = *	11.8 = *	0.282 =	1.34 =	0.152 =
Lead	mg/L	0.0011 = *	0.00074 J *	0.00069 J *	0.00032 J *	0.0003 J *	0.0002 U	0.00051 J *
Magnesium	mg/L	27.5 = *	29 = *	11.2 =	12.1 =	10.4 =	51.5 = *	23.5 = *
Manganese	mg/L	0.405 =	0.418 =	0.781 =	2.59 = *	0.957 =	5.87 = *	5.08 = *
Nickel	mg/L	0.0157 =	0.0167 =	0.0893 = *	0.021 =	0.0108 =	0.0269 =	0.0975 = *
Potassium	mg/L	6.43 = *	6.71 = *	2.78 =	3.2 =	1.52 =	4.04 =	2.68 =
Sodium	mg/L	6.09 =	6.4 =	36.3 =	3.51 =	2.49 =	7.25 =	5.19 =
Thallium	mg/L	0.00083 U	0.0009 U	0.0014 = *	0.00018 U	0.000059 U	0.00048 U	0.00031 U
Zinc	mg/L	0.0415 J	0.0425 J	0.241 J *	0.017 J	0.0499 =	0.0085 U	0.373 = *
<i>Semivolatile Organics</i>								
Bis(2-ethylhexyl)phthalate	mg/L	0.013 U	0.013 U	0.013 U	0.013 U	0.0043 J	0.013 U	0.013 U
<i>Volatile Organics</i>								
Acetone	mg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.01 UJ	0.009 =	0.01 UJ

ID = Identifier.

RI = Remedial investigation.

RQL = Ramsdell Quarry Landfill

Qualifiers:

J = Estimated value less than reporting limits.

U = Non-detect.

"=" = Analyte present and concentration accurate.

\* = Value above facility-wide background.

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**APPENDIX A**

**GROUNDWATER SAMPLING LOGS  
AND CHAINS OF CUSTODY**

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## COMPREHENSIVE WATER LEVEL MEASUREMENTS

**PROJECT NAME:** Ramsdell Quarry Phase I RI

**DELIVERY ORDER NO:** CY11

WELL NUMBER	DATE	TIME	DEPTH TO WATER *	INSTRUMENT	SERIAL NO.	REMARKS	
RQL-mwΦΦ6	12/01/04	1344	33.61'	Heron DT			
RQL-mwΦΦ7	↓	1342	4.92'				
RQL-mwΦΦ8		1344	5.24'				
RQL-mwΦΦ9		1348	3.93'				
RQL-mwΦ10		1311	24.44'				
RQL-mwΦ11		1315	21.12'				
RQL-mwΦ12		1318	21.48'				
RQL-mwΦ13		1322	24.45'				
RQL-mwΦ14		1325	19.37'				
RQL-mwΦ15		1329	30.36'				
RQL-mwΦ16		1336	34.40'				
RQL-mwΦ17		↓	1338	29.31'			
					Xm 12/01/04		

\* All measurements from V-notch top of casing

RECORDED BY:

(Signature and Date)

QA CHECK BY:

(Signature and Date)

A-3

2

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Ramsdell Quarry Phase I RI

DELIVERY ORDER NO: CY11

Date (mm/dd/yy): 12/03/04

Su M Tu W Th (F) Sa

PAGE 1 OF 3

KELLY MILNER

JEN LOERCH

Narrative (include time and location):

0820 Arrive at RQL-mw-012 and set up for micropurging using bladder pump.

Water level = 21.28 ft BTOC

PID = 0.0 ppm

0835 Take initial reading after setting controller at 5 sec discharge, 15 sec refill, 30 PSIG. No draw down of water in well.

0900 Collect sample RQ0145 after parameters stabilize. Also collect duplicate sample RQ0161 and split sample RQ0164. The regular sample RQ0145 is an MS/MSD.

*9:00 12/03/04*

Daily Weather Conditions: (A.M.) LT SNOW, CLOUDY, 35°F

P.M.

Recorded By *Jen Loerch*

QA Checked By *K. W.*

### WELL PURGE RECORD

PROJECT NAME: Ramsdell Quarry Phase I RI

DELIVERY ORDER NO: CY11

Page 2 of 3

Date: 12 / 03 / 04

Time: 0820

Well Number and Location: RQL-MW-012

Purge Crew: K. MILNER, J. LOERCH

Date and Time: Begin: 12/03/04 / 0835 Completed: 12/03/04 / 1100

Purge Method(S): BLADDER PUMP

Total Quantity of Water Removed: 1.2 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	15251	12/03/04
Specific Conductivity	↓	↓
Water Level	HERON DIPPERT 15287	N/A
pH	15251	12/03/04

Recorded By: [Signature] <sup>12/03/04</sup>  
(Signature and Date)

QA Check By: [Signature] <sup>12/3/04</sup>  
(Signature and Date)

## WELL PURGE RECORD

PROJECT NAME: Ramsdell Quarry Phase I RI

DELIVERY ORDER NO: CY11

PAGE 3 OF 3

WELL NUMBER AND LOCATION: RQL-mw-012

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY ( $\mu$ MHOS/CM) <i>ms/cm</i>	pH (Standard Units)	TURBIDITY (NTU)	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
12/03/04	0835	0	8.3	0.355	4.40	66	0	—	initial reading
	0840	0.20	10.4	0.624	4.99	31	0.2	—	
	0845	0.20	10.8	0.734	5.24	20	0.4	—	
	0850	0.20	10.8	0.825	5.27	13	0.6	—	
	0855	0.20	10.7	0.850	5.32	6	0.8	—	
	0900	0.20	10.3	0.846	5.35	4	1.0	—	params stable, begin collecting sample
	0900	—	—	—	—	—	1.2	—	RO0145 (MS/MSB) & DUP RO0101 & SPLIT
✓	1045	—	10.4	0.822	5.31	—	—	—	RO0104 FINAL READING
<i>Spec 12/03/04</i>									

RECORDED BY: Jim J. [Signature] 12/03/04

(Signature and Date)

QA CHECK BY: [Signature] 12/3/04

(Signature and Date)

A-6

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TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Ramsdell Quarry Phase I RI

DELIVERY ORDER NO: CY11

Date (mm/dd/yy): 12/03/04 Su M Tu W Th (F) Sa

PAGE 1 OF 3

KELLY MILNER

JEN LOERCH

Narrative (include time and location):

1115 Arrive at RQL-mw-Φ13 and set up for micropurging and sampling using bladder pump.

Water level = 24.38 ft BTOC

1124 Begin micropurging. Controller settings: 6 sec discharge, 15 sec refill, 35 PSIG. About 100 ml/min.

1145 Collect sample RQΦ146.

Daily Weather Conditions: (A.M.) CLOUDY, 38°F

P.M.

Recorded By: [Signature] 12/03/04

QA Checked By: [Signature]

### WELL PURGE RECORD

PROJECT NAME: Ramsdell Quarry Phase I RI

DELIVERY ORDER NO: CY11

Page 2 of 3

Date: 12/03/04

Time: 1115

Well Number and Location: ROL-MW-Φ13

Purge Crew: KELLY MILNER, JEN LOERCH

Date and Time: Begin: 12/03/04 / 1124 Completed: 12/03/04 / 1320

Purge Method(S): BLADDER PUMP

Total Quantity of Water Removed: 0.5 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	15251	12/03/04
Specific Conductivity	↓	↓
Water Level	HERON DIPPERT 15287	N/A
pH	15251	12/03/04

Recorded By: [Signature] 12/03/04  
(Signature and Date)

QA Check By: \_\_\_\_\_  
(Signature and Date)



# WELL PURGE RECORD

PROJECT NAME: Ramsdell Quarry Phase I RI

DELIVERY ORDER NO: CY11

PAGE 3 OF 3

WELL NUMBER AND LOCATION: RQL-mw-013

DATE	TIME	TOTAL GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY <small>(μMHOS/CM) MS/CM</small>	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS	
12/03/04	1124	0	7.3	0.349	4.47	512	0	—	initial reading	
	1129 #132	500 mL	7.7	0.364	4.35	492	500 mL	—		
	1134 #132	1000 mL	8.3 7.3	0.392	4.31	138	500 mL	—		
	1139 #142	1500 mL	7.4	0.404	4.27	210	500 mL	—		
	1144	2000 mL	7.7	0.430	4.27	207	500 mL	—		
	1145									COLLECT SAMPLE RQL0146
	1315		9.7	0.530	4.20	13		—	FINAL READINGS	
Jan 12/03/04										

RECORDED BY: [Signature] 12/03/04  
(Signature and Date)

QA CHECK BY: [Signature] 12/3/04  
(Signature and Date)

A-9

60

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# TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Ramsdell Quarry Phase I RI

DELIVERY ORDER NO: CY11

Date (mm/dd/yy): 12/03/04 Su M Tu W Th (F) Sa

PAGE 1 OF 3

KELLY MILNER

JEN LOERCH

Narrative (include time and location):

1355 Arrive at RQL-mw-014 and set up for micropurging using a bladder pump. H<sub>2</sub>O = 19.22'

1400 Begin micropurging. Controller settings: 5sec purge 15sec refill  
Water is bright orange initially.  
Collect sample RQ0147.

*Jan 12/03/04*

Daily Weather Conditions: (A.M.) 40°F, windy

P.M.

Recorded By

*[Signature]*

QA Checked By

*[Signature]* 12/03/04

**WELL PURGE RECORD**

**PROJECT NAME: Ramsdell Quarry Phase I RI**      **DELIVERY ORDER NO: CY11**

Page 2 of 3

Date: 12/03/04

Time: 1355

Well Number and Location: RQL-MW-014

Purge Crew: K. MILNER, J. LOERCH

Date and Time:      Begin: 12/3/04 <sup>SEA 3/29/05</sup> 1355      Completed: 12/3/04 <sup>SEA 3/28/05</sup> 1500

Purge Method(S): BLADDER PUMP

Total Quantity of Water Removed: 0.6 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	15251	12/03/04
Specific Conductivity	↓	↓
Water Level	HERON DIPPER T 15287	N/A
pH	15251	12/03/04

Recorded By: [Signature] 12/03/04  
(Signature and Date)

QA Check By: [Signature] 12/3/04  
(Signature and Date)  
Sally Alsher 3/29/05

**WELL PURGE RECORD**

**PROJECT NAME:** Ramsdell Quarry Phase I RI

**DELIVERY ORDER NO:** CY11

PAGE 3 OF 3

WELL NUMBER AND LOCATION: RQL-mwφ14

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (μMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
12/03/04	1415	φ	1φ.4	φ.20φ	5.95	2φ1	φ	φ	initial readings
↓	142φ	φ.2	11.1	φ.223	6.φ4	2φφ	φ.2	—	
↓	1425	φ.2	11.3	φ.239	6.φ8	2φ2	φ.4	—	
↓	143φ	φ.2	11.5	φ.242	6.φ8	2φ6	φ.6	—	params stable - collect sample
↓	143φ	—	—	—	—	—	—	—	RQφ147 collected
↓	1455	—	11.3	φ.343	6.14	φ3	φ.6	—	final readings
<del>gpc 12/27/04</del>									

RECORDED BY: [Signature] 12/03/04  
(Signature and Date)

QA CHECK BY: [Signature] 12/03/04  
(Signature and Date)

A-12

44

TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Ramsdell Quarry Phase I RI

DELIVERY ORDER NO: CY11

Date (mm/dd/yy): 12/02/04

Su M Tu W Th F Sa

PAGE 1 OF 3

KELLY MILNER

JEN LOERCH

Narrative (include time and location):

1205 Arrive at MW-015 and set up for purging and sampling with bladder pump.

Water level = 30.45 ft BTOC

PID = 0.0 ppm

1310 Begin micropurging after experiencing problems with one of the pumps, which does not work. Switch pumps and are able to start micropurging. Controller is set at 2.0 sec discharge, 58.0 sec refill, 30 PSIG.

1355 Collect sample RQ0148

~~12/03/04~~

Daily Weather Conditions: A.M. MOSTLY CLOUDY, 38°F

P.M. PARTLY CLOUDY, 42°F

Recorded By *Jen Loerch* 12/02/04

QA Checked By *K.M.*

### WELL PURGE RECORD

PROJECT NAME: Ramsdell Quarry Phase I RI

DELIVERY ORDER NO: CY11

Page 2 of 3

Date: 12/02/04

Time: 1300

Well Number and Location: RQ-MS015

Purge Crew: K. Milner J. Loerch

Date and Time: Begin: 12/02/04, 1300 Completed: 12/2/04, 1400

Purge Method(S): Bladder pump

Total Quantity of Water Removed: 0.25 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	15251	12/02/04
Specific Conductivity	15251	↓
Water Level	15287	NA
pH	15251	12/02/04

Recorded By: \_\_\_\_\_  
(Signature and Date)

QA Check By: Jeff Hain 12/02/04  
(Signature and Date)

## WELL PURGE RECORD

PROJECT NAME: Ramsdell Quarry Phase I RI

DELIVERY ORDER NO: CY11

PAGE 3 OF 3

WELL NUMBER AND LOCATION: ROL-mw015

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
12/02/04	1310	0	9.7	0.231	6.07	459	0	—	initial readings
↓	1315	400ml	9.5	0.227	6.19	706	400ml	—	
	1320	400ml	9.6	0.226	6.20	205	800ml	—	
	1325	400ml	9.4	0.223	6.23	272	1200ml	—	parameters stable, collect sample
	1355	—	—	—	—	—	—	—	RO0148 collected
	1550	0	8.8	0.260	6.30	61	1200ml	—	final readings
<div style="position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%); opacity: 0.5;"> <p>gsc 12/03/04</p> </div>									

RECORDED BY:

K.M.  
(Signature and Date) 12/02/04

QA CHECK BY:

Jefferson 12/03/04  
(Signature and Date)

A-15

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TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Ramsdell Quarry Phase I RI

DELIVERY ORDER NO: CY11

Date (mm/dd/yy): 12/02/04 Su M Tu W Th F Sa

PAGE 1 OF 4

K. Milner

K. MILNER

Narrative (include time and location):

RQLMW-016

SEA 3/24/05

1350 - Set up to bail well dry. Cannot micropurge

this well

H<sub>2</sub>O = 34.7'

TD ~ 41.63'

1358 - initial Horiba readings

1430 - 11 gals removed - well bailed dry.

Will wait 24 hrs for recharge to sample

*jm* 12/03/04

Daily Weather Conditions: A.M.

P.M. 40°F, sunny

Recorded By *[Signature]* 12/02/04

QA Checked By *[Signature]* 12/03/04



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TASK TEAM ACTIVITY LOG SHEET

PROJECT NAME: Ramsdell Quarry Phase I RI

DELIVERY ORDER NO: CY11

Date (mm/dd/yy): 12/03/04 Su M Tu W Th (F) Sa

PAGE 2 OF 4

K. MILNER

Narrative (include time and location):

1215 RETURN TO RQL-MW-016 TO COLLECT SAMPLE (WELL BAILED DRY YESTERDAY).

1230 Collect sample RQ0149.

Daily Weather Conditions: A.M.

(P.M) MOSTLY CLOUDY, 38° F

Recorded By

*[Signature]*

12/03/04

QA Checked By

### WELL PURGE RECORD

PROJECT NAME: Ramsdell Quarry Phase I RI

DELIVERY ORDER NO: CY11

Page 2 of 34

Time: 1400 <sup>12/02/04</sup>

Date: 12/02/04

Well Number and Location: RQL-mw016

Purge Crew: K. Milner

Date and Time: Begin: 12/02/04, 1350 Completed: 12/3/04, 1245

Purge Method(S): disposable bailer

Total Quantity of Water Removed: 11 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	15251	12/2/04
Specific Conductivity	↓	↓
Water Level	15287	NA
pH	15251	12/2/04

Recorded By: K. M.  
(Signature and Date) 12/02/04

QA Check By: John 12/03/04  
(Signature and Date)

# WELL PURGE RECORD

PROJECT NAME: Ramsdell Quarry Phase I RI

DELIVERY ORDER NO: CY11

PAGE 3 OF 3-4 <sup>9th February</sup>

WELL NUMBER AND LOCATION: ROL-wells

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
12/2/04	1358	∅	14.6	2.00	6.16	5.01	∅	—	initial readings
↓	1430	11	—	—	—	—	11	—	well dry - wait 2 hrs for recharge
12/3/04	1230	—	—	—	—	—	—	—	R00149 collected
<div style="border: 1px solid black; width: 100%; height: 100%; transform: rotate(-45deg); opacity: 0.5;"></div>									

Jm 12/03/04

RECORDED BY: XW 12/2/04  
(Signature and Date)

QA CHECK BY: [Signature] 12/03/04  
(Signature and Date)

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WELL PURGE RECORD

PROJECT NAME: Ramsdell Quarry Phase I RI

DELIVERY ORDER NO: CY11

Page 2 of 3

Date: 12/01/04

Time: 1430

Well Number and Location: ROL-mw017

Purge Crew: Kelly Milner

Jen Loerch

Date and Time: Begin: 12/01/04, 1430 Completed: 12/02/04, 1500

Purge Method(S): disposable bailer

Total Quantity of Water Removed: 2.5 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	15251	12/01/04
Specific Conductivity	15251	↓
Water Level	15287	NA
pH	15281	12/01/04

Recorded By: [Signature] (Signature and Date) 12/02/04

QA Check By: [Signature] 12/03/04 (Signature and Date)





953 Lafayette Drive, Oak Ridge, Tennessee 37831 (865) 481-4600

COC NO.: RQGPE - LF001

page 1 of 1

CHAIN OF CUSTODY RECORD

PROJECT NAME: Ramsdell Quarry Phase I RI				REQUESTED PARAMETERS								LABORATORY NAME: GPL Environmental																																																											
DELIVERY ORDER NUMBER: CY11				<table border="1"> <tr><td>VOCs</td><td>SVOCs</td><td>Pesticides / PCBs</td><td>Explosives</td><td>Propellants</td><td>Filtered Metals</td><td>Cyanide</td></tr> <tr><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>1</td><td>1</td></tr> <tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>1</td><td>1</td></tr> <tr><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>1</td><td>1</td></tr> </table>								VOCs	SVOCs	Pesticides / PCBs	Explosives	Propellants	Filtered Metals	Cyanide	3	2	2	2	2	1	1	3							3	2	2	2	2	1	1	3	2	2	2	2	1	1	LABORATORY ADDRESS: 200 Perry Parkway - 7210A Corporate Ct Geithersburg, MD 20877 Frederick, MD Attn: Amy Goodman Debra Griffith 21703																								
VOCs	SVOCs	Pesticides / PCBs	Explosives									Propellants	Filtered Metals	Cyanide																																																									
3	2	2	2									2	1	1																																																									
3																																																																							
3	2	2	2	2	1	1																																																																	
3	2	2	2	2	1	1																																																																	
PROJECT MANAGER: Kevin Jago 865-481-4614				PHONE NO: 301-926-6802																																																																			
Sampler (Signature): <i>K.M.</i>		(Printed Name): Kelly Milner		<table border="1"> <tr><th>Sample ID</th><th>Date Collected</th><th>Time Collected</th><th>Matrix</th><th>VOCs</th><th>SVOCs</th><th>Pesticides / PCBs</th><th>Explosives</th><th>Propellants</th><th>Filtered Metals</th><th>Cyanide</th><th>Nb. of Containers</th></tr> <tr><td>RQ0168</td><td>12/02/04</td><td>1100</td><td>WA</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>1</td><td>1</td><td>13</td></tr> <tr><td>RQ0179</td><td>↓</td><td>1100</td><td>WA</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr> <tr><td>RQ0148</td><td>↓</td><td>1855</td><td>WA</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>1</td><td>1</td><td>13</td></tr> <tr><td>RQ0150</td><td>↓</td><td>1600</td><td>WA</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>1</td><td>1</td><td>13</td></tr> </table>								Sample ID	Date Collected	Time Collected	Matrix	VOCs	SVOCs	Pesticides / PCBs	Explosives	Propellants	Filtered Metals	Cyanide	Nb. of Containers	RQ0168	12/02/04	1100	WA	3	2	2	2	2	1	1	13	RQ0179	↓	1100	WA	3							3	RQ0148	↓	1855	WA	3	2	2	2	2	1	1	13	RQ0150	↓	1600	WA	3	2	2	2	2	1	1	13
Sample ID	Date Collected	Time Collected	Matrix									VOCs	SVOCs	Pesticides / PCBs	Explosives	Propellants	Filtered Metals	Cyanide	Nb. of Containers																																																				
RQ0168	12/02/04	1100	WA									3	2	2	2	2	1	1	13																																																				
RQ0179	↓	1100	WA									3							3																																																				
RQ0148	↓	1855	WA									3	2	2	2	2	1	1	13																																																				
RQ0150	↓	1600	WA	3	2	2	2	2	1	1	13																																																												
42 TOTAL																																																																							
RELINQUISHED BY: <i>K.M.</i>		Date/Time: 12/02/04 1900		RECEIVED BY:		Date/Time:		TOTAL NUMBER OF 42		Cooler Temperature: 4°C																																																													
COMPANY NAME: SAIC				COMPANY NAME:				Cooler ID:		FEDEX NUMBER: 7908 4742 5241 7908 4742 5252 7908 4742 5290																																																													
RECEIVED BY: <i>[Signature]</i>		Date/Time: 12/5/04 8:45		RELINQUISHED BY:		Date/Time:																																																																	
COMPANY NAME: GPL				COMPANY NAME:																																																																			
RELINQUISHED BY:		Date/Time:		RECEIVED BY:		Date/Time:																																																																	
COMPANY NAME:				COMPANY NAME:																																																																			









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**APPENDIX B**  
**ANALYTICAL LABORATORY DATA TABLES**

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**Table for Ramsdell Quarry Groundwater (December 04)**

**Explosives  
Site Related Contaminants**

Station		RQLmw-012	RQLmw-012	RQLmw-013	RQLmw-014	RQLmw-015	RQLmw-016	RQLmw-017
Sample ID		RQ0145	RQ0161	RQ0146	RQ0147	RQ0148	RQ0149	RQ0150
Customer ID		RQLmw-012-0145-GW	RQLmw-012-0161-GW	RQLmw-013-0146-GW	RQLmw-014-0147-GW	RQLmw-015-0148-GW	RQLmw-016-0149-GW	RQLmw-017-0150-GW
Date		12/03/2004	12/03/2004	12/03/2004	12/03/2004	12/02/2004	12/03/2004	12/02/2004
Filtered		Total	Total	Total	Total	Total	Total	Total
Field Type		Grab	Field Duplicate	Grab	Grab	Grab	Grab	Grab
Analyte (mg/L)	Units							
Explosives								
1,3,5-Trinitrobenzene	MG/L	0.00016 UJ	0.00017 UJ	0.00016 UJ	0.00017 UJ	0.00016 U	0.00016 UJ	0.00016 U
1,3-Dinitrobenzene	MG/L	0.00016 UJ	0.00017 UJ	0.00016 UJ	0.00017 UJ	0.00016 U	0.00016 UJ	0.00016 U
2,4,6-Trinitrotoluene	MG/L	0.00016 UJ	0.00017 UJ	0.00016 UJ	0.00017 UJ	0.00016 U	0.00016 UJ	0.00016 U
2,4-Dinitrotoluene	MG/L	0.00016 UJ	0.00017 UJ	0.00016 UJ	0.00017 UJ	0.00016 U	0.00016 UJ	0.00016 U
2,6-Dinitrotoluene	MG/L	0.00016 UJ	0.00017 UJ	0.00016 UJ	0.00017 UJ	0.00016 U	0.00016 UJ	0.00016 U
2-Amino-4,6-dinitrotoluene	MG/L	0.00016 UJ	0.00017 UJ	0.00016 UJ	0.00017 UJ	0.00016 U	0.00016 UJ	0.00016 U
2-Nitrotoluene	MG/L	0.00031 UJ	0.00034 UJ	0.00031 UJ	0.00034 UJ	0.00031 U	0.00031 UJ	0.00031 U
3-Nitrotoluene	MG/L	0.00031 UJ	0.00034 UJ	0.00031 UJ	0.00034 UJ	0.00031 U	0.00031 UJ	0.00031 U
4-Amino-2,6-dinitrotoluene	MG/L	0.00016 UJ	0.00017 UJ	0.00016 UJ	0.00017 UJ	0.00016 U	0.00016 UJ	0.00016 U
4-Nitrotoluene	MG/L	0.00031 UJ	0.00034 UJ	0.00031 UJ	0.00034 UJ	0.00031 U	0.00031 UJ	0.00031 U
HMX	MG/L	0.00031 UJ	0.00034 UJ	0.00031 UJ	0.00034 UJ	0.00031 U	0.00031 UJ	0.00031 U
Nitrobenzene	MG/L	0.00016 UJ	0.00017 UJ	0.00016 UJ	0.00017 UJ	0.00016 U	0.00016 UJ	0.00016 U
Nitrocellulose	MG/L	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Nitroglycerin	MG/L	0.016 UJ	0.017 UJ	0.016 UJ	0.017 UJ	0.016 U	0.016 UJ	0.016 U
Nitroguanidine	MG/L		0.01 U		0.01 U	0.01 U		0.01 U
RDX	MG/L	0.00031 UJ	0.00034 UJ	0.00031 UJ	0.00034 UJ	0.00031 UJ	0.00031 UJ	0.00031 UJ
Tetryl	MG/L	0.00031 UJ	0.00034 UJ	0.00031 UJ	0.00034 UJ	0.00031 U	0.00031 UJ	0.00031 U

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J - estimated, U - not detected.

**Table for Ramsdell Quarry Groundwater (December 04)**  
**Inorganics**  
**Site Related Contaminants**

Station		RQLmw-012	RQLmw-012	RQLmw-013	RQLmw-014	RQLmw-015	RQLmw-016	RQLmw-017
Sample ID		RQ0145	RQ0161	RQ0146	RQ0147	RQ0148	RQ0149	RQ0150
Customer ID		RQLmw-012-0145-GW	RQLmw-012-0161-GW	RQLmw-013-0146-GW	RQLmw-014-0147-GW	RQLmw-015-0148-GW	RQLmw-016-0149-GW	RQLmw-017-0150-GW
Date		12/03/2004	12/03/2004	12/03/2004	12/03/2004	12/02/2004	12/03/2004	12/02/2004
Filtered		Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved	Dissolved
Field Type		Grab	Field Duplicate	Grab	Grab	Grab	Grab	Grab
Analyte (mg/L)	Units							
<b>Inorganics</b>								
Cyanide	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Aluminum	MG/L	1.11 = *	1.24 = *	5.92 = *	0.0123 J *	0.0119 J *	0.0366 = *	2.4 = *
Antimony	MG/L	0.00013 U	0.00013 U	0.00013 U	0.00013 U	0.00013 U	0.00017 J *	0.00013 U
Arsenic	MG/L	0.00035 U	0.00035 U	0.0023 = *	0.00035 U	0.0013 J *	0.00035 U	0.00035 U
Barium	MG/L	0.0207 =	0.0216 =	0.0412 =	0.0204 =	0.0016 =	0.0118 =	0.0067 =
Beryllium	MG/L	0.000063 J *	0.00007 J *	0.00078 = *	0.000025 U	0.000029 J *	0.000025 U	0.0011 = *
Cadmium	MG/L	0.00044 J *	0.00049 J *	0.00018 U	0.00018 U	0.00018 U	0.00018 U	0.00043 J *
Calcium	MG/L	100 = *	104 = *	25.8 =	29 =	23.2 =	363 = *	73.7 = *
Chromium	MG/L	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0113 = *	0.0011 U
Cobalt	MG/L	0.0055 = *	0.006 = *	0.0421 = *	0.0093 = *	0.0017 = *	0.0056 = *	0.0319 = *
Copper	MG/L	0.0034 = *	0.0034 = *	0.00072 U	0.00077 U	0.0018 = *	0.0013 = *	0.0022 = *
Iron	MG/L	0.105 =	0.116 =	4.83 = *	11.8 = *	0.282 =	1.34 =	0.152 =
Lead	MG/L	0.0011 = *	0.00074 J *	0.00069 J *	0.00032 J *	0.0003 J *	0.0002 U	0.00051 J *
Magnesium	MG/L	27.5 = *	29 = *	11.2 =	12.1 =	10.4 =	51.5 = *	23.5 = *
Manganese	MG/L	0.405 =	0.418 =	0.781 =	2.59 = *	0.957 =	5.87 = *	5.08 = *
Mercury	MG/L	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U
Nickel	MG/L	0.0157 =	0.0167 =	0.0893 = *	0.021 =	0.0108 =	0.0269 =	0.0975 = *
Potassium	MG/L	6.43 = *	6.71 = *	2.78 =	3.2 =	1.52 =	4.04 =	2.68 =
Selenium	MG/L	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00041 U	0.00041 U
Silver	MG/L	0.00038 U	0.00038 U	0.00038 U	0.00038 U	0.00038 U	0.00038 U	0.00038 U
Sodium	MG/L	6.09 =	6.4 =	36.3 =	3.51 =	2.49 =	7.25 =	5.19 =
Thallium	MG/L	0.00083 U	0.0009 U	0.0014 = *	0.00018 U	0.000059 U	0.00048 U	0.00031 U
Vanadium	MG/L	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U
Zinc	MG/L	0.0415 J	0.0425 J	0.241 J *	0.017 J	0.0499 =	0.0085 U	0.373 = *

\* - exceeds site-wide background criteria.  
= - detected, J - estimated, U - not detected.

**Table for Ramsdell Quarry Groundwater (December 04)**

**Pesticides  
Site Related Contaminants**

Station		RQLmw-012	RQLmw-012	RQLmw-013	RQLmw-014	RQLmw-015	RQLmw-016	RQLmw-017
Sample ID		RQ0145	RQ0161	RQ0146	RQ0147	RQ0148	RQ0149	RQ0150
Customer ID		RQLmw-012-0145-GW	RQLmw-012-0161-GW	RQLmw-013-0146-GW	RQLmw-014-0147-GW	RQLmw-015-0148-GW	RQLmw-016-0149-GW	RQLmw-017-0150-GW
Date		12/03/2004	12/03/2004	12/03/2004	12/03/2004	12/02/2004	12/03/2004	12/02/2004
Filtered		Total	Total	Total	Total	Total	Total	Total
Field Type		Grab	Field Duplicate	Grab	Grab	Grab	Grab	Grab
Analyte (mg/L)	Units							
Pesticides and PCBs								
4,4'-DDD	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
4,4'-DDE	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
4,4'-DDT	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
Aldrin	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
Dieldrin	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
Endosulfan I	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
Endosulfan II	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
Endosulfan sulfate	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
Endrin	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
Endrin aldehyde	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
Endrin ketone	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
Heptachlor	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
Heptachlor epoxide	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
Lindane	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
Methoxychlor	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
PCB-1016	MG/L	0.002 U	0.0014 U	0.0013 U	0.0013 U	0.0013 U	0.0014 U	0.0015 U
PCB-1221	MG/L	0.002 U	0.0014 U	0.0013 U	0.0013 U	0.0013 U	0.0014 U	0.0015 U
PCB-1232	MG/L	0.002 U	0.0014 U	0.0013 U	0.0013 U	0.0013 U	0.0014 U	0.0015 U
PCB-1242	MG/L	0.002 U	0.0014 U	0.0013 U	0.0013 U	0.0013 U	0.0014 U	0.0015 U
PCB-1248	MG/L	0.002 U	0.0014 U	0.0013 U	0.0013 U	0.0013 U	0.0014 U	0.0015 U
PCB-1254	MG/L	0.002 U	0.0014 U	0.0013 U	0.0013 U	0.0013 U	0.0014 U	0.0015 U
PCB-1260	MG/L	0.002 U	0.0014 U	0.0013 U	0.0013 U	0.0013 U	0.0014 U	0.0015 U
Toxaphene	MG/L	0.002 U	0.0014 U	0.0013 U	0.0013 U	0.0013 U	0.0014 U	0.0015 U
alpha-BHC	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
alpha-Chlordane	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
beta-BHC	MG/L	0.0001 UJ	0.00007 UJ	0.00006 UJ	0.00006 UJ	0.00006 UJ	0.00007 UJ	0.00008 UJ
delta-BHC	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U
gamma-Chlordane	MG/L	0.0001 U	0.00007 U	0.00006 U	0.00006 U	0.00006 U	0.00007 U	0.00008 U

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**Table for Ramsdell Quarry Groundwater (December 04)**  
**Semivolatiles**  
**Site Related Contaminants**

Station		RQLmw-012	RQLmw-012	RQLmw-013	RQLmw-014	RQLmw-015	RQLmw-016	RQLmw-017
Sample ID		RQ0145	RQ0161	RQ0146	RQ0147	RQ0148	RQ0149	RQ0150
Customer ID		RQLmw-012-0145-GW	RQLmw-012-0161-GW	RQLmw-013-0146-GW	RQLmw-014-0147-GW	RQLmw-015-0148-GW	RQLmw-016-0149-GW	RQLmw-017-0150-GW
Date		12/03/2004	12/03/2004	12/03/2004	12/03/2004	12/02/2004	12/03/2004	12/02/2004
Filtered		Total	Total	Total	Total	Total	Total	Total
Field Type		Grab	Field Duplicate	Grab	Grab	Grab	Grab	Grab
Analyte (mg/L)	Units							
<b>Semi-Volatile Organics</b>								
1,2,4-Trichlorobenzene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
1,2-Dichlorobenzene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
1,3-Dichlorobenzene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
1,4-Dichlorobenzene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
2,4,5-Trichlorophenol	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
2,4,6-Trichlorophenol	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
2,4-Dichlorophenol	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
2,4-Dimethylphenol	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
2,4-Dinitrophenol	MG/L	0.025 U	0.025 U	0.027 U	0.025 U	0.025 U	0.025 U	0.027 U
2,4-Dinitrotoluene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
2,6-Dinitrotoluene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
2-Chloronaphthalene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
2-Chlorophenol	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
2-Methyl-4,6-dinitrophenol	MG/L	0.025 U	0.025 U	0.027 U	0.025 U	0.025 U	0.025 U	0.027 U
2-Methylnaphthalene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
2-Methylphenol	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
2-Nitrobenzenamine	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
2-Nitrophenol	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
3,3'-Dichlorobenzidine	MG/L	0.025 U	0.025 U	0.027 U	0.025 U	0.025 U	0.025 U	0.027 U
3-Nitrobenzenamine	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
4-Bromophenyl phenyl ether	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
4-Chloro-3-methylphenol	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
4-Chlorobenzenamine	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
4-Chlorophenyl phenyl ether	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
4-Methylphenol	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
4-Nitrobenzenamine	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
4-Nitrophenol	MG/L	0.025 U	0.025 U	0.027 U	0.025 U	0.025 U	0.025 U	0.027 U
Acenaphthene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Acenaphthylene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U

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**Table for Ramsdell Quarry Groundwater (December 04)**  
**Semivolatiles**  
**Site Related Contaminants**

Station		RQLmw-012	RQLmw-012	RQLmw-013	RQLmw-014	RQLmw-015	RQLmw-016	RQLmw-017
Sample ID		RQ0145	RQ0161	RQ0146	RQ0147	RQ0148	RQ0149	RQ0150
Customer ID		RQLmw-012-0145-GW	RQLmw-012-0161-GW	RQLmw-013-0146-GW	RQLmw-014-0147-GW	RQLmw-015-0148-GW	RQLmw-016-0149-GW	RQLmw-017-0150-GW
Date		12/03/2004	12/03/2004	12/03/2004	12/03/2004	12/02/2004	12/03/2004	12/02/2004
Filtered		Total	Total	Total	Total	Total	Total	Total
Field Type		Grab	Field Duplicate	Grab	Grab	Grab	Grab	Grab
Analyte (mg/L)	Units							
<b>Semi-Volatile Organics</b>								
Anthracene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Benz(a)anthracene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Benzenemethanol	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Benzo(a)pyrene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Benzo(b)fluoranthene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Benzo(ghi)perylene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Benzo(k)fluoranthene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Benzoic acid	MG/L	0.025 U	0.025 U	0.027 U	0.025 U	0.025 U	0.025 U	0.027 U
Bis(2-chloroethoxy)methane	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Bis(2-chloroethyl) ether	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Bis(2-chloroisopropyl) ether	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Bis(2-ethylhexyl)phthalate	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.0043 J	0.013 U	0.013 U
Butyl benzyl phthalate	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Carbazole	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Chrysene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Di-n-butyl phthalate	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Di-n-octylphthalate	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Dibenz(a,h)anthracene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Dibenzofuran	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Diethyl phthalate	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Dimethyl phthalate	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Fluoranthene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Fluorene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Hexachlorobenzene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Hexachlorobutadiene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Hexachlorocyclopentadiene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Hexachloroethane	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Indeno(1,2,3-cd)pyrene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Isophorone	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U

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**Table for Ramsdell Quarry Groundwater (December 04)  
Semivolatiles  
Site Related Contaminants**

Station		RQLmw-012	RQLmw-012	RQLmw-013	RQLmw-014	RQLmw-015	RQLmw-016	RQLmw-017
Sample ID		RQ0145	RQ0161	RQ0146	RQ0147	RQ0148	RQ0149	RQ0150
Customer ID		RQLmw-012-0145-GW	RQLmw-012-0161-GW	RQLmw-013-0146-GW	RQLmw-014-0147-GW	RQLmw-015-0148-GW	RQLmw-016-0149-GW	RQLmw-017-0150-GW
Date		12/03/2004	12/03/2004	12/03/2004	12/03/2004	12/02/2004	12/03/2004	12/02/2004
Filtered		Total	Total	Total	Total	Total	Total	Total
Field Type		Grab	Field Duplicate	Grab	Grab	Grab	Grab	Grab
Analyte (mg/L)	Units							
<b>Semi-Volatile Organics</b>								
N-Nitroso-di-n-propylamine	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
N-Nitrosodiphenylamine	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Naphthalene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Nitrobenzene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Pentachlorophenol	MG/L	0.025 U	0.025 U	0.027 U	0.025 U	0.025 U	0.025 U	0.027 U
Phenanthrene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Phenol	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U
Pyrene	MG/L	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U	0.013 U

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**Table for Ramsdell Quarry Groundwater (December 04)**

**Volatiles  
Site Related Contaminants**

Station		RQLmw-012	RQLmw-012	RQLmw-013	RQLmw-014	RQLmw-015	RQLmw-016	RQLmw-017
Sample ID		RQ0145	RQ0161	RQ0146	RQ0147	RQ0148	RQ0149	RQ0150
Customer ID		RQLmw-012-0145-GW	RQLmw-012-0161-GW	RQLmw-013-0146-GW	RQLmw-014-0147-GW	RQLmw-015-0148-GW	RQLmw-016-0149-GW	RQLmw-017-0150-GW
Date		12/03/2004	12/03/2004	12/03/2004	12/03/2004	12/02/2004	12/03/2004	12/02/2004
Filtered		Total	Total	Total	Total	Total	Total	Total
Field Type		Grab	Field Duplicate	Grab	Grab	Grab	Grab	Grab
Analyte (mg/L)	Units							
<b>Volatile Organics</b>								
1,1,1-Trichloroethane	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
1,1,2,2-Tetrachloroethane	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
1,1,2-Trichloroethane	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
1,1-Dichloroethane	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
1,1-Dichloroethene	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
1,2-Dibromoethane	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
1,2-Dichloroethane	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
1,2-Dichloroethene	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.001 UJ	0.001 U	0.001 UJ
1,2-Dichloropropane	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
2-Butanone	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.01 UJ	0.005 U	0.01 UJ
2-Hexanone	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.01 UJ	0.005 U	0.01 UJ
4-Methyl-2-pentanone	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.01 UJ	0.005 U	0.01 UJ
Acetone	MG/L	0.005 U	0.005 U	0.005 U	0.005 U	0.01 UJ	0.009 =	0.01 UJ
Benzene	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
Bromochloromethane	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
Bromodichloromethane	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
Bromoform	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
Bromomethane	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 UJ	0.001 U	0.01 UJ
Carbon disulfide	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
Carbon tetrachloride	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
Chlorobenzene	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
Chloroethane	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 UJ	0.001 U	0.01 UJ
Chloroform	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
Chloromethane	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 UJ	0.001 U	0.01 UJ
Dibromochloromethane	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
Dimethylbenzene	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
Ethylbenzene	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
Methylene chloride	MG/L	0.0026 U	0.0028 U	0.0025 U	0.001 U	0.005 UJ	0.0024 U	0.01 UJ
Styrene	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
Tetrachloroethene	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ

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**Table for Ramsdell Quarry Groundwater (December 04)**

**Volatiles**

**Site Related Contaminants**

<b>Station</b>		<b>RQLmw-012</b>	<b>RQLmw-012</b>	<b>RQLmw-013</b>	<b>RQLmw-014</b>	<b>RQLmw-015</b>	<b>RQLmw-016</b>	<b>RQLmw-017</b>
<b>Sample ID</b>		<b>RQ0145</b>	<b>RQ0161</b>	<b>RQ0146</b>	<b>RQ0147</b>	<b>RQ0148</b>	<b>RQ0149</b>	<b>RQ0150</b>
<b>Customer ID</b>		<b>RQLmw-012-0145-GW</b>	<b>RQLmw-012-0161-GW</b>	<b>RQLmw-013-0146-GW</b>	<b>RQLmw-014-0147-GW</b>	<b>RQLmw-015-0148-GW</b>	<b>RQLmw-016-0149-GW</b>	<b>RQLmw-017-0150-GW</b>
<b>Date</b>		12/03/2004	12/03/2004	12/03/2004	12/03/2004	12/02/2004	12/03/2004	12/02/2004
<b>Filtered</b>		<b>Total</b>	<b>Total</b>	<b>Total</b>	<b>Total</b>	<b>Total</b>	<b>Total</b>	<b>Total</b>
<b>Field Type</b>		<b>Grab</b>	<b>Field Duplicate</b>	<b>Grab</b>	<b>Grab</b>	<b>Grab</b>	<b>Grab</b>	<b>Grab</b>
<b>Analyte (mg/L)</b>	<b>Units</b>							
<b>Volatile Organics</b>								
Toluene	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
Trichloroethene	MG/L	0.001 U	0.001 U	0.001 U	0.0011 UJ	0.005 UJ	0.001 U	0.005 UJ
Vinyl chloride	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.01 UJ	0.001 U	0.01 UJ
cis-1,3-Dichloropropene	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ
trans-1,3-Dichloropropene	MG/L	0.001 U	0.001 U	0.001 U	0.001 U	0.005 UJ	0.001 U	0.005 UJ

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**Draft Phase I Remedial Investigation (RI) December Follow-On Groundwater Sampling  
at the Ramsdell Quarry Landfill at the  
Ravenna Army Ammunition Plant, Ravenna, Ohio  
Comment Response Table  
June 7, 2005**

Comment Number	Page or Section	Comment	Response
<i>Ohio EPA NEDO, DERR</i>			
1	Section 2.2, page 2-3, 2 <sup>nd</sup> para, last sentence	Please remove the word “former” from this sentence. These wells are still in existence.	Agree. The word “former” has been deleted as these wells have not yet been plugged and abandoned.
2	Figures 2-1 and 3-1, pages 2-4 and 3-2	The potentiometric surface contour symbols are missing from the legend. Please add solid blue line (with elevation) and label it “Groundwater Potentiometric Surface Elevation (amsl, actual)”. Also, add a dashed blue line (with elevation) and label it “Groundwater Potentiometric Surface Elevation (amsl, inferred)”.	Agree. Figures 2-1 and 3-1 have been revised, and legend entries have been made as requested in the comment.
3	Figure 3-1, page 3-2	Groundwater elevations for monitoring wells RQLmw-007 and RQLmw-012 are reported wrong on the figure. For RQLmw-007, change “966.99” to “960.99”; and for RQLmw-012, change “960.11” to “956.17”. Adjust the spacing of the potentiometric surface contours with respect to the newly corrected values.	Agree. Typos on the water elevations shown on Figure 3-1 have been corrected as requested in the comment, and several contour lines on Figure 3-1 adjusted accordingly.
4	Section 3.3, Results, Page 3-3, 2 <sup>nd</sup> para, 1 <sup>st</sup> sentence	The text states “as in May 2004, the December 2004 sample from RQLmw-017 has the greatest number of SRCs detected (11).” Since RQLmw-017 is the furthest upgradient well from the landfill, additional text may be warranted in this section to explain this unusual occurrence.	Clarification. While 11 SRCs were detected above background, it should be noted that all of the identified SRCs are inorganics; no explosives were detected in the upgradient well. Of the 11 SRCs, aluminum, beryllium, cadmium, cobalt, copper, and lead are considered to be SRCs because they were not detected in the background data set and, therefore, the background criterion was set to zero. In addition, calcium and magnesium are considered essential nutrients and are generally not considered SRCs unless detected at very high concentrations. Both calcium and magnesium concentrations were less than two times the background criteria. Of the remaining SRCs detected in RQLmw-017, nickel was also present at less than twice the background criteria, and only manganese and zinc were detected at concentrations more than twice the site background criteria. A caveat has been added to the text in this section stating that, “All SRCs present in this well were inorganics. Six of the metals considered to be SRCs were not detected in the background data set, and site background for these metals (aluminum, beryllium, cadmium, cobalt, copper, and lead) was set to zero; therefore, any detection of these metals would, by definition, exceed the background criteria but may not indicate a site-related contamination problem. Of the five SRCs detected that had background concentrations greater than zero, only manganese and zinc were detected at concentrations greater than two times the background criteria.”