C-BLOCK QUARRY TABLE OF CONTENTS

C-BLOCK QUARRY FIGURES

C-BLOCK QUARRY TABLES

1.0 INTRODUCTION

This report documents the results of C-Block Quarry (AOC-06) sampling effort which was completed during the activities conducted from October 2004 to May 2005 to characterize the 14 Ravenna Army Ammunition Plant (RVAAP) Areas of Concern (AOCs).

1.1 PURPOSE AND SCOPE

Characterization activities were conducted at C-Block Quarry to collect sufficient data for all applicable media to allow efficient planning and execution of future environmental actions.

The characterization effort for the C-Block Quarry was undertaken to accomplish the following:

- Collect characterization data using multi-increment (MI) sampling to provide data for future risk assessments that may be conducted;
- Develop and/or update the Conceptual Site Model to identify the key elements that should be considered in future actions;
- Assess AOC-specific physical characteristics;
- Assess potential sources of contamination;
- Allow initial assessment of the nature and lateral extent of soil, sediment, surface and groundwater contamination (the depth of contamination was not evaluated for this characterization effort); and
- Conduct a preliminary human health and ecological screening.

The investigation approach to the C-Block Quarry involved a combination of field and laboratory activities to characterize the site. Field investigation techniques included surface soil (0-1 ft) samples (multi-increment (MI) and discrete), soil boring and sampling, surface water, monitoring well installation and development, groundwater sampling, sample and monitoring well location survey, and aquifer testing. The rationale for the AOC-specific sampling plan was biased based on historical information including past usage, past investigations, ecological settings, climatic conditions, and geological and hydrologic characteristics. The field program was conducted in general accordance with the revised (USACE, 2001a) and the Final Sampling and Analysis Plan Addendum FSAP for the characterization of 14 RVAAP AOCs (MKM, 2004).

1.2 BACKGROUND INFORMATION

This section briefly describes C-Block Quarry and previous investigations performed.

1.2.1 AOC Description and History

The C-Block Quarry is located in the northwestern portion of the facility north of Newton Falls Road within the central portion of the C-Block storage area. The material mined at C-Block Quarry Consisted of Massillon Sandstone (Pennsylvanian System, Pottsville Group). This was quarried for the purpose of road and construction base material. C-Block Quarry has a measured maximum depth of 25 ft in the center of the quarry and tapers to zero depth to the north and south. C-Block Quarry is an unlined borrow pit (approximately 150 ft by 600 ft or 0.3 acres) that was used during the 1950's as a disposal area for

annealing and pickling process wastes. Spent pickle liquors from brass finishing that contained lead, mercury, chromium, and sulfuric acid were disposed in the pit. The quantity of waste disposed is unknown. Based upon preliminary site assessments conducted by MKM, fill dirt and some construction and demolition type materials were placed and/or disposed in the quarry. Field observations from the AOC characterization effort suggest the fill material ranges in depth from 1.5 to 5 feet with deeper amounts where debris and soil piles exist. Currently, C-Block Quarry is densely populated by trees and ground level vegetation.

1.2.2 Previous Investigation

The following evaluations and sampling efforts have been conducted at C-Block Quarry:

1.2.2.1 Preliminary Review and Visual Site Inspection conducted as a part of Resource Conservation and Recovery Act (RCRA) Facility Assessment conducted by the USEPA. (Jacobs Engineering Group, Inc., 1989)

This document could not be located.

1.2.2.2 Preliminary Assessment for the Ravenna Army Ammunition Plant (USACE, 1996)

This assessment identified the following conditions at RVAAP:

- Potential chemicals of concern (PCOCs) at RVAAP sites were identified explosives (TNT, RDX, HMX, RDXX, composition B, and lead azide) and heavy metals (lead and mercury).
- The primary sources of potential contamination at RVAAP were identified as wastewater effluent from munitions assembly and demilitarization process, open burning and detonation of explosives, and landfill operations.
- Primary contaminant release mechanisms from load lines were process effluent discharges to surface water (drainage ditches, settling ponds, and streams) and process building wastewater wash-out on to surface soils. Media of concern were identified as a soil, sediment, groundwater and surface water.
- The greatest potential for release of contaminants to groundwater from load lines likely was identified as wastewater effluent discharge to unlined earthen settling ponds. Concrete settling tanks, open drainage ditches, and storm sewers were also identified as a concern relative to groundwater.
- The primary contaminant release mechanism from open burning and detonation areas resulted from the burning and detonation of off-specification explosives on the ground surface. Media of concern was identified as soils, groundwater, surface water and sediment.
- The primary release mechanism at landfills was identified as a result of potential leaching of contaminants from buried/disposal materials. Groundwater and soils were selected as media of concern.
- Known releases of contamination to surface water and soils have occurred from load line (assembly and demilitarization) operations and from open burning and detonation operations.

- Known releases of contamination to groundwater were noted to have occurred from quarry landfill operations.
- The greatest potential for off-site migration of contaminants during load line operations was identified as surface water. The greatest potential for current off-site migration of contaminants was identified as groundwater and surface water.

Based on qualitative assessment of the potential hazards, release mechanisms, and environmental conditions at RVAAP, LL-12, Building 1200 and the Landfill N. of Winklepeck Burning Grounds were considered among the higher priority sites in this assessment.

1.2.2.3 Relative Risk Site Evaluation, Ravenna Army Ammunition Plant (USACHPPM, 1996)

This evaluation identified only surface soil as a possible media of concern and identified a potential for contaminate migration. The evaluation also identified the potential for exposure to receptors because the site is not restricted. The final score for the RRSE at C-Block Quarry was "low."

1.2.2.4 August 2001 – USACE Collected Additional Samples from the Quarry.

This document could not be located.

1.2.3 Regulatory Authorities

Volume I, Section 1.2.3 identifies the regulatory authorities which oversee remedial activities for these AOCs.

1.2.4 Regulatory Status of C-Block Quarry

Volume I, Section 1.2.4 identifies the regulatory status for this AOC.

2.0 ENVIRONMENTAL SETTING AT C-BLOCK QUARRY

This section describes the physical characteristics of C-Block Quarry and its adjacent environment that are factors in interpreting the potential contaminant transport pathways, receptor populations, and exposure scenarios with respect to the evaluation of human health and ecological risks. The area immediately surrounding C-Block Quarry is forested except for the clearings immediately adjacent to the storage bunkers. The AOC is located on a bedrock and topographic high with decreasing elevations in north, south and east directions. The quarry was excavated from the sandstone bedrock which remains exposed along the quarry walls and portions of the quarry floor. The Quarry is bounded on the east by C-Block lane 3-C and on the west by C-Block lane 4-C. Newton Falls Road is located approximately 700 feet south of the quarry and North Line.

2.1 SURFACE FEATURES

The topography at C-Block is characterized by a large plateau which slopes radially in all directions. The AOC is characterized by contours that show a range of elevation between 1100 ft amsl to 1180 ft amsl from a topographic high where the quarry is located in the center of a large plateau to a low area found in the far eastern portion of the AOC (USGS Topographic Map, Windham Quadrangle, 1994).

The quarry area is located on a local bedrock high area with surface drainage moving away from the area in a radial pattern. Surface water in the pit flows radially inward toward the topographic low point in the quarry area. The quarry walls are composed of sandstone bedrock outcroppings. Observations of fractures in those outcroppings indicate the existence of a defined fracture pattern.

2.2 METEOROLOGY AND CLIMATE

Meteorology and climate are addressed in Section 2.2, Volume I.

2.3 SURFACE WATER HYDROLOGY

Surface water drainage generally follows the topography of the AOC toward the southeast. Intermittent surface water flows in drainage ditches located within the AOC. Generally, surface water flow is away from the quarry in an east-northeast or west-southwest direction. Any precipitation which falls within the footprint of the quarry will collect with the quarry's low elevation. In addition, an unknown quantity of surface waters enters the quarry from the east drainage ditch of lane C-3A via a drainage swale. Based on soil borings located outside the quarry, groundwater is located at an elevation below the quarry's bottom. Therefore the bedrock sidewall of the quarry does not contribute to surface water at the C-Block Quarry. These ditches are fed by surface runoff from precipitation events. After leaving the AOC, the water commingles with effluent from other RVAAP drainage ways. Eventually the installation-wide drainage feeds the West Branch of the Mahoning River, located just west of the installation. The West Branch of the Mahoning River in turn flows to the Michael J. Kirwan Reservoir, immediately south of RVAAP across State Highway 5.

2.4 GEOLOGY

Lithologic logs from four borings located near the quarry, which were advanced during the characterization activities and completed as monitoring wells, were used to characterize the surface and

subsurface geology at C-Block. Soils were encountered generally from 0 to 2 ft in each of the borings and weathered sandstone bedrock was encountered at the range of 2 to 6 ft when installing the C-Block monitoring wells. Fine to medium grained, light brown to reddish brown sandstone was cored and described to depths reaching from 6 ft bgs to a maximum depth of 50 ft bgs. The boring logs, which detail the vertical lithologic sequences, are found in Appendix H.

2.4.1 Glacial Deposits

Subsurface lithology at C-Block Quarry contains information from borings placed adjacent to the quarry, and consists mostly of sand-rich silt tills overlying bedrock consisting of sandstones and minor interbedded shales. These deposits are generally firm, moderately plastic, and tend to hold water where encountered. Groundwater was encountered 30 to 40 ft bgs during drilling of the groundwater monitoring wells. Cross-sections of the subsurface at C-Block Quarry illustrate the lateral distribution and variation of these discontinuous glaciated sediments (Figures CBL-1 through CBL-4).

2.4.2 Sedimentary Rocks

The exposed formation at C-Block Quarry consists of Massillon Sandstone (Pennsylvanian System, Pottsville Group). Weathered fine-grained, light brown sandstone bedrock was encountered at 2 to 6 ft bgs. White, brown, tan and reddish brown, medium to fine grained sandstone was cored and described to depths reaching from 6 ft bgs to a maximum depth of 50 ft bgs. Additionally, dark red to black shale partings were described at various steps in the borings when installing the C-Block monitoring wells.

2.5 SOIL

According to the Soil Survey of Portage County, Ohio (USDASCS, 1978), RVAAP soils are described as being nearly level to gently sloping, and are poor to moderately well drained. Four soil types are found in the areas adjacent to the C-Block Quarry. Any soil materials found in the quarry were placed there by previous RVAAP operations or washed in from the lane ditch within C-Block Quarry: the silt loam (2 to 6 percent slopes) on west and east of the quarry, Mitiwanga silt loam (2 to 6 percent slopes) at within the quarry, Rittman silt loam (2 to 6 percent slopes) on west side of the AOC and Wadsworth silt loam (2-6 percent slopes) on East side of the AOC. Sloped soil along drainage pathways, rapid runoff and severe erosion are general characteristics of the Wadsworth silt loam. Deep, poorly-drained soil generally characterizes the Mitiwangra silt loam. Rittman silt loam is generally deep, moderately-well drained, gently sloping to steep soils with a medium runoff, slow permeability and seasonal wetness.

2.6 HYDROGEOLOGY

Volume 1, Section 2.6 describes the unconsolidated sediments and bedrock which influence the hydrogeological characteristics at RVAAP. In addition to the general regional information included in Volume 1, information about the bedrock found beneath C-Block Quarry was obtained when monitoring wells were installed and groundwater discharge points (springs) were identified within the area of the AOC. Based upon three independent rounds of water level measurements (February, March and April 2005), the bedrock groundwater flow in the vicinity of C-Block Quarry appears to be in a west-southwest direction. Figures CBL-9, 10 and 11 show the potentiometric surface and flow direction at the site. Additionally, four springs were identified northeast of C-Block Quarry. These springs are located along

lane C-5 (the springs are represented in Figures CBL-6 and CBL-7 as the Sediment/Surface water sampling locations), and, based upon elevation, appear to represent the potentiometric surface of groundwater in the area. However the correlation between the groundwater elevations between the installed monitoring wells and these springs can only be inferred. Hence figures CBL-9, 10 and 11 strictly correlate monitoring well groundwater elevations. The C-Block Quarry well logs indicate that fine grained sandstone was encountered at depths ranging from 2 to 6 ft.

2.7 DEMOGRAPHY AND LAND USE

Demographics and land use are discussed in Volume 1, Section 2.7.

2.8 ECOLOGY

Ecological information is provided in Volume I, Section 2.8.

3.0 C-BLOCK QUARRY CHARACTERIZATION ACTIVITIES

This section describes the field and analytical methods implemented during the RVAAP 14 AOC Characterization at C-Block Quarry (CBL). The field and analytical programs were conducted in accordance with the RVAAP Facility Wide Sampling and Analysis Plan (FWSAP) (USACE, 2001a) and the RVAAP 14 AOC FWSAP Addendum (MKM, 2004). Investigation objectives, rationale for sampling locations, and sampling methods are briefly discussed in this section.

3.1 FIELD ACTIVITIES

Field activities conducted from October 2004 thru May 2005 included:

- Collecting multi-increment (MI) surface soil (0-1 ft) samples (11-04-04 – 11-11-04);
- Collecting MI sediment samples from drainage pathways (11-08-04 – 11-11-04);
- Collecting surface water samples from drainage pathways (11-08-04 – 11-11-04);
- Installing four groundwater monitoring wells (12-13-04 – 01-04-05);
- Collecting geotechnical samples from the borings (Shelby Tubes) (11-08-04 – 01-04-05);
- Conducting well slug tests (01-26-05);
- Collecting groundwater samples from monitoring wells (01-12-05 – 01-20-05); and
- Surveying sampling and monitoring well locations (12-13-04 – 01-28-05).

Sampling points for the characterization of this AOC were located to assess the impact that C-Block Quarry operations may have had on soil, sediment, surface water, and groundwater; and to evaluate where contaminants related to the former operations may be impacting the AOC. The following sections describe the rationales for, and methods of sample, collection employed during the characterization activities. Information from previous assessments and evaluations plus institutional knowledge about the disposal that occurred at the quarry were used to determine the sampling locations, type of media collected, analyses run and numbers of samples for this characterization activity. Because of the possible disposal of annealing wastes, all samples were analyzed for Chromium +6. Table CBL-1 summarizes the types and numbers of samples that were collected and the analyses conducted on the samples. A photolog of the investigation activities is provided in Appendix C. Figure CBL-5 shows the locations of the monitoring wells installed during the characterization activities and Figure CBL-6 show the actual sample locations for all other media collected at this AOC.

3.1.1 MI Surface Soil (0-1 ft) Sampling

MI surface soil (0-1 ft) samples were collected at this AOC to:

- Assess the potential impact of C-Block Quarry operations on the soils within the AOC; and
- Determine the nature of contamination (if present).

The floor of C-Block Quarry was divided into six grids. Each MI surface soil (0-1 ft) samples grid is considered an exposure unit. One MI surface soil (0-1 ft) sample was collected from each grid. Multi-increment samples were collected as described in Volume I, Section 3.1.10.1. One split sample was collected and submitted for analysis by an independent, USACE-approved laboratory. Analysis of MI surface soils (0-1 ft) for CBL included the following parameters: TAL Metals, Explosives and Cr+6.

VOC samples were collected as discrete samples to fulfill the 10 percent full suite requirement and the FWSAP approved VOC collection methods. Section 3.1.10.3 of Volume I describes the procedure used to collect discrete surface soils (0-1 ft) samples. Discrete VOC samples were not subjected to MI sample drying or processing. Field sampling forms documenting the Surface soils (0-1 ft) sampling activities are presented in Appendix E.

3.1.2 MI Sediment Sampling

MI sediment samples were collected at this AOC to:

- Evaluate whether sediments are being impacted via surface water runoff at the C-Block Quarry;
- Evaluate the migration pathway for contaminants that may have been suspended in surface water runoff; and
- Evaluate whether contaminants may have migrated beyond the AOC boundaries.

Four locations were selected to evaluate whether the drainage system at C-Block Quarry allowed contaminants to migrate beyond the site boundary. Two of the surface water locations were collected from natural springs and two of the locations were collected from small ponded areas. All MI sediment sampling grids were located in areas containing shallow water and, as a result, samples were able to be collected on foot, using the procedures described in Section 3.1.10.4 of Volume I. Each MI sediment sample grid is considered an exposure unit. One split sample was collected and submitted for analysis to an independent, USACE-approved laboratory. Analysis of sediment for CBL included the following parameters: TAL Metals, Explosives, Cr+6, TOC and grain size.

Field sampling forms from MI sediment sampling are presented in Appendix Q.

3.1.3 Surface Water Sampling

Surface water samples were collected at this AOC to:

- Evaluate whether surface water is being impacted by runoff from C-Block Quarry; and
- Identify the migration pathways for contaminated runoff (if any) from C-Block Quarry.

Four surface water samples were co-located with the MI sediment samples to evaluate whether contaminants could be impacting surface water within the AOC boundary. One surface water sample was collected from each spring/ponded location identified in Section 3.1.2 of this AOC-specific report. Water quality measurements (pH, conductivity, dissolved oxygen content, and temperature) were recorded just prior to sample collection. Surface water samples were collected using the direct fill method, as referenced in Volume I, section 3.1.10.9. One split sample was collected and submitted for analysis to an independent USACE approved laboratory.

Field sampling forms for surface water sampling are presented in Appendix O.

3.1.4 Groundwater Investigation Activities

Four boreholes were advanced into the bedrock at C-Block Quarry. Borehole termination depth ranged from 44.0 to 50.0 ft bgs at the C-Block Quarry. Groundwater was encountered at depths ranging from 30 to 40 ft. In CBLmw-004 the first saturated zone was encountered at 16 ft with a second saturated zone at 35 ft.

The groundwater characterization activities included installing four groundwater monitoring wells, conducting slug tests, collecting one round of groundwater samples and measuring groundwater levels on three separate occasions. Those activities were conducted at this AOC to:

- Determine whether contaminants from the quarrying and fill operations had adversely impacted groundwater quality underlying the AOC;
- Evaluate the quality of groundwater upgradient of C-Block Quarry; and
- Collect data pertaining to the groundwater flow regime at C-Block Quarry.

Surface topography and regional bedrock maps indicated the C-Block Quarry is located on a bedrock high. Therefore, the four groundwater monitoring wells were placed in an orientation that assured that representative upgradient and downgradient wells would be installed. Potentiometric maps drawn using groundwater level information from the four new monitoring wells indicate that groundwater flow direction is South-Southwest. Wells CBLmw-001 and CBLmw-002 are located downgradient and Wells CBLsw-003 and CBLmw-004 are located upgradient of C-Block Quarry.

3.1.4.1 Monitoring Well Installation and Development

An 11.25 in. OD hollow-stem auger was used to advance each borehole through the unconsolidated material found at C-Block Quarry. Bedrock was encountered in all four boring locations at depths of 1.9 ft. bgs (CBLmw-001), 6.0 ft bgs (CBLmw-002), 2.5 ft bgs (CBLmw-003) and 5.0 ft bgs (CBLmw-004). Upon encountering bedrock, a 6 in. OD air rotary hammer with 3.95 in. core barrel was used to advance the boring. The average total depth of the boreholes was 14.04 m (46.08 ft) bgs.

Monitoring well installation and development at C-Block Quarry followed the procedures reported in Volume I, Section 3.1.6. Well construction diagrams and well development records are provided in Appendix H.

3.1.4.2 Geotechnical Sample Collection (Shelby Tubes)

Geotechnical samples were collected during groundwater monitoring well installation. Two Shelby tubes were collected at Monitoring Well Locations CBLmw-001 (0 to 2 ft) and CBLmw-004 (2 to 4 ft) and sent to the laboratory for analysis. Geotechnical sample collection was conducted as specified in Section 4.4.2.4.1 of the FWSAP. Goetechnical Analysis of Shelby tubes included the following parameters: Atterberg Limits, moisture content, total organic content, specific gravity and pH. The geotechnical analytical results can be found in Appendix J.

3.1.4.3 Groundwater Sampling

All groundwater sampling was conducted as outlined in Section 3.1.10.11, Volume I of this characterization report. No detections were observed in the PID readings for the wells at C-Block Quarry. This information is provided on the field forms located in Appendix H. Specific information related to the type of PID used and calibration is included in Section 3.1.5 of Volume 1. Samples were prepared, packaged and shipped per Volume I, Section 3.1.14. One split sample was collected and submitted for analysis to an independent, USACE-approved laboratory. Well purging and sampling records are provided at Appendix H and analytical results from the samples are presented in Appendix L. All groundwater sampling was conducted in accordance with the procedures provided in Section 4.3.4 and 4.3.5 of the FWSAP. Section 3.1.10.11 of Volume 1 also discusses the groundwater sampling procedures used for this project. Analysis of groundwater at CBL included the following parameters: TAL Metals, Explosives, Propellants, VOCs, SVOCs, Cr+6, Pesticides and PCBs.

3.1.4.4 In-Situ Permeability Testing

Slug tests were performed at the four C-Block Quarry monitoring wells as discussed in Volume I, Section 3.1.10.12. Slug test data records are provided at Appendix K. The testing results are presented in Section 4.5.

3.1.4.5 Water Level Measurements

Water level measurements were performed at the four C-Block Quarry monitoring wells as discussed in Volume I, Section 3.1.10.13. Groundwater elevation data are included in Appendix M.

3.1.5 Sample Location and Monitoring Well Survey

The sample location and monitoring well survey at C-Block Quarry was conducted per the specifications in Section 3.1.11, in Volume I of this characterization report. The monitoring well survey report can be found in Appendix N and sample location survey data in Appendix S.

3.2 DEVIATIONS FROM THE WORK PLAN

Every effort was made to complete the field activities as specified in the FWSAP and the approved RVAAP 14 AOC FWSAP Addendum. However, in some instances, circumstances or field conditions necessitated a modification. Changes made during the C-Block Quarry investigation are noted below.

- When Surface Water Sample CBLsw-004-SW was being collected, the water quality meter malfunctioned. Therefore, the water quality measurements (pH, conductivity, dissolved oxygen content and temperature) were collected at a later date.
- Because the MI sampling grids were small, ten aliquots were collected rather than 30.
- At CBLsw-004-SW, a surface water sample and co-located MI sediment sample were collected as contingency samples from a spring. The contingency samples were collected to more fully characterize C-Block Quarry's surface water.

- The well construction of the four C-Block Quarry wells was modified to cover a potential cap zone. Monitoring Wells CBLmw-001, CBLmw-002, CBLmw-003 and CBLmw-004 were constructed with 5 ft of sand above the screen rather than the 3 ft of sand specified in the FWSAP. CBLmw-004 was constructed with 3.7 ft of bentonite rather than the 3 ft stipulated in the FWSAP.
- The approved work plan for the characterization activities stipulated that monitoring wells be developed no earlier than one day, and no later than seven days, after the grout set. Due to the Christmas holidays, development of Monitoring Wells CBLmw-002 and CBLmw-003 was not initiated until 13 days after the grout was set.

Although some deviations were implemented, the objectives of characterizing the C-Block Quarry AOC were still achieved.

4.0 NATURE OF CONTAMINATION AT C-BLOCK QUARRY

This section summarizes the analytical results obtained from the environmental sampling conducted at the C-Block Quarry. The results are organized by media: surface soils (0-1 ft), groundwater, surface water, and sediment. The number of samples collected and the number of analytical results that exceeded either the RVAAP background criteria or Region 9 residential Preliminary Remediation Goals are listed in each subsection. The evaluation completed in this section is a preliminary comparison and is not intended to be used alone for making risk management decisions. The risk screening, presented later in this AOC-specific report, further discusses and evaluates the contaminants detected during this AOC characterization. The following sections present a summation and initial screening of the analytical data for samples collected during the AOC characterization.

4.1 MI SURFACE SOIL (0-1 FT)

Seven MI Surface Soil (0-1 ft) samples (six regular and one QC) were collected during the C-Block Quarry characterization activities. Additionally, one discrete surface soils (0-1 ft) sample was collected for VOC analysis. All positive detections were compared to RVAAP background (discrete background values from the Winklepeck Burning Grounds Phase II RI, 1999) and PRG values as previously discussed.

Surface Soil (0-1 ft) results at or above detection limits are presented in Table CBL-2. All Surface Soil (0-1 ft) analytical results are presented in Table CBL-6. Locations where Surface Soil (0-1 ft) analytes were detected at or above RVAAP-specific background concentrations and PRGs are illustrated in Figure CBL-7. Laboratory analytical reports are provided in Appendix F.

The Surface Soil (0-1 ft) analytical results are summarized as follows:

- **Aluminum** exceeded the Region 9 PRG in five samples with a **maximum concentration of 12000 mg/kg.**
- **Arsenic** exceeded the Region 9 PRG in six samples and exceeded background and the Region 9 PRG in one sample with a **maximum concentration of 19 mg/kg.**
- **Chromium** exceeded background in one sample and exceeded background and the Region 9 PRG in five samples with a **maximum concentration of 920 mg/kg.**
- **Copper** exceeded background in four samples with a **maximum concentration of 78 mg/kg.**
- **Iron** exceeded the Region 9 PRG in five samples with a **maximum concentration of 22000 mg/kg.**
- **Lead** exceeded background in one sample with a **maximum concentration of 43 mg/kg.**
- **Manganese** exceeded the Region 9 PRG in six samples with a **maximum concentration of 950 mg/kg.**
- **Potassium** exceeded background in one sample with a **maximum concentration of 960 mg/kg.**
- **Sodium** exceeded background in seven samples with a **maximum concentration of 310 mg/kg.**
- **Vanadium** exceeded the Region 9 PRG in six samples with a **maximum concentration of 24 mg/kg.**

- **Mercury** exceeded background in four samples with a **maximum concentration of 0.073 mg/kg.**
- **Thallium** exceeded background in two samples with a **maximum concentration of 0.36 mg/kg.**
- **2,4,6-TNT** exceeded the Region 9 PRG in one sample with a **maximum concentration of 22 mg/kg.**
- **2-Amino-4,6-Dinitrotoluene** exceeded laboratory detection limits in two samples with a **maximum concentration of 0.64 mg/kg**.
- **Nitrocellulose** exceeded laboratory detection limits in one sample with a **maximum concentration of 1.3 mg/kg.**
- **VOCs, SVOCs, pesticides and PCBs** were below Region 9 PRGs and/or laboratory detection limits.

4.2 SEDIMENTS

Six sediment samples (four regular and two QC) were collected during the AOC characterization at CBL. Of the six sediment samples collected, two contained VOC aliquots which were collected discretely. Results from the sediment samples were compared to facility-wide background (discrete background values from the Winklepeck Burning Grounds Phase II RI, 1999) concentrations for sediments and/or PRGs for residential soil.

Sediment results at or above detection limits are presented in Table CBL-3. All sediment analytical results are presented in Table CBL-7. Locations where sediment analytes were detected at or above background concentrations and PRGs are illustrated in Figure CBL-7. Laboratory analytical reports are provided in Appendix R.

Other details pertinent to the sediment analytical results:

- **Aluminum** exceeded the Region 9 PRG in four samples and exceeded background and the Region 9 PRG in one sample with a **maximum concentration of 14000 mg/kg.**
- **Arsenic** exceeded the Region 9 PRG in five samples with a **maximum concentration of 15 mg/kg.**
- **Beryllium** exceeded background in five samples with a **maximum concentration of 1.2 mg/kg.**
- **Cadmium** exceeded background in one sample with a **maximum concentration of 0.12 mg/kg.**
- **Cobalt** exceeded background in two samples with a **maximum concentration of 9.3 mg/kg.**
- **Iron** exceeded the Region 9 PRG in five samples with a **maximum concentration of 26000 mg/kg.**
- **Manganese** exceeded the Region 9 PRG in three samples with a **maximum concentration of 970 mg/kg.**
- **Potassium** exceeded background in one sample with a **maximum concentration of 960 mg/kg.**
- **Sodium** exceeded background in four samples with a **maximum concentration of 350 mg/kg.**
- **Vanadium** exceeded the Region 9 PRG in three samples, and exceeded background and the Region 9 PRG in two samples with a **maximum concentration of 29 mg/kg.**
- **Mercury** exceeded background in one sample with a **maximum concentration of 0.062 mg/kg.**
- **Thallium** exceeded the Region 9 PRG in one sample with a **maximum concentration of 0.64 mg/kg.**
- **VOCs, SVOCs, pesticides, PCBs, explosives and propellants** were below Region 9 PRGs and/or laboratory detection limits.

4.3 SURFACE WATER

Five surface water samples (four regular and one QC) were collected during the C-Block Quarry characterization. Results from analyses were compared to surface water background concentrations (USACE, 2001b) and/or USEPA Region 9 tap water PRGs.

Surface water results at or above detection limits are presented in Table CBL-4. All surface water analytical results are presented in Table CBL-8. Locations where surface water analytes were detected at or above background concentrations and PRGs are illustrated in Figure CBL-7. Laboratory analytical reports are provided in Appendix P. Analysis of surface water at CBL included the following parameters: TAL Metals, Explosives, Propellants, VOCs, SVOCs, Cr+6, Pesticides and PCBs.

Other details pertinent to the surface water analytical results:

- **Barium** exceeded background in two samples with a **maximum concentration of 120 µg/L.**
- **Chromium** exceeded background in two samples with a **maximum concentration of 2.0 µg/L.**
- **Cobalt** exceeded background in five samples with a **maximum concentration of 9.0 µg/L.**
- **Iron** exceeded the Region 9 PRG in five samples, and exceeded background and the Region 9 PRG in one sample with a **maximum concentration of 23000 µg/L.**
- **Manganese** exceeded the background in one sample, and exceeded background and the Region 9 PRG in four samples with a **maximum concentration of 4100 µg/L.**
- **Nickel** exceeded background in three samples with a **maximum concentration of 7.4 µg/L.**
- **Potassium** exceeded background in four samples with a **maximum concentration of 12000 µg/L.**
- **Vanadium** exceeded background in one sample with a **maximum concentration of 2.7 µg/L.**
- **Arsenic** exceeded background and the Region 9 PRG in four samples with a **maximum concentration of 11 µg/L.**
- **Hexavalent Chromium** exceeded background in one sample with a **maximum concentration of 22 µg/L.**
- **Lead** exceeded background in one sample with a **maximum concentration of 1.0 µg/L.**
- **Mercury** exceeded background in two samples with a **maximum concentration of 0.066 µg/L.**
- **Thallium** exceeded background in one sample with a **maximum concentration of 1.7 µg/L.**
- **Methylene Chloride** exceeded the Region 9 PRG in one sample with a **maximum concentration of 130 µg/L.** All other **VOCs** were below the Region 9 PRGs and/or detection limits.
- **Bis(2-ethylhexyl)phthalate** exceeded the Region 9 PRG in one sample with a **maximum concentration of 130 µg/L.** All other **SVOCs** were below the Region 9 PRGs and/or detection limits.
- **Pesticides, PCBs, explosives and propellants** were below Region 9 PRGs and/or laboratory detection limits.

4.4 GROUNDWATER

Five groundwater samples (four regular and one QC) were collected from the four newly installed monitoring wells (CBLmw-001 through CBLmw 004) during the C-Block Quarry characterization. Groundwater samples were collected to identify any subsurface contamination of the shallow water table.

The groundwater analytical results were compared to background values and USEPA Region 9 tap water PRGs.

Groundwater results at or above detection limits are presented in Table CBL-5. All groundwater analytical results are presented in Table CBL-9. Locations where groundwater analytes were detected at or above background concentrations and PRGs are illustrated in Figure CBL-8. Laboratory analytical reports are provided in Appendix L.

Other details pertinent to the groundwater analytical results:

- **Cobalt** exceeded background in three samples with a **maximum concentration of 2.6 µg/L.**
- **Copper** exceeded background in five samples with a **maximum concentration of 11 µg/L.**
- **Hexavalent Chromium** exceeded background in four samples with a **maximum concentration of 7.7 µg/L.**
- **Benzo(a)anthracene** exceeded the Region 9 residential PRG in one sample with a **maximum concentration of 0.16 J µg/L.** J value indicates an estimated result.
- **Benzo(a)pyrene** exceeded the Region 9 residential PRG in one sample with a **maximum concentration of 0.17 J µg/L.** J value indicates an estimated result.
- **Benzo(b)fluoranthene** exceeded the Region 9 residential PRG in one sample with a **maximum concentration of 0.13 J µg/L.** J value indicates an estimated result.
- **Bis(2-ethylhexyl)phthalate** exceeded the Region 9 residential PRG in two samples with a **maximum concentration of 400 µg/L.**
- **Indeno(1,2,3-cd)pyrene** exceeded the Region 9 residential PRG in one sample with a **maximum concentration of 0.14 J µg/L.** J value indicates an estimated result.
- **VOCs, pesticides, PCBs, explosives and propellants** were below Region 9 residential PRGs and/or laboratory detection limits.

4.5 GEOTECHNICAL

Geotechnical analysis was conducted during groundwater monitoring well installation. Two Shelby tubes were collected at monitoring well locations CBLmw-001 (0 to 2 ft) and CBLmw-004 (2 to 4 ft). The results of the geotechnical analysis are summarized in the following table.

Sample Number	Depth feet	Moisture Content %	Liquid Limit %	Plastic Limit %	Plastic Index	Agg. %	C Sand %	M Sand %	F Sand %	Silt & Clay %	Soil Descr.	Class Sym.	pH	Specific Gravity
CBLmw-001 (0-2 ft.)	1.7	18.0	31	21	10	12.1	12.2	9.3	17.5	49.0	Mottled brown clayey sand, little gravel	SC	6.9	2.760
CBLmw-004 (2-4 ft.)	3.7	14.5	17	17	NP	2.9	3.1	10.3	34.1	49.6	Brown silty sand, trace gravel	SM	8.4	2.767

4.6 IN SITU PERMEABILITY TESTING RESULTS

Following installation of the monitoring wells, a slug test was completed to determine the in-situ permeability of the aquifer underlying the C-Block Quarry. The following table shows the results of the slug tests performed in January and February 2005.

Hydraulic Conductivities in C-Block Quarry Monitoring Wells

Monitoring Well ID	Screened Interval Depth (ft)	Total Borehole Depth (ft)	Geologic Material Adjacent to Screen	Hydraulic conductivity (cm/s)
MW-001	39-49	50	sandstone	1.75 E-4
MW-002	34.5-44.5	45.3	sandstone	4.14 E-4
MW-003	33-43	44	sandstone	3.69 E-4
MW-004	34-44	45	sandstone	5.62 E-4

Based on the results of the slug tests, the hydraulic conductivities arithmetic average is 3.80×10^{-4} cm/s in the soil underlying C-Block Quarry. This conductivity rate is average for RVAAP. Previous slug tests performed at wells located at other sites within RVAAP indicate average hydraulic conductivities between 3.87×10^{-2} cm/s to 4.46×10^{-6} cm/s (USACE, 2001b). The field measurements and test data are provided in Appendix K along with the calculation worksheets for the tests.

Data from the three rounds of well gauging were used to produce potentiometric surface maps for C-Block Quarry (Figures CBL-9 through CBL-11). The water level data suggest that groundwater flows to the west-southwest at a gradient of approximately 0.005 ft/ft.

5.0 HUMAN HEALTH AND ECOLOGICAL RISK SCREENING FOR C-BLOCK QUARRY

This section details both the human health and ecological risk screening performed at C-Block Quarry.

5.1 HUMAN HEALTH RISK SCREENING

Volume 1, Section 5.1 explains how the C-Block Quarry data were screened to determine human health contaminants of concern (COPCs). Total chromium analytical results were conservatively screened against 1/10th of the PRG value; therefore, a screening value of 21 mg/kg was used rather than 210 mg/kg.

5.1.1 Surface Soil (0-1 ft)

Table CBL-10 presents the human health screening table for Surface Soil (0-1 ft) in C-Block Quarry. A total of 34 constituents were detected including metals and semi-volatile organic compounds (SVOCs):

- Eight constituents had detections greater than background concentrations: arsenic, chromium, copper, lead, potassium, sodium, mercury and thallium.
- Seven constituents had detections above the adjusted Region 9 residential PRGs: aluminum, arsenic, chromium, iron, manganese, vanadium and 2,4,6-TNT.
- Concentrations of two constituents, arsenic and chromium, exceeded both the RVAAP-specific background value established for that compound and the Region 9 PRG.
- Five constituents have no established background value or Region 9 PRG: benzo(g,h,i)perylene, phenanthrene, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, and nitrocellulose.

Based on these comparisons, eight chemicals of potential concern (COPCs) were identified in Surface Soil (0-1 ft) in C-Block Quarry: arsenic, chromium, benzo(g,h,i)perylene, phenanthrene, 2,4,6-TNT, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, and nitrocellulose. Of these COPCs only arsenic, chromium, and 2,4,6-TNT were above either background concentrations or PRGs. All other COPCs were identified as COPCs because no screening criteria have been established.

5.1.2 Sediment

Table CBL-11 presents the human health screening table for sediment in C-Block Quarry. Twenty-four constituents were detected in sediment. These constituents included 21 metals, one volatile organic compound (VOC), and two SVOCs.

- Seven constituents had detected concentrations greater than background values: aluminum, beryllium, cadmium, cobalt, sodium, vanadium, and mercury.
- Six constituents had detections above the adjusted Region 9 residential PRGs: aluminum, arsenic, iron, manganese, vanadium, and thallium.

- Concentrations of two constituents, arsenic and vanadium, exceeded both the RVAAP-specific background value established for that compound and the Region 9 PRG.

Of these constituents, aluminum and vanadium, which had detected concentrations above both background and PRGs, were identified as COPCs.

5.1.3 Surface Water

Table CBL-12 presents the human health screening table for surface water in C-Block Quarry. Analysis of five C-Block Quarry surface water samples resulted in a total of 31 detected constituents.

- Thirteen constituents had detections greater than background values: arsenic, barium, chromium, cobalt, hexavalent chromium, iron, lead, manganese, nickel, potassium, vanadium, mercury, and thallium.
- Five constituents had detections above the Region 9 PRGs: arsenic, iron, manganese, methylene chloride and bis(2-ethylhexyl)phthalate.
- Iron, manganese, and arsenic had detected concentrations above both background and PRGs.

Based on these comparisons, five COPCs were identified in C-Block Quarry surface water: arsenic, iron, manganese, methylene chloride, and bis(2-ethylhexyl)phthalate. All COPCs were either above PRGs or both background and PRGs.

5.1.4 Groundwater

Table CBL-13 presents the human health screening table for groundwater in C-Block Quarry. Twenty-four constituents were detected in groundwater, including metals and SVOCs.

- Three constituents had detections greater than background concentrations: cobalt, copper, and hexavalent chromium.
- Five constituents had detections above the Region 9 PRGs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, bis(2-ethylhexyl)-phthalate, and indeno(1,2,3-cd)pyrene.
- Two constituents, 2-methylnaphthalene and penanthrene, had no established screening values.

Based on these comparisons, seven COPCs were identified in groundwater including 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, indeno(1,2,3-cd)pyrene, and phenanthrene. All COPCs were identified based on an exceedance of the PRG except 2-methylnaphthalene and phenanthrene which were identified as COPC due to the lack of appropriate screening criteria.

5.2 ECOLOGICAL RISK SCREENING

See Volume I, Section 5.2 for an explanation of the procedures used to conduct this ecological risk screen.

5.2.1 Surface Soil (0-1 ft)

Table CBL-14 presents the ecological screening table for Surface Soil (0-1 ft) at the C-Block Quarry. A total of 34 constituents were detected.

- Seven constituents had detections greater than background concentrations: chromium; copper; lead; potassium; sodium; mercury; and thallium.
- Ten constituents had detections above ecological screening values: aluminum; chromium; copper; iron; lead; manganese; selenium; vanadium; zinc; and mercury.
- Four constituents (chromium, copper, lead and mercury) had reported concentrations that exceeded Region 9 PRGs and the background value established for RVAAP Surface Soil (0-1 ft)s.
- Three explosives (2,4,6-TNT; 2-amino-4,6-dinitrotoluene; and 4-amino-2,6-dinitrotoluene) and one propellant (nitrocellulose), which were detected in C-Block Quarry Surface Soil (0-1 ft)s, have no screening values.

Based on these comparisons, eight constituents were identified as chemicals of potential ecological concern (COPECs) in Surface Soil (0-1 ft) at the C-Block Quarry: chromium, copper, lead, mercury, 2,4,6-TNT, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, and nitrocellulose. Of these COPECs, 2,4,6-TNT, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, and nitrocellulose were identified due to the lack of screening criteria.

5.2.2 Sediment

Table CBL-15 presents the ecological screening table for sediment at the C-Block Quarry. Twenty-five constituents were detected in sediment.

- Seven constituents had detected concentrations greater than background values: aluminum; beryllium; cadmium; cobalt; sodium; vanadium; and mercury.
- One constituent, acetone, had detections above the ecological screening value.
- Nine constituents have no screening value. Of the nine, three constituents (aluminum, beryllium and vanadium) exceed the background value established for RVAAP.

Based on these comparisons, five constituents were identified as COPECs: aluminum, beryllium, vanadium, mercury, and acetone. Aluminum, beryllium, and vanadium were identified as COPECs due to the lack of screening criteria and the fact that they exceed the RVAAP background value. Mercury was identified as a COPEC in sediment because it is considered to be persistent, bioaccumulative, and toxic.

5.2.3 Surface Water

Table CBL-16 presents the ecological screening table for surface water at the C-Block Quarry. Thirty-one constituents were detected in surface water.

- Thirteen constituents had detections greater than background values: barium; chromium; cobalt; iron; manganese; nickel; potassium; vanadium; arsenic; hexavalent chromium; lead; mercury; and thallium.
- One constituent, hexavalent chromium, was detected above ecological screening values.
- Seven constituents (aluminum, iron, magnesium, manganese, acetone, benzoic acid and benzyl alcohol) had no screening values. Of those seven, two constituents (iron and manganese) also exceed the background values established for RVAAP.

Based on these comparisons, seven constituents were identified as COPECs in surface water at the C-Block Quarry: iron; manganese; hexavalent chromium; mercury; acetone; benzoic acid; and benzyl alcohol. All COPECs, except hexavalent chromium and mercury, were identified due to the lack of screening criteria. Mercury was identified as a COPEC in surface water because it is considered to be persistent, bioaccumulative, and toxic.

6.0 SUMMARY AND CONCLUSION FOR THE CHARACTERIZATION OF C-BLOCK QUARRY

This section briefly summarizes the existing conditions that were found during the AOC characterization at C-Block Quarry and the risk screening tasks that were completed.

6.1 NATURE OF CONTAMINATION

Contaminants were detected above screening criteria in four media: Surface Soil (0-1 ft), sediment, surface water and groundwater. Seven constituents other than inorganics were detected above screening criteria in the samples collected from the various media. Explosives were detected above screening criteria in only one out of seven soil sample locations; SVOCs in one out of five surface water samples and three out of five groundwater samples; and VOCs in one out of four surface water samples. Therefore, no inferences can be made regarding contaminant distribution in any of the media because of the low frequency of detection.

Contaminants detected in soil above background and/or PRG screening values included metals, SVOCs, explosives and propellants.

In sediment, 11 metals, one VOC and two SVOCs were detected at concentrations above background and/or PRG screening values.

In surface water, 12 metals were detected above background and/or PRG screening values as well as one VOCs and one SVOCs.

In groundwater, three metals and five SVOCs were detected above background and/or PRG screening values. Generally, constituents in the downgradient well (CBLmw-002-GW) were detected at higher concentrations than those in the upgradient wells.

6.2 HUMAN HEALTH RISK SCREENING

An HHRS was conducted to compare the concentrations detected in the C Block Quarry samples to RVAAP-specific background values and U.S. EPA Region 9 PRGs. This preliminary screen was conducted to identify potential COPCs. The following table identifies the COPCs by media.

Table CBL-18			
Chemical of Potential Concern - All Media			
Soils	**Sediment**	**Surface Water**	**Groundwater**
Arsenic	Aluminum	Arsenic	2-methylnaphthalene
Chromium	Vanadium	Iron	Benzo(a)anthracene
Benzo(g,h,i)perylene		Manganese	Benzo(a)pyrene
Phenanthrene		Methylene Chloride	Benzo(b)fluoranthene
2,4,6-TNT		Bis(2-ethylhexyl)phthalate	Bis(2-ethylhexyl)phthalate
2-amino-4,6-dinitrotoluene			Indeno(1,2,3-cd)pyrene
4-amino-2,6-dinitrotoluene			Phenanthrene
Nitrocellulose			

6.3 ECOLOGICAL RISK SCREENING

An ERS was performed to compare contaminant concentrations detected in C-Block Quarry to RVAAP-specific background values and ecological screening values. The ERS was conducted as outlined in Volume 1, Section 5.2. The ERS identified COPECs for C-Block Quarry. The following table summarizes those COPECs by media.

Table CBL-19			
Chemicals of Potential Ecological Concern– All Media			
Soils	**Sediment**	**Surface Water**	**Groundwater**
Arsenic	Beryllium	Iron	Groundwater not
Chromium	Acetone	Manganese	evaluated for ERS
Copper		Hexavalent Chromium	
Lead		Mercury	
Mercury		Acetone	
2,4,6-TNT		Benzoic Acid	
2-amino-4,6-dinitrotoluene		Benzyl Alcohol	
4-amino-2,6-dinitrotoluene			
Nitrocellulose			

6.4 CONCLUSION

Based on the COPCs presented in Section 6.2 and the COPECs presented in Section 6.3, a full risk evaluation should be considered in the overall risk management decisions that are made for C-Block Quarry.

CBLmw-004

A

C

CBLmw-003

B'

C-Block Quarry

CBLmw-001

B

CBLmw-002

C'

A'

MKM Engineers, Inc.
4153 Bluebonnett Drive
Stafford, TX 77477

Ravenna Army Ammunition Plant
Ravenna, Ohio
Figure CBL-1
C-Block Quarry
Geologic Cross Section Map

Characterization of 14 RVAAP AOCs

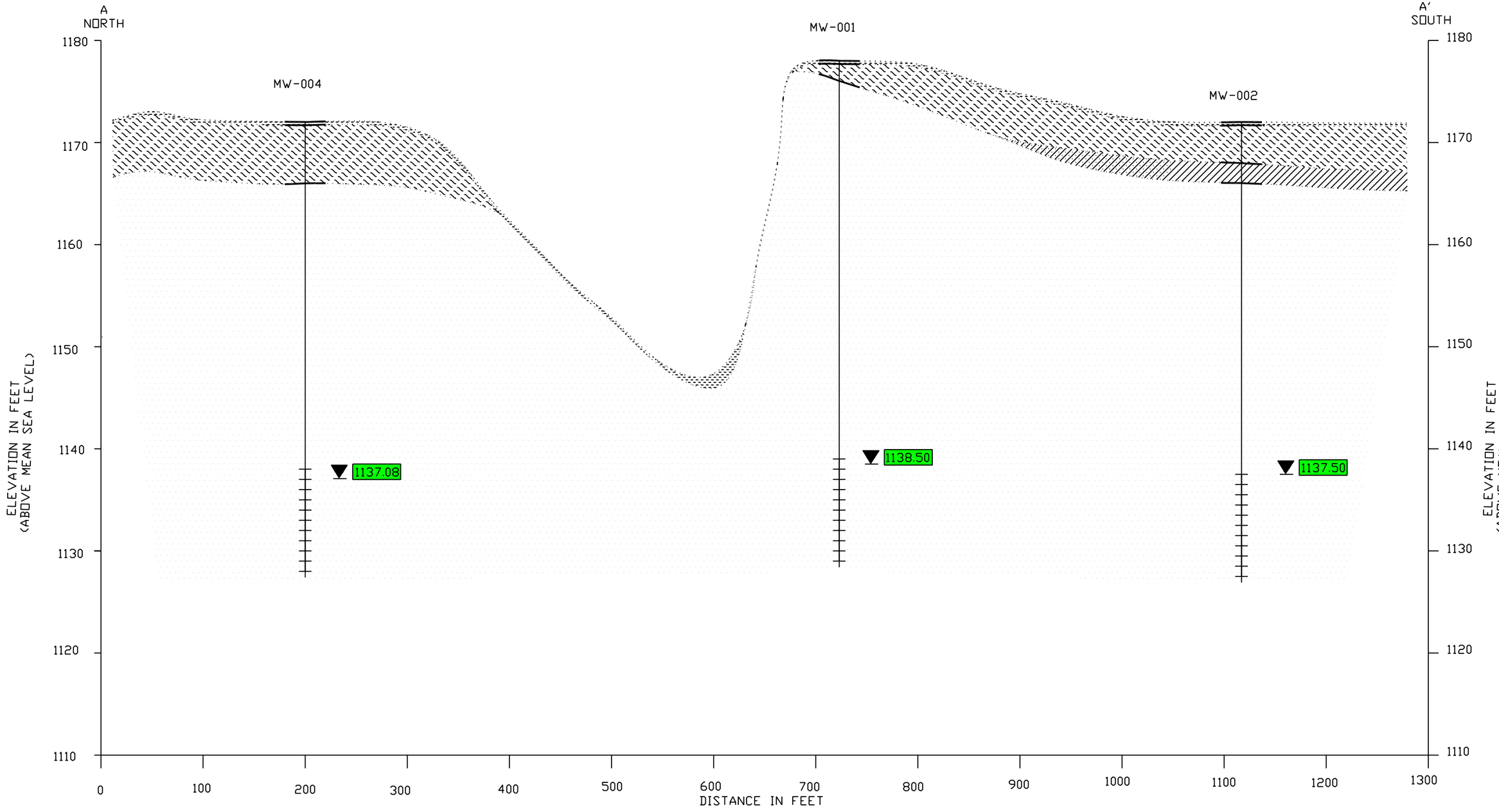
Drawn By:	Checked By:	Date Drawn:	Project No.:
ST	SL	03/30/05	04-02-0030

0 20 40 80 120 Feet

N W E S

Legend

- Monitoring Well Locations
- Geologic Cross Section
- Vegetation
- Streams/Ditches
- Road
- 10 ft Contour Line
- 2 ft Contour Line



CROSS SECTION A

HORIZONTAL 1"=100'
VERTICAL 1"=10'

VERTICAL EXAGGERATION = 10X

LEGEND

- TOP SOIL
- SANDY SILT
- DEPTH GROUNDWATER ENCOUNTERED
- KNOWN SUBSURFACE SOIL CONDITIONS
- SILTY SAND
- SAND STONE
- SCREEN INTERVAL
- 1140.64 GROUNDWATER ELEVATION (ft)
- EXPECTED SUBSURFACE SOIL CONDITIONS

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
			05/25/06	MS

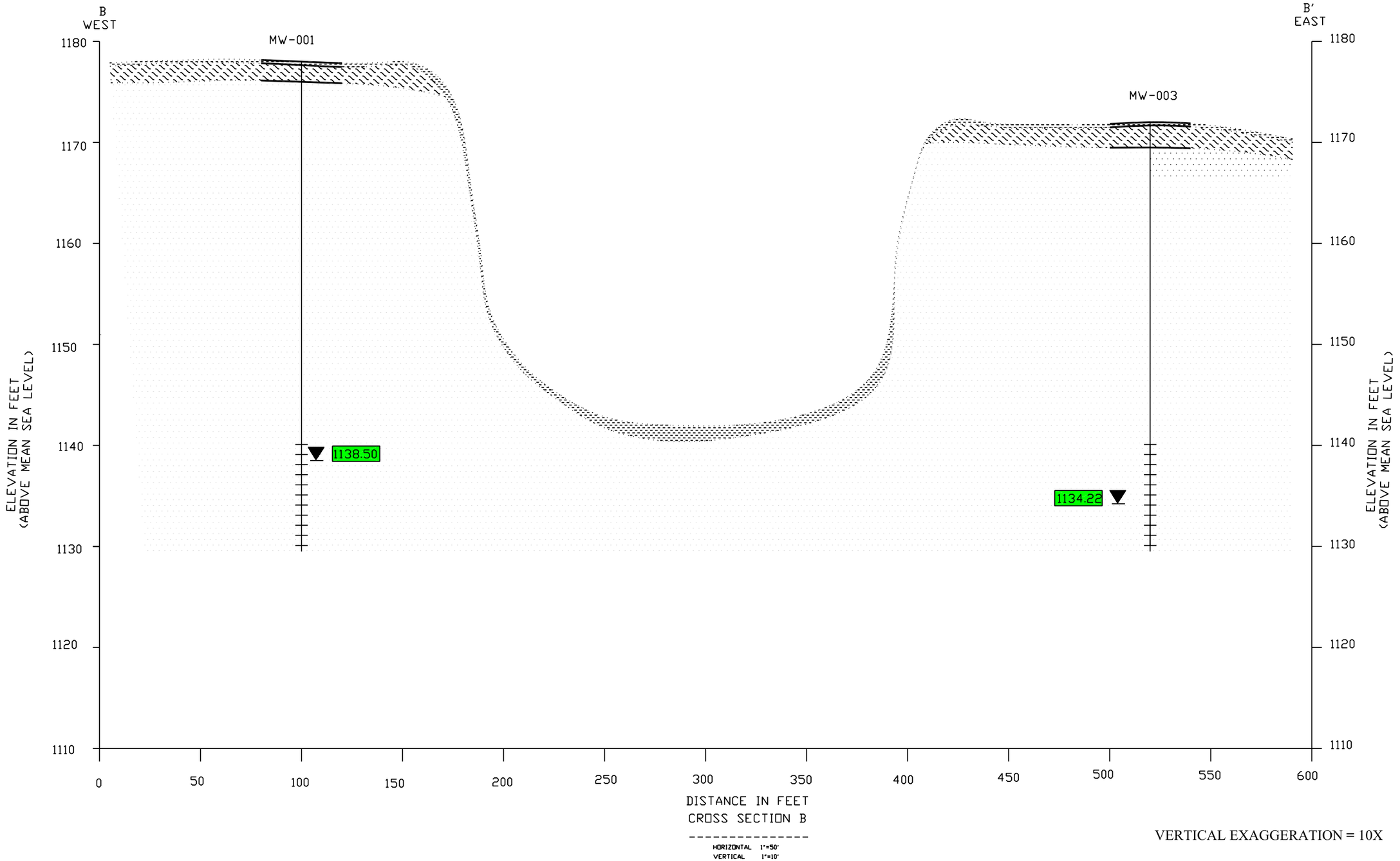
MKM ENGINEERS, INC.

DATE DRAWN 04/18/05

FIGURE CBL-2
C-BLOCK QUARRY
GEOLOGIC CROSS SECTION A
RAVENNA ARMY AMMUNITION PLANT, RAVENNA OHIO

SIZE	PROJECT NO.	DWG NO.	REV
D		CBL-2	

DRAWN BY	ST	APPR. BY	SRL



LEGEND

TOP SOIL
SANDY SILT
DEPTH GROUNDWATER ENCOUNTERED
KNOWN SUBSURFACE SOIL CONDITIONS
SILTY SAND
SAND STONE
SCREEN INTERVAL
1140.64 GROUNDWATER ELEVATION (ft)
EXPECTED SUBSURFACE SOIL CONDITIONS

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
			05/25/06	MS

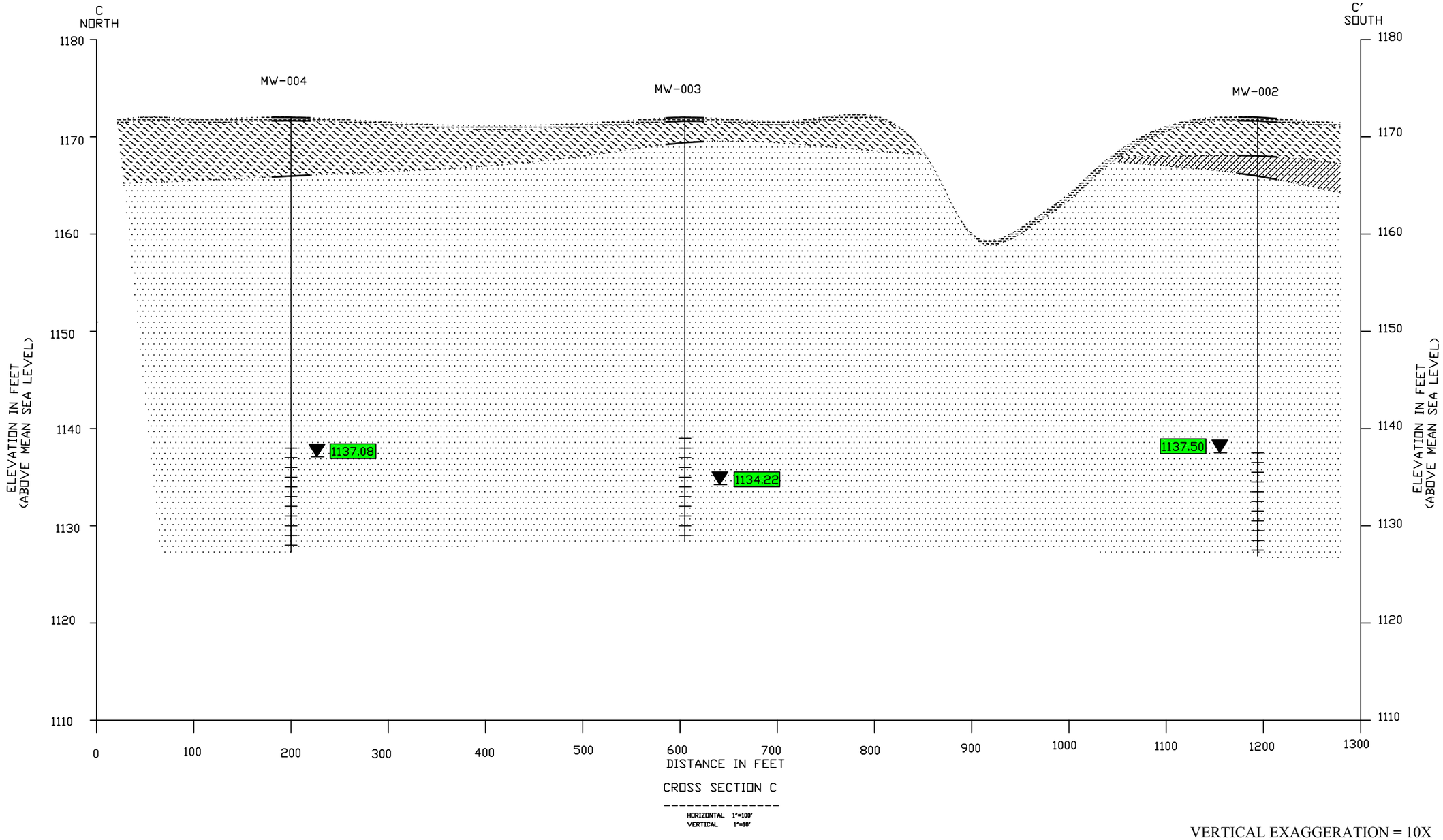
MKM ENGINEERS, INC.

DATE DRAWN 04/18/05

FIGURE CBL-3
C-BLOCK QUARRY
GEOLOGIC CROSS SECTION B
RAVENNA ARMY AMMUNITION PLANT, RAVENNA OHIO

SIZE	PROJECT NO.	DWG NO.	REV
D		CBL-3	

DRAWN BY	ST	APPR. BY	SRL



VERTICAL EXAGGERATION = 10X

LEGEND

TOP SOIL
SANDY SILT
DEPTH GROUNDWATER ENCOUNTERED
KNOWN SUBSURFACE SOIL CONDITIONS
SILTY SAND
SAND STONE
SCREEN INTERVAL
1140.64 GROUNDWATER ELEVATION (ft)
EXPECTED SUBSURFACE SOIL CONDITIONS

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
			05/25/06	MS

MKM ENGINEERS, INC.

DATE DRAWN 04/18/05

FIGURE CBL-4
C-BLOCK QUARRY
GEOLOGIC CROSS SECTION C
RAVENNA ARMY AMMUNITION PLANT, RAVENNA OHIO

SIZE	PROJECT NO.	DWG NO.	REV
D		CBL-4	

DRAWN BY	ST	APPR. BY	SRL

CBLmw-004

CBLmw-003

C-Block Quarry

CBLmw-001

CBLmw-002

Legend

- Monitoring Well Locations
- Vegetation
- Streams/Ditches
- Road
- 10 ft Contour Line
- 2 ft Contour Line

MKM Engineers, Inc.
4153 Bluebonnet Drive
Stafford, TX 77477

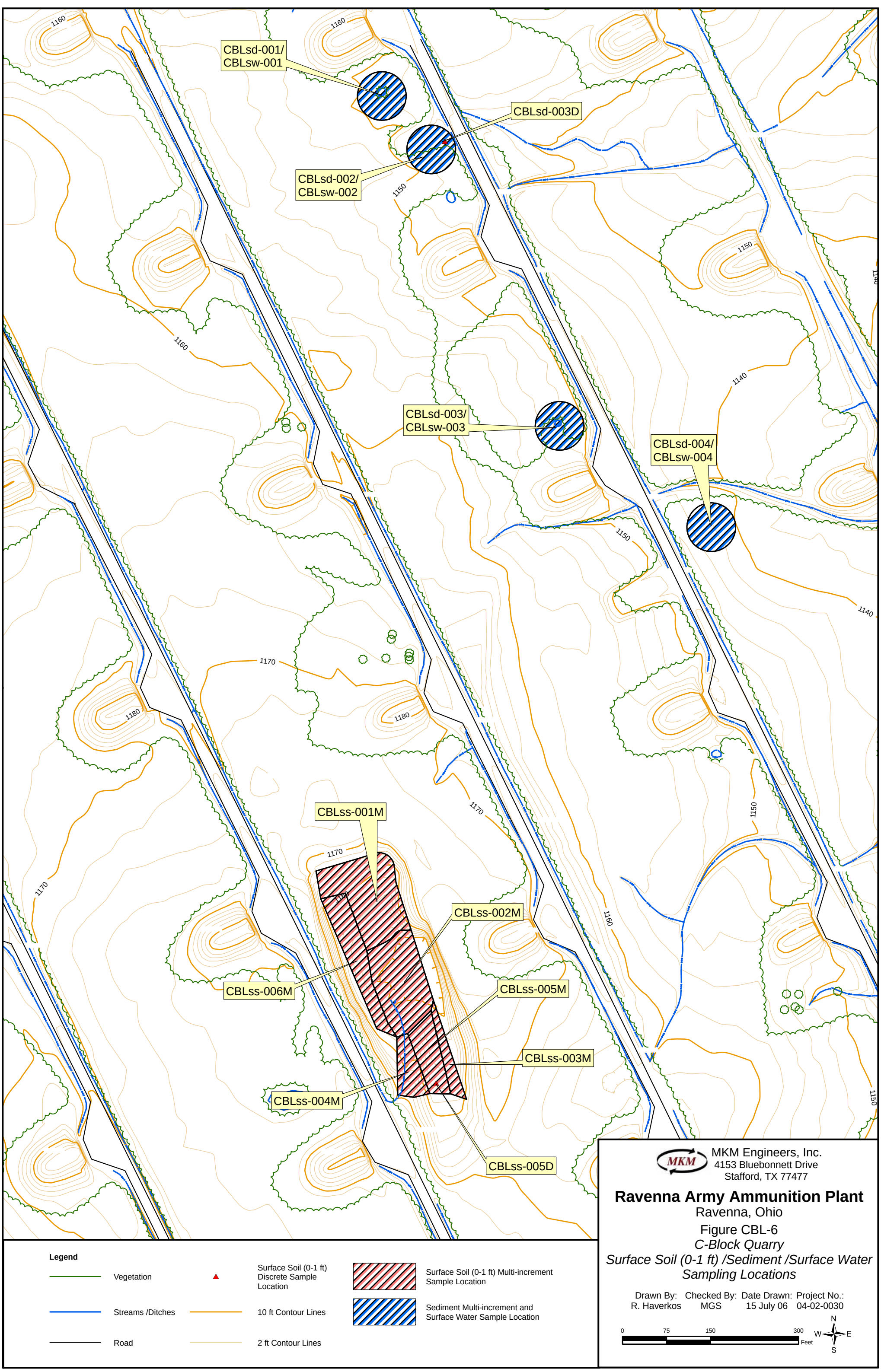
Ravenna Army Ammunition Plant
Ravenna, Ohio
Figure CBL-5
C-Block Quarry
Monitoring Well Locations

Characterization of 14 RVAAP AOCs

Drawn By:	Checked By:	Date Drawn:	Project No.:
ST	SL	03/30/05	04-02-0030

0 20 40 80 120 Feet

N W E S



Legend

- Vegetation
- Streams /Ditches
- Road
- Surface Soil (0-1 ft) Discrete Sample Location
- 10 ft Contour Lines
- 2 ft Contour Lines
- Surface Soil (0-1 ft) Multi-increment Sample Location
- Sediment Multi-increment and Surface Water Sample Location

MKM Engineers, Inc.
4153 Bluebonnett Drive
Stafford, TX 77477

Ravenna Army Ammunition Plant

Ravenna, Ohio

Figure CBL-6

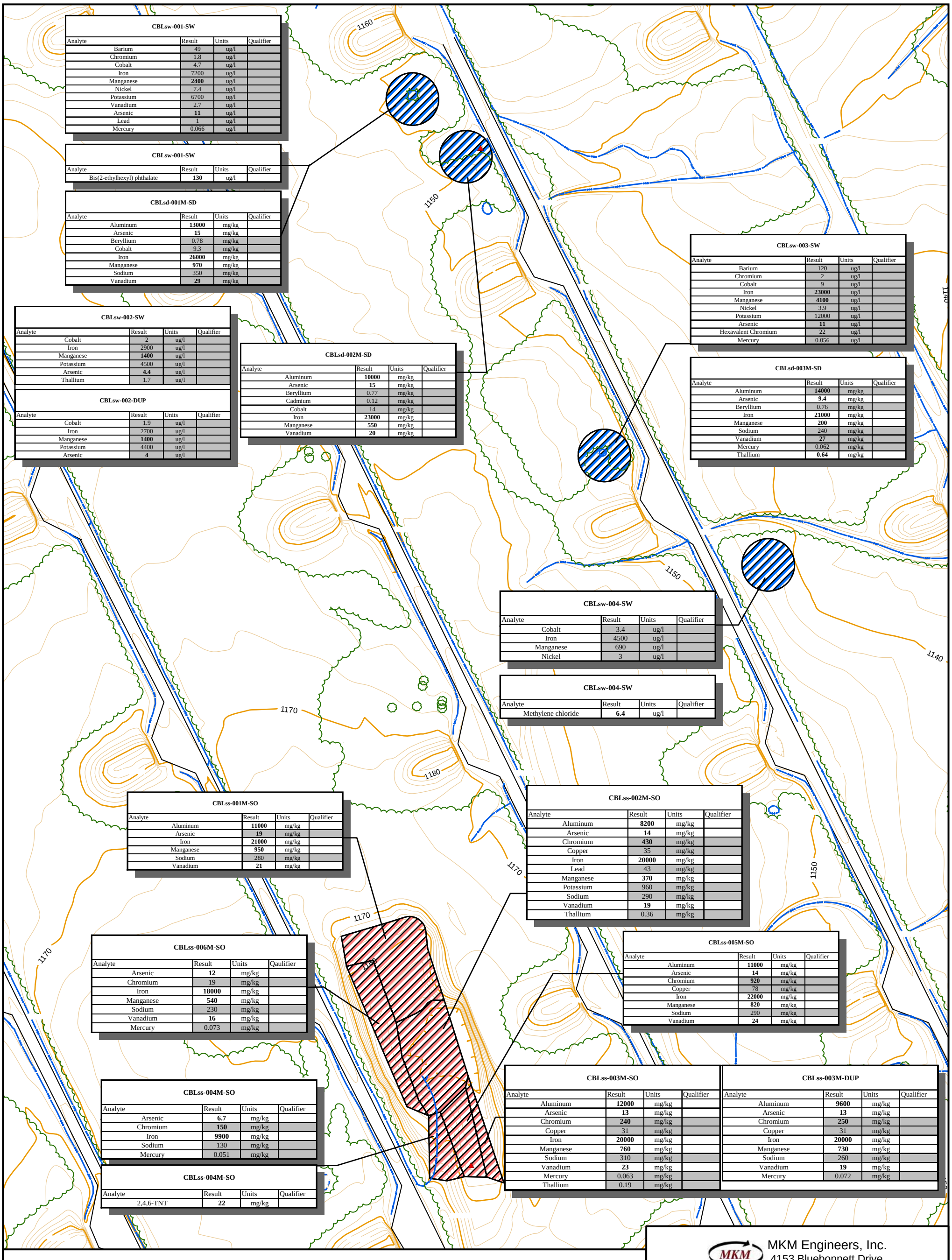
C-Block Quarry

Surface Soil (0-1 ft) /Sediment /Surface Water Sampling Locations

Drawn By:	Checked By:	Date Drawn:	Project No.:
R. Haverkos	MGS	15 July 06	04-02-0030

0 75 150 300 Feet

N W E S



CBLsw-001-SW

Analyte	Result	Units	Qualifier
Barium	49	ug/l	
Chromium	1.8	ug/l	
Cobalt	4.7	ug/l	
Iron	7200	ug/l	
Manganese	**2400**	ug/l	
Nickel	7.4	ug/l	
Potassium	6700	ug/l	
Vanadium	2.7	ug/l	
Arsenic	**11**	ug/l	
Lead	1	ug/l	
Mercury	0.066	ug/l	

CBLsw-001-SW

Analyte	Result	Units	Qualifier
Bis(2-ethylhexyl) phthalate	**130**	ug/l	

CBLsd-001M-SD

Analyte	Result	Units	Qualifier
Aluminum	**13000**	mg/kg	
Arsenic	**15**	mg/kg	
Beryllium	0.78	mg/kg	
Cobalt	9.3	mg/kg	
Iron	**26000**	mg/kg	
Manganese	**970**	mg/kg	
Sodium	350	mg/kg	
Vanadium	**29**	mg/kg	

CBLsw-002-SW

Analyte	Result	Units	Qualifier
Cobalt	2	ug/l	
Iron	2900	ug/l	
Manganese	**1400**	ug/l	
Potassium	4500	ug/l	
Arsenic	**4.4**	ug/l	
Thallium	1.7	ug/l	

CBLsw-002-DUP

Analyte	Result	Units	Qualifier
Cobalt	1.9	ug/l	
Iron	2700	ug/l	
Manganese	**1400**	ug/l	
Potassium	4400	ug/l	
Arsenic	**4**	ug/l	

CBLsd-002M-SD

Analyte	Result	Units	Qualifier
Aluminum	**10000**	mg/kg	
Arsenic	**15**	mg/kg	
Beryllium	0.77	mg/kg	
Cadmium	0.12	mg/kg	
Cobalt	14	mg/kg	
Iron	**23000**	mg/kg	
Manganese	**550**	mg/kg	
Vanadium	**20**	mg/kg	

CBLsw-003-SW

Analyte	Result	Units	Qualifier
Barium	120	ug/l	
Chromium	2	ug/l	
Cobalt	9	ug/l	
Iron	**23000**	ug/l	
Manganese	**4100**	ug/l	
Nickel	3.9	ug/l	
Potassium	12000	ug/l	
Arsenic	**11**	ug/l	
Hexavalent Chromium	22	ug/l	
Mercury	0.056	ug/l	

CBLsd-003M-SD

Analyte	Result	Units	Qualifier
Aluminum	**14000**	mg/kg	
Arsenic	**9.4**	mg/kg	
Beryllium	0.76	mg/kg	
Iron	**21000**	mg/kg	
Manganese	**200**	mg/kg	
Sodium	240	mg/kg	
Vanadium	**27**	mg/kg	
Mercury	0.062	mg/kg	
Thallium	**0.64**	mg/kg	

CBLsw-004-SW

Analyte	Result	Units	Qualifier
Cobalt	3.4	ug/l	
Iron	4500	ug/l	
Manganese	690	ug/l	
Nickel	3	ug/l	

CBLsw-004-SW

Analyte	Result	Units	Qualifier
Methylene chloride	**6.4**	ug/l	

CBLss-001M-SO

Analyte	Result	Units	Qualifier
Aluminum	**11000**	mg/kg	
Arsenic	**19**	mg/kg	
Iron	**21000**	mg/kg	
Manganese	**950**	mg/kg	
Sodium	280	mg/kg	
Vanadium	**21**	mg/kg	

CBLss-002M-SO

Analyte	Result	Units	Qualifier
Aluminum	**8200**	mg/kg	
Arsenic	**14**	mg/kg	
Chromium	**430**	mg/kg	
Copper	35	mg/kg	
Iron	**20000**	mg/kg	
Lead	43	mg/kg	
Manganese	**370**	mg/kg	
Potassium	960	mg/kg	
Sodium	290	mg/kg	
Vanadium	**19**	mg/kg	
Thallium	0.36	mg/kg	

CBLss-006M-SO

Analyte	Result	Units	Qualifier
Arsenic	**12**	mg/kg	
Chromium	19	mg/kg	
Iron	**18000**	mg/kg	
Manganese	**540**	mg/kg	
Sodium	230	mg/kg	
Vanadium	**16**	mg/kg	
Mercury	0.073	mg/kg	

CBLss-005M-SO

Analyte	Result	Units	Qualifier
Aluminum	**11000**	mg/kg	
Arsenic	**14**	mg/kg	
Chromium	**920**	mg/kg	
Copper	78	mg/kg	
Iron	**22000**	mg/kg	
Manganese	**820**	mg/kg	
Sodium	290	mg/kg	
Vanadium	**24**	mg/kg	

CBLss-004M-SO

Analyte	Result	Units	Qualifier
Arsenic	**6.7**	mg/kg	
Chromium	**150**	mg/kg	
Iron	**9900**	mg/kg	
Sodium	130	mg/kg	
Mercury	0.051	mg/kg	

CBLss-004M-SO

Analyte	Result	Units	Qualifier
2,4,6-TNT	**22**	mg/kg	

CBLss-003M-SO

Analyte	Result	Units	Qualifier
Aluminum	**12000**	mg/kg	
Arsenic	**13**	mg/kg	
Chromium	**240**	mg/kg	
Copper	31	mg/kg	
Iron	**20000**	mg/kg	
Manganese	**760**	mg/kg	
Sodium	310	mg/kg	
Vanadium	**23**	mg/kg	
Mercury	0.063	mg/kg	
Thallium	0.19	mg/kg	

CBLss-003M-DUP

Analyte	Result	Units	Qualifier
Aluminum	**9600**	mg/kg	
Arsenic	**13**	mg/kg	
Chromium	**250**	mg/kg	
Copper	31	mg/kg	
Iron	**20000**	mg/kg	
Manganese	**730**	mg/kg	
Sodium	260	mg/kg	
Vanadium	**19**	mg/kg	
Mercury	0.072	mg/kg	

Legend

- Vegetation
- Streams / Ditches
- Road
- 10 ft Contour Lines
- 2 ft Contour Lines
- Surface Soil (0-1 ft) / Sediment Discrete Sample Location
- Surface Soil (0-1 ft) Multi-increment Sample Location
- Sediment Multi-increment and Surface Water Sample Location

Notes:

If Result = or > Background, then the value is presented with a shaded/highlighted style
If Result = or > Background & PRG, then result is presented with a bold + shaded/highlighted style.
If Result = or > PRG, then the value is presented with a bold style.
Result < PRG & Background, then the value is presented with a normal style.
Mg/KG - Milligrams per Kilogram (parts per million - ppm)
Ug/L - Microgrms per Liter (parts per billion - ppb)

MKM Engineers, Inc.
4153 Bluebonnett Drive
Stafford, TX 77477

Ravenna Army Ammunition Plant

Ravenna, Ohio

Figure CBL-7

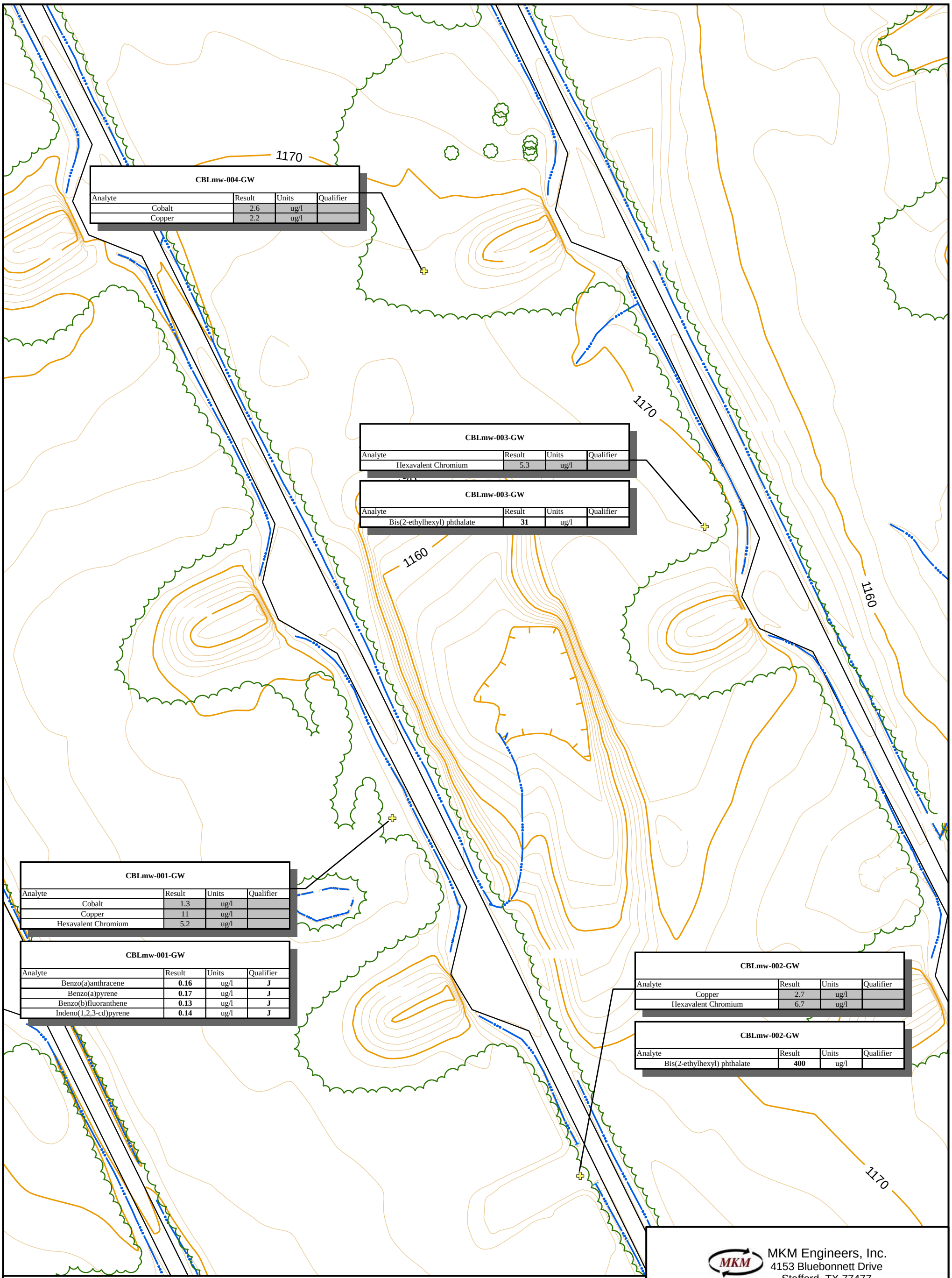
C-Block Quarry

Surface Soil (0-1 ft)/Sediment/Discrete and Surface Water Sample Location Exceedences

Drawn By:	Checked By:	Date Drawn:	Project No.:
R. Haverkos	MGS	15 July 06	04-02-0030

0 75 150 300 Feet

N W E S



Notes:

J - estimated value
If Result = or > Background, then the value is presented with a shaded/highlighted style
If Result = or > Background & PRG, then result is presented with a bold + shaded/highlighted style.
If Result = or > PRG, then the value is presented with a bold style.
Result < PRG & Background, then the value is presented with a normal style.
Ug/L - Micrograms per Liter (parts per billion - ppb)

MKM Engineers, Inc.
4153 Bluebonnett Drive
Stafford, TX 77477

Ravenna Army Ammunition Plant

Ravenna, Ohio

Figure CBL-8

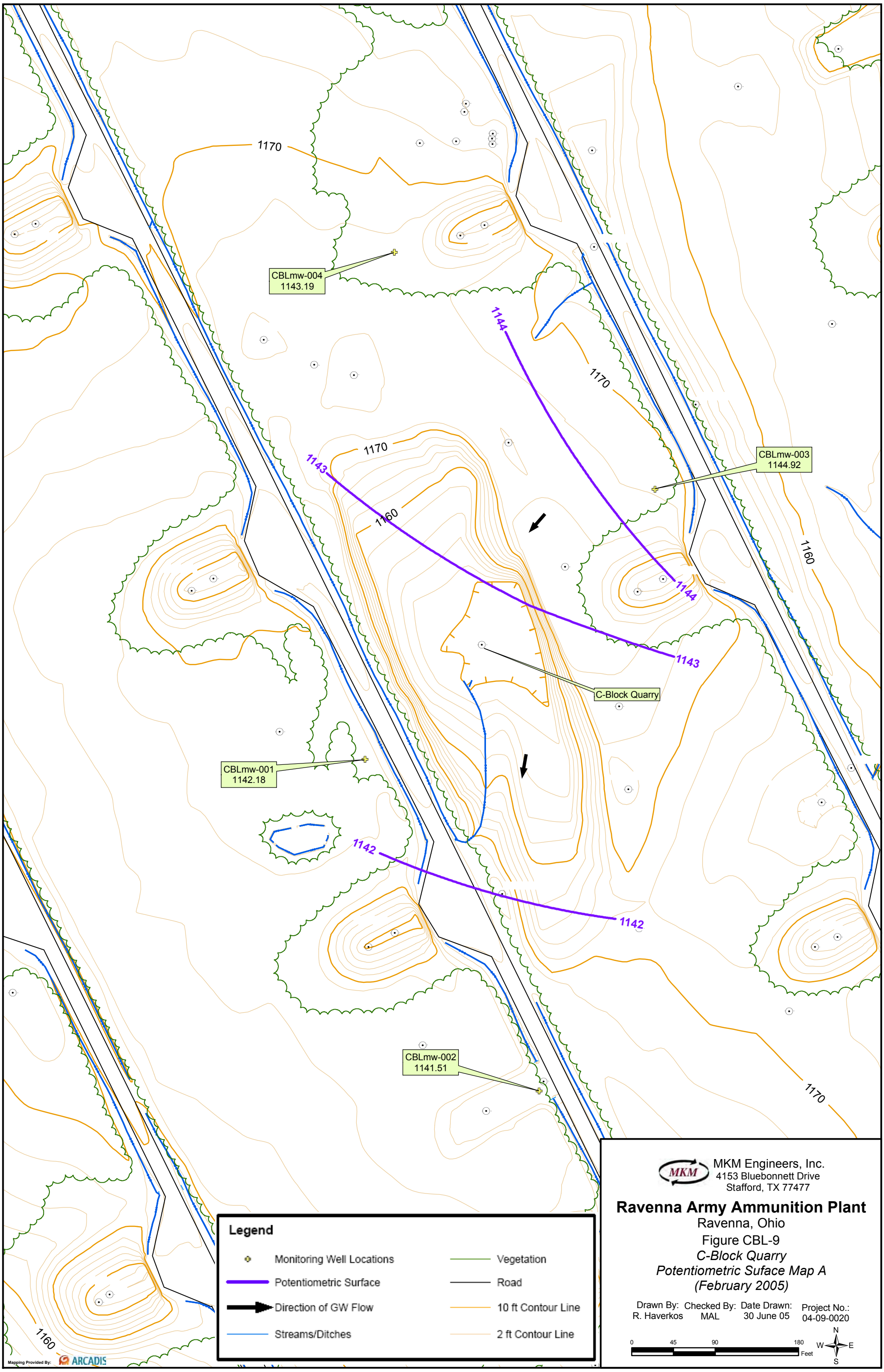
C-Block Quarry

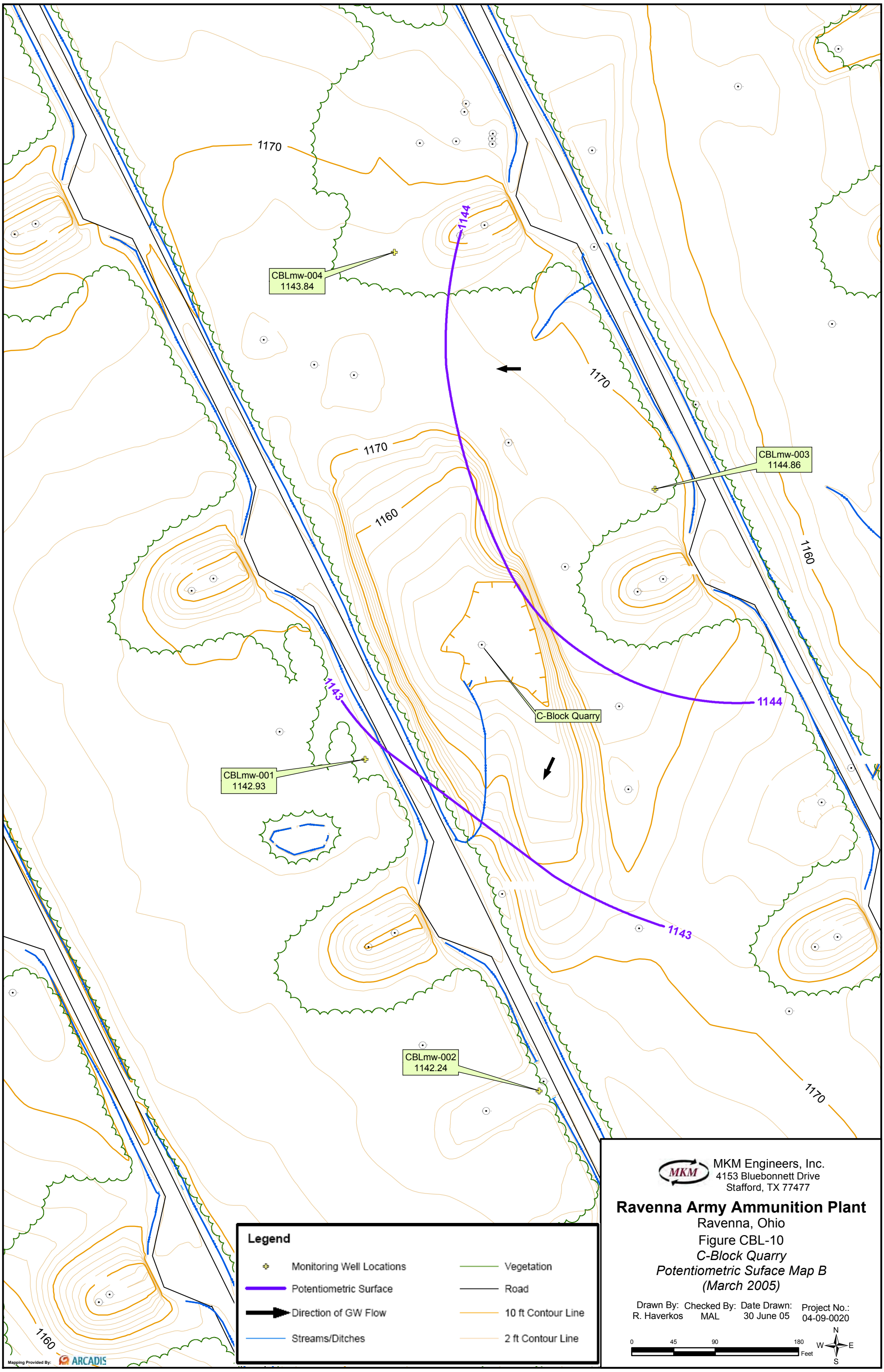
Groundwater Sample Locations Exceedences

Drawn By:	Checked By:	Date Drawn:	Project No.:
R. Haverkos	MGS	15 July 06	04-02-0030

0 45 90 180 Feet

N W E S


1170
CBLmw-004
1143.19
1144
1170
1143
1170
CBLmw-003
1144.92
1160
1144
1143
C-Block Quarry
CBLmw-001
1142.18
1142
1142
1170
CBLmw-002
1141.51
1170
1160
Mapping Provided By: ARCADIS
Legend
Monitoring Well Locations
Potentiometric Surface
Direction of GW Flow
Streams/Ditches
Vegetation
Road
10 ft Contour Line
2 ft Contour Line
MKM Engineers, Inc.
4153 Bluebonnett Drive
Stafford, TX 77477
Ravenna Army Ammunition Plant
Ravenna, Ohio
Figure CBL-9
C-Block Quarry
Potentiometric Suface Map A
(February 2005)
Drawn By: R. Haverkos
Checked By: MAL
Date Drawn: 30 June 05
Project No.: 04-09-0020
0 45 90 180 Feet
N
W E
S



MKM Engineers, Inc.
4153 Bluebonnett Drive
Stafford, TX 77477

Ravenna Army Ammunition Plant

Ravenna, Ohio

Figure CBL-10

C-Block Quarry

Potentiometric Suface Map B

(March 2005)

Drawn By:	Checked By:	Date Drawn:	Project No.:
R. Haverkos	MAL	30 June 05	04-09-0020

0 45 90 180 Feet

N W E S

CBLmw-004
1144.33

CBLmw-003
1145.36

CBLmw-001
1143.51

CBLmw-002
1142.79

C-Block Quarry

1170
1160
1145
1144
1143

Legend

- Monitoring Well Locations
- Potentiometric Surface
- Direction of GW Flow
- Streams/Ditches
- Vegetation
- Road
- 10 ft Contour Line
- 2 ft Contour Line

Mapping Provided By: ARCADIS

MKM Engineers, Inc.
4153 Bluebonnett Drive
Stafford, TX 77477

Ravenna Army Ammunition Plant

Ravenna, Ohio

Figure CBL-11

C-Block Quarry

Potentiometric Suface Map C

(April 2005)

Drawn By:	Checked By:	Date Drawn:	Project No.:
R. Haverkos	MAL	30 June 05	04-09-0020

0 45 90 180 Feet

N W E S

Table CBL-1
C-Block Quarry Summary of Sampling and Analysis
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

SAMPLE PREFIX		VOC	SVOC	Explosives	Propellants	TAL Metals	Chrome +6	Pesticides	PCB	Cyanides	Nitrate	TOC	Geo-Tech	Grain	FIELD QA/QC SAMPLES				
CBL	SAMPLE ID	8260B	8270C	8330	3532/8330	6010/7000	7196A	8081A	8082B	9010A/9012A	EPA 353.2	EPA 415.1	Analysis (Various)	Size ASTM D422	Multi-Incremental QA	Duplicate Sample	Equipment Blank	Trip Blank	MS/MSD	USACE Split
MULTI-INCREMENTAL SOILS																				
Surface Soils	SS-001M			1		1	1													
	SS-002M			1		1	1													
	SS-003M			1		1	1													
	SS-004M			1		1	1									1			1	1
	SS-005M	1	1	1	1	1	NT	1	1											
	SS-006M			1		1	1													
		1	1	6	1	6	5	1	1	0	0	0	0	0	0	1	0	0	1	1
GROUNDWATER	MW-001	1	1	1	1	1	1	1	1				1	1		1			1	1
	MW-002	1	1	1	1	1	1	1	1											
	MW-003	1	1	1	1	1	1	1	1											
	MW-004	1	1	1	1	1	1	1	1				1	1						
		4	4	4	4	4	4	4	4	0	0	0	2	2	0	1	0	0	1	1
SURFACE WATER	SW-001	1	1	1	1	1	1	1	1											
Spring	SW-002	1	1	1	1	1	1	1	1							1				1
	SW-003	1	1	1	1	1	1	1	1											
Contingency	SW-004	1	1	1	1	1	1	1	1											
		4	4	4	4	4	4	4	4	0	0	0	0	0	0	1	0	0	0	1
SEDIMENT	SD-001M			1		1	1					1		1						
Spring	SD-002M	1	1	1	1	1	1	1	1			1		1		1 - only VOC				1 - only VOC
	SD-003M			1		1	1					1		1						
Contingency	SD-004M			1		1	1					1		1		1				1
		1	1	4	1	4	4	1	1	0	0	4	0	4	0	1	0	0	0	1

Notes:

Blank cell indicates that either the sample was not analyzed for that compound and/or the sample did not have a QC or Split sample associated with the regular sample.
Geo-tech analysis consists of Moisture Content (ASTM D2216), Atterburg Limits (ASTM D4318), UCS (ASTM D2487), pH (EPA 150.1) & Specific Gravity (ASTM D854)
Grainsize and TOC are taken at "all major drainageway" sediments
All shelby tubes taken during MW installatinons will have full geo-tech and grainsize analyses

Table CBL-2
C-Block Quarry Summary of Surface Soil (0-1 ft) Detections
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLss-001M-SO	CBLss-002M-SO	CBLss-003M-DUP	CBLss-003M-SO	CBLss-004M-SO	CBLss-005D-SO	CBLss-005M-SO	CBLss-006M-SO
					Sample Date:	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004
					Sample Depth:	0-1 ft	0-1 ft	0-1 ft	0-1 ft	0-0.5 ft	0-1 ft	0-1 ft	0-1 ft
Group	Method	Parameter	Region 9 PRG (Res Soil)	Surface Soil Background Criteria	Units								
Metals	6010B	Aluminum	7614 nc	17700	mg/kg	**11000**	**8200**	**9600**	**12000**	1800		**11000**	7100
	6010B	Arsenic	0.39 ca	15.4	mg/kg	19	**14**	**13**	**13**	**6.7**		**14**	**12**
	6010B	Barium	538 nc	88.4	mg/kg	74	63	79	79	23		84	50
	6010B	Beryllium	15 nc	0.88	mg/kg	0.69	0.49	0.65	0.71	0.22		0.7	0.55
	6010B	Calcium	--[n]	15800	mg/kg	1300	620	370	350	960		830	890
	6010B	Chromium	1000 nc	17.4	mg/kg	17	450	250	240	150		920	19
	6010B	Cobalt	30 ca	10.4	mg/kg	9.6	5.6	8.4	8.6	1.7		8.3	6.8
	6010B	Copper	313 nc	17.7	mg/kg	16	35	31	31	17		78	15
	6010B	Iron	2346 nc	23100	mg/kg	**21000**	**20000**	**20000**	**20000**	**9900**		**22000**	**18000**
	6010B	Lead	400 pbk	26.1	mg/kg	21	43	22	21	17		24	21
	6010B	Magnesium	--[n]	3030	mg/kg	2100	1500	1700	1800	270		1900	1300
	6010B	Manganese	176 nc	1450	mg/kg	**950**	**370**	**730**	**760**	140		**820**	**540**
	6010B	Nickel	156 nc	21.1	mg/kg	16	13	15	15	13		16	15
	6010B	Potassium	--[n]	927	mg/kg	870	960	640	910	360		890	650
	6010B	Selenium	39 nc	1.4	mg/kg	0.84	0.64		0.85	0.48		0.79	
	6010B	Sodium	--[n]	123	mg/kg	280	290	260	310	130		290	230
	6010B	Vanadium	7.8 nc	31.1	mg/kg	**21**	**19**	**19**	**23**	5.3		**24**	**16**
	6010B	Zinc	2346 nc	61.8	mg/kg	57	47	54	56	34		59	52
	7196A	Hexavalent Chromium	30 ca	17.4	mg/kg				5.4 J				
	7471A	Mercury	2.3 nc	0.04	mg/kg			0.072	0.063	0.05U			0.073
	7841	Thallium	0.52 nc	0.00	mg/kg		0.36		0.19				
SVOCs	8270C	Benzo(a)anthracene	0.62 ca	--	mg/kg							0.017 J	
	8270C	Benzo(b)fluoranthene	0.62 ca	--	mg/kg							0.036 J	
	8270C	Benzo(g,h,i)perylene	--	--	mg/kg							0.019 J	
	8270C	Benzo(k)fluoranthene	6.2 ca	--	mg/kg							0.019 J	
	8270C	Bis(2-ethylhexyl) phthalate	35 ca	--	mg/kg							0.054 J	
	8270C	Chrysene	62 ca	--	mg/kg							0.028 J	
	8270C	Fluoranthene	229 nc	--	mg/kg							0.036 J	
	8270C	Phenanthrene	--	--	mg/kg							0.017 J	
	8270C	Pyrene	232 nc	--	mg/kg							0.027 J	
Explosives	8330	2,4,6-TNT	16 ca	--	mg/kg			0.085 J	0.092 J	**22**		0.15	
	8330	2-Amino-4,6-Dinitrotoluene	--	--	mg/kg					0.54		0.19 J	
	8330	4-Amino-2,6-Dinitrotoluene	--	--	mg/kg					0.64		0.12 J	
Propellants	353.2 Modified	Nitrocellulose	--	--	mg/kg							1.3	

Notes:
-- - no background/PRG value is available for this analyte
blank cells indicated the analyte was a non-detect (with "U" qualifier) or analysis was not performed
mg/kg - means milligrams per Kilogram (parts per million - ppm)
PRG - preliminary remediation goals
nc - non-cancer basis, value is 1/10 the published PRG
ca - cancer basis
pbk - based on PBK modeling
mcl - based on CWA maximum contaminant level
max - ceiling limit
sat - soil saturation
[n] - nutrient
J - estimated value
If Result = or > Background, then the value is presented with a shaded/highlighted style
If Result = or > Background & PRG, then result is presented with a bold + shaded/highlighted style
If Result = or > PRG, then the value is presented with a bold style
If Result < PRG & Background, then the value is presented with a normal style.

Table CBL-3
C-Block Quarry Summary of Sediment Detections
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBL.sd-001M-SD	CBL.sd-002D-DUP	CBL.sd-002D-SD	CBL.sd-002M-SD	CBL.sd-003M-SD	CBL.sd-004M-DUP	CBL.sd-004M-SD
					Sample Date:	11/9/2004	11/9/2004	11/9/2004	11/9/2004	11/8/2004	11/11/2004	11/11/2004
					Sample Depth:	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft
Group	Method	Parameter	Region 9 PRG (Res Soil)	Sediment Background Criteria	Units							
Metals	6010B	Aluminum	7614 nc	13900	mg/kg	**13000**			**10000**	**14000**	**12000**	**11000**
	6010B	Arsenic	0.39 ca	19.5	mg/kg	**15**			**15**	**9.4**	**4.4**	**6.4**
	6010B	Barium	538 nc	123	mg/kg	52			63	77	96	82
	6010B	Beryllium	15 nc	0.38	mg/kg	0.78			0.77	0.76	0.8	1.2
	6010B	Cadmium	3.7 nc	0.00	mg/kg				0.12			
	6010B	Calcium	--[n]	5510	mg/kg	310			2200	910	380	560
	6010B	Chromium	1000 nc	18.1	mg/kg	15			14	16	14	13
	6010B	Cobalt	30 ca	9.1	mg/kg	9.3			14	9	3.6	2.9
	6010B	Copper	313 nc	27.6	mg/kg	9.3			14	18	7	7.8
	6010B	Iron	2346 nc	28200	mg/kg	**26000**			**23000**	**21000**	**11000**	**15000**
	6010B	Lead	400 pbk	27.4	mg/kg	15			22	15	18	21
	6010B	Magnesium	--[n]	2760	mg/kg	1600			2100	2300	1500	1200
	6010B	Manganese	176 nc	1950	mg/kg	**970**			**550**	**200**	76	81
	6010B	Nickel	156 nc	17.7	mg/kg	11			16	17	11	11
	6010B	Potassium	--[n]	1950	mg/kg	950			780	1100	860	780
	6010B	Selenium	39 nc	1.7	mg/kg	1.1			0.6	1	0.85	0.97
	6010B	Sodium	--[n]	112	mg/kg	350				240	310	350
	6010B	Vanadium	7.8 nc	26.1	mg/kg	**29**			**20**	27	**25**	**24**
	6010B	Zinc	2346 nc	532	mg/kg	39			62	60	47	45
	7471A	Mercury	2.3 nc	0.06	mg/kg	0.019			0.015	0.062	0.054	
	7841	Thallium	0.52 nc	0.89	mg/kg	0.18				**0.64**		
VOCs	8260B	Acetone	1412 nc	--	mg/kg			0.011 J				
SVOCs	8270C	Benzo(b)fluoranthene	0.62 ca	--	mg/kg				0.014 J			
	8270C	Fluoranthene	229 nc	--	mg/kg				0.017 J			

Notes:
-- - no background/PRG value is available for this analyte
blank cells indicated the analyte was a non-detect (with "U" qualifier) or analysis was not performed
mg/kg - means milligrams per Kilogram (parts per million - ppm)
PRG - preliminary remediation goals
nc - non-cancer basis, value is 1/10 the published PRG
ca - cancer basis
pbk - based on PBK modeling
mcl - based on CWA maximum contaminant level
max - ceiling limit
sat - soil saturation
[n] - nutrient
J - estimated value
If Result = or > Background, then the value is presented with a shaded/highlighted style
If Result = or > Background & PRG, then result is presented with a bold + shaded/highlighted style
If Result = or > PRG, then the value is presented with a bold style
If Result < PRG & Background, then the value is presented with a normal style

Table CBL-4
C-Block Quarry Summary of Surface Water Detections
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLsw-001-SW	CBLsw-002-DUP	CBLsw-002-SW	CBLsw-003-SW	CBLsw-004-SW
					Sample Date:	11/9/2004	11/9/2004	11/9/2004	11/8/2004	11/11/2004
					Sample Depth:	surface	surface	surface	surface	surface
Group	Method	Parameter	Region 9 PRG (Tap Water)	Surface Water Background Criteria	Units					
Metals	6010B	Aluminum	36499 nc	3370	ug/l	480	160	160	350	200
	6010B	Barium	2555 nc	47.5	ug/l	49	28	32	120	36
	6010B	Calcium	--[n]	41400	ug/l	4500	11000	11000	17000	4900
	6010B	Chromium	109 nc	0.00	ug/l	1.8			2	
	6010B	Cobalt	730 nc	0.00	ug/l	4.7	1.9	2	9	3.4
	6010B	Copper	1460 nc	7.9	ug/l	4.5	2.3	2.1	3.4	
	6010B	Iron	10950 nc	2560	ug/l	7200	2700	2900	**23000**	4500
	6010B	Magnesium	--[n]	10800	ug/l	1700	2300	2300	3500	1500
	6010B	Manganese	876 nc	391	ug/l	**2400**	**1400**	**1400**	**4100**	690
	6010B	Nickel	730 nc	0.00	ug/l	7.4			3.9	3
	6010B	Potassium	--[n]	3170	ug/l	6700	4400	4500	12000	1400
	6010B	Sodium	--[n]	21300	ug/l					1600
	6010B	Vanadium	36 nc	0.00	ug/l	2.7				
	6010B	Zinc	10950 nc	42	ug/l	23			19	
	7060A	Arsenic	0.045 ca	3.2	ug/l	**11**	**4**	**4.4**	**11**	
	7196A	Hexavalent Chromium	109 nc	7.9	ug/l				22	
	7421	Lead	15 mcl	0.00	ug/l	1				
	7470A	Mercury	11 nc	0.00	ug/l	0.066			0.056	
	7841	Thallium	2.4 nc	0.00	ug/l			1.7		
VOCs	8260B	Acetone	5475 nc	--	ug/l	8.6 J	8.2 J	8.6 J	14	
	8260B	Carbon disulfide	1043 nc	--	ug/l				3.7 J	
	8260B	Methylene chloride	4.3 ca	--	ug/l					**6.4**
	8260B	Toluene	723 nc	--	ug/l	8.6			64	14
SVOCs	8270C	2,4-Dimethylphenol	730 nc	--	ug/l				88	
	8270C	2-Methylphenol	1825 nc	--	ug/l	28			72	
	8270C	4-Methylphenol	182 nc	--	ug/l				86	32
	8270C	Benzoic acid	145979 nc	--	ug/l				410	
	8270C	Benzyl alcohol	10950 nc	--	ug/l				12 J	8.6 J
	8270C	Bis(2-ethylhexyl) phthalate	4.8 ca	--	ug/l	**130**				
	8270C	Isophorone	71 ca	--	ug/l				2.2	
	8270C	Phenol	10950 nc	--	ug/l				68	4.3 J

Notes:
-- - no background/PRG value is available for this analyte
blank cells indicated the analyte was a non-detect (with "U" qualifier) or analysis was not performed
ug/l means micrograms per Liter (parts per billion - ppb)
PRG - preliminary remediation goals (The screeing value for lead is the Maximum Contaminant level (MCL) from the safe Drinking Water Act)
nc - non-cancer basis
ca - cancer basis
pbk - based on PBK modeling
mcl - based on CWA maximum contaminant level
max - ceiling limit
sat - soil saturation
[n] - nutrient
J - estimated value
If Result = or > Background, then the value is presented with a shaded/highlighted style
If Result = or > Background & PRG, then result is presented with a bold + shaded/highlighted style
If Result = or > PRG, then the value is presented with a bold style
If Result < PRG & Background, then the value is presented with a normal style

Table CBL-5
C-Block Quarry Summary of Groundwater Detections
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLmw-001-DUP	CBLmw-001-GW	CBLmw-002-GW	CBLmw-003-GW	CBLmw-004-GW
					Sample Date:	1/20/2005	1/20/2005	1/12/2005	1/12/2005	1/17/2005
					Sample Depth:	39.8 ft.	39.8 ft.	41.3 ft.	38.1 ft.	41 ft.
					Description	C/Filtered	C/Filtered	C/Filtered	C/Filtered	C/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)	Consolidated Filtered Groundwater Background	Units					
Metals	6010B	Aluminum	36499 nc	--	ug/l			30		25
	6010B	Barium	2555 nc	256	ug/l	31	31	64	39	32
	6010B	Calcium	--[n]	53100	ug/l	3200	3200	8000	13000	6000
	6010B	Cobalt	730 nc	0.00	ug/l	1.6	1.3			2.6
	6010B	Copper	1460 nc	0.00	ug/l	11	11	2.7		2.2
	6010B	Iron	10950 nc	1430	ug/l					43
	6010B	Magnesium	--[n]	15000	ug/l	1500	1500	4500	2800	2300
	6010B	Manganese	876 nc	1340	ug/l	190	190	35	3.8	140
	6010B	Nickel	730 nc	83.4	ug/l	6.4	6	10	4.7	14
	6010B	Potassium	--[n]	5770	ug/l	1000	950	1500	1100	1300
	6010B	Sodium	--[n]	51400	ug/l	980	890	2700	1400	
	6010B	Zinc	10950 nc	52.3	ug/l	25	26	35	17	13
	7196A	Hexavalent Chromium	109 nc	0.00	ug/l	7.7	5.2	6.7	5.3	
SVOCs	8270C	2-Methylnaphthalene	--	--	ug/l			0.25 J		
	8270C	Benzo(a)anthracene	0.092 ca	--	ug/l		**0.16 J**			
	8270C	Benzo(a)pyrene	0.0092 ca	--	ug/l		**0.17 J**			
	8270C	Benzo(b)fluoranthene	0.092 ca	--	ug/l		**0.13 J**			
	8270C	Benzo(k)fluoranthene	0.92 ca	--	ug/l		0.22 J			
	8270C	Bis(2-ethylhexyl) phthalate	4.8 ca	--	ug/l			**400**	**31**	
	8270C	Chrysene	9.2 ca	--	ug/l		0.14 J	0.12 J		
	8270C	Fluoranthene	1460 nc	--	ug/l			0.32 J		
	8270C	Indeno(1,2,3-cd)pyrene	0.092 ca	--	ug/l		**0.14 J**			
	8270C	Phenanthrene	--	--	ug/l			0.24 J		
	8270C	Pyrene	182 nc	--	ug/l			0.4 J		

Notes:
-- - no background/PRG value is available for this analyte
blank cells indicated the analyte was a non-detect (with "U" qualifier) or analysis was not performed
ug/l means micrograms per Liter (parts per billion - ppb)
UC/Filtered – GW sample was filtered for metals and taken from an unconsolidated MW
C/Filtered – GW sample was filtered for metals and taken from a consolidated (bedrock) MW
PRG - preliminary remediation goals (The screeing value for lead is the Maximum Contaminant level (MCL) from the safe Drinking Water Act)
nc - non-cancer basis
ca - cancer basis
pbk - based on PBK modeling
mcl - based on CWA maximum contaminant level
max - ceiling limit
sat - soil saturation
[n] - nutrient
J - estimated value
If Result = or > Background, then the value is presented with a shaded/highlighted style
If Result = or > Background & PRG, then result is presented with a bold + shaded/highlighted style
If Result = or > PRG, then the value is presented with a bold style
If Result < PRG & Background, then the value is presented with a normal style

Table CBL-6
C-Block Quarry Summary of All Surface Soil (0-1 ft) Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

							CBLss-001M-SO	CBLss-002M-SO	CBLss-003M-DUP	CBLss-003M-SO	CBLss-004M-SO	CBLss-005D-SO	CBLss-005M-SO	CBLss-006M-SO
						Sample Date:	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004
						Sample Depth:	0-1 ft	0-1 ft	0-1 ft	0-1 ft	0-0.5 ft	0-1 ft	0-1 ft	0-1 ft
Group	Method	Parameter	Region 9 PRG (Res Soil)		Surface Soil Background Criteria	Units								
Metals	6010B	Aluminum	7614	nc	17700	mg/kg	**11000**	**8200**	**9600**	**12000**	1800		**11000**	7100
	6010B	Arsenic	0.39	ca	15.4	mg/kg	**19**	**14**	**13**	**13**	**6.7**		**14**	**12**
	6010B	Barium	538	nc	88.4	mg/kg	74	63	79	79	23		84	50
	6010B	Beryllium	15	nc	0.88	mg/kg	0.69	0.49	0.65	0.71	0.22		0.7	0.55
	6010B	Cadmium	3.7	nc	0.00	mg/kg	0.13 U	0.125 U	0.13 U	0.12 U	0.13 U		0.13 U	0.13 U
	6010B	Calcium	--[n]		15800	mg/kg	1300	620	370	350	960		830	890
	6010B	Chromium	1000	nc	17.4	mg/kg	17	430	250	240	150		920	19
	6010B	Cobalt	30	ca	10.4	mg/kg	9.6	5.6	8.4	8.6	1.7		8.3	6.8
	6010B	Copper	313	nc	17.7	mg/kg	16	35	31	31	17		78	15
	6010B	Iron	2346	nc	23100	mg/kg	**21000**	**20000**	**20000**	**20000**	**9900**		**22000**	**18000**
	6010B	Lead	400	pbk	26.1	mg/kg	21	43	22	21	17		24	21
	6010B	Magnesium	--[n]		3030	mg/kg	2100	1500	1700	1800	270		1900	1300
	6010B	Manganese	176	nc	1450	mg/kg	**950**	**370**	**730**	**760**	140		**820**	**540**
	6010B	Nickel	156	nc	21.1	mg/kg	16	13	15	15	13		16	15
	6010B	Potassium	--[n]		927	mg/kg	870	960	640	910	360		890	650
	6010B	Selenium	39	nc	1.4	mg/kg	0.84	0.64	0.75 U	0.85	0.48		0.79	0.8 U
	6010B	Silver	39	nc	0.00	mg/kg	0.55 U	0.5 U	0.5 U	0.485 U	0.5 U		0.5 U	0.5 U
	6010B	Sodium	--[n]		123	mg/kg	280	290	260	310	130		290	230
	6010B	Vanadium	7.8	nc	31.1	mg/kg	**21**	**19**	**19**	**23**	5.3		**24**	**16**
	6010B	Zinc	2346	nc	61.8	mg/kg	57	47	54	56	34		59	52
	7041	Antimony	3.1	nc	0.96	mg/kg	0.7 U	0.7 U	0.7 U	0.65 U	0.7 U		0.75 U	0.7 U
	7196A	Hexavalent Chromium	30	ca	17.4	mg/kg	1.1 U	1.1 U	1.05 U	5.4 J	1 U			1 U
	7471A	Mercury	2.3	nc	0.04	mg/kg	0.0245 U	0.024 U	0.072	0.063	0.051		0.0245 U	0.073
	7841	Thallium	0.52	nc	0.00	mg/kg	0.3 U	0.36	0.305 U	0.19	0.305 U		0.315 U	0.305 U
Pesticides	8081A	4,4'-DDD	2.4	ca	--	mg/kg							0.0009 U	
	8081A	4,4'-DDE	1.7	ca	--	mg/kg							0.0011 U	
	8081A	4,4'-DDT	1.7	ca	--	mg/kg							0.0009 U	
	8081A	Aldrin	0.029	ca	--	mg/kg							0.0009 U	
	8081A	alpha-BHC	0.09	sat	--	mg/kg							0.0009 U	
	8081A	alpha-Chlordane	1.6	ca	--	mg/kg							0.0009 U	
	8081A	beta-BHC	0.32	ca	--	mg/kg							0.0009 U	
	8081A	delta-BHC	--		--	mg/kg							0.0009 U	
	8081A	Dieldrin	0.030	ca	--	mg/kg							0.0009 U	
	8081A	Endosulfan I	37	nc	--	mg/kg							0.0009 U	
	8081A	Endosulfan II	37	nc	--	mg/kg							0.0009 U	
	8081A	Endosulfan sulfate	37	nc	--	mg/kg							0.0009 U	
	8081A	Endrin	1.8	nc	--	mg/kg							0.0009 U	
	8081A	Endrin aldehyde	--		--	mg/kg							0.0009 U	
	8081A	Endrin ketone	--		--	mg/kg							0.0009 U	
	8081A	gamma-BHC	0.44	ca	--	mg/kg							0.0009 U	
	8081A	gamma-Chlordane	1.6	ca	--	mg/kg							0.0009 U	
	8081A	Heptachlor	0.11	ca	--	mg/kg							0.0009 U	
	8081A	Heptachlor epoxide	0.053	ca	--	mg/kg							0.0009 U	
	8081A	Methoxychlor	31	nc	--	mg/kg							0.0045 U	

Table CBL-6
C-Block Quarry Summary of All Surface Soil (0-1 ft) Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLss-001M-SO	CBLss-002M-SO	CBLss-003M-DUP	CBLss-003M-SO	CBLss-004M-SO	CBLss-005D-SO	CBLss-005M-SO	CBLss-006M-SO
					Sample Date:	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004
					Sample Depth:	0-1 ft	0-1 ft	0-1 ft	0-1 ft	0-0.5 ft	0-1 ft	0-1 ft	0-1 ft
Group	Method	Parameter	Region 9 PRG (Res Soil)	Surface Soil Background Criteria	Units								
	8081A	Toxaphene	0.44 ca	--	mg/kg							0.009 U	
PCBs	8082	Aroclor 1016	0.39 nc	--	mg/kg							0.018 U	
	8082	Aroclor 1221	0.22 ca	--	mg/kg							0.018 U	
	8082	Aroclor 1232	0.22 ca	--	mg/kg							0.009 U	
	8082	Aroclor 1242	0.22 ca	--	mg/kg							0.018 U	
	8082	Aroclor 1248	0.22 ca	--	mg/kg							0.009 U	
	8082	Aroclor 1254	0.22 ca	--	mg/kg							0.018 U	
	8082	Aroclor 1260	0.22 ca	--	mg/kg							0.018 U	
VOCs	8260B	1,1,1-Trichloroethane	1200 sat	--	mg/kg						0.00335 U		
	8260B	1,1,2,2-Tetrachloroethane	0.41 ca	--	mg/kg						0.00335 U		
	8260B	1,1,2-Trichloroethane	0.73 ca	--	mg/kg						0.00335 U		
	8260B	1,1-Dichloroethane	51 nc	--	mg/kg						0.00335 U		
	8260B	1,1-Dichloroethene	12 nc	--	mg/kg						0.00335 U		
	8260B	1,2-Dibromoethane	0.032 ca	--	mg/kg						0.00335 U		
	8260B	1,2-Dichloroethane	0.28 ca	--	mg/kg						0.00335 U		
	8260B	1,2-Dichloroethene (total)	6.9 nc	--	mg/kg						0.0065 U		
	8260B	1,2-Dichloropropane	0.34 ca	--	mg/kg						0.00335 U		
	8260B	2-Butanone	2231 nc	--	mg/kg						0.01 U		
	8260B	2-Hexanone	530 nc	--	mg/kg						0.0065 U		
	8260B	4-Methyl-2-pentanone	528 nc	--	mg/kg						0.0065 U		
	8260B	Acetone	1412 nc	--	mg/kg						0.01 U		
	8260B	Benzene	0.64 ca	--	mg/kg						0.00335 U		
	8260B	Bromochloromethane	--	--	mg/kg						0.00335 U		
	8260B	Bromodichloromethane	0.82 ca	--	mg/kg						0.00335 U		
	8260B	Bromoform	62 ca	--	mg/kg						0.00335 U		
	8260B	Bromomethane	0.39 nc	--	mg/kg						0.00335 U		
	8260B	Carbon disulfide	36 nc	--	mg/kg						0.00335 U		
	8260B	Carbon tetrachloride	0.25 ca	--	mg/kg						0.00335 U		
	8260B	Chlorobenzene	15 nc	--	mg/kg						0.00335 U		
	8260B	Chloroethane	3.0 ca	--	mg/kg						0.00335 U		
	8260B	Chloroform	0.22 ca	--	mg/kg						0.00335 U		
	8260B	Chloromethane	4.7 nc	--	mg/kg						0.00335 U		
	8260B	cis-1,2-Dichloroethene	4.3 nc	--	mg/kg						0.00335 U		
	8260B	cis-1,3-Dichloropropene	0.78 ca	--	mg/kg						0.00335 U		
	8260B	Dibromochloromethane	1.1 ca	--	mg/kg						0.00335 U		
	8260B	Ethylbenzene	395 sat	--	mg/kg						0.00335 U		
	8260B	m&p-Xylenes	27 nc	--	mg/kg						0.0065 U		
	8260B	Methylene chloride	9.1 ca	--	mg/kg						0.0065 U		
	8260B	o-Xylene	27 nc	--	mg/kg						0.00335 U		
	8260B	Styrene	1700 sat	--	mg/kg						0.00335 U		
	8260B	Tetrachloroethene	0.48 ca	--	mg/kg						0.00335 U		
	8260B	Toluene	520 sat	--	mg/kg						0.00335 U		
	8260B	Total Xylenes	27 nc	--	mg/kg						0.0065 U		

Table CBL-6
C-Block Quarry Summary of All Surface Soil (0-1 ft) Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLss-001M-SO	CBLss-002M-SO	CBLss-003M-DUP	CBLss-003M-SO	CBLss-004M-SO	CBLss-005D-SO	CBLss-005M-SO	CBLss-006M-SO
					Sample Date:	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004
					Sample Depth:	0-1 ft	0-1 ft	0-1 ft	0-1 ft	0-0.5 ft	0-1 ft	0-1 ft	0-1 ft
Group	Method	Parameter	Region 9 PRG (Res Soil)	Surface Soil Background Criteria	Units								
	8260B	trans-1,2-Dichloroethene	6.9 nc	--	mg/kg						0.00335 U		
	8260B	trans-1,3-Dichloropropene	0.78 ca	--	mg/kg						0.00335 U		
	8260B	Trichloroethene	0.053 ca	--	mg/kg						0.00335 U		
	8260B	Vinyl chloride	0.079 ca	--	mg/kg						0.00335 U		
SVOCs	8270C	1,2,4-Trichlorobenzene	6.2 nc	--	mg/kg							0.09 U	
	8270C	1,2-Dichlorobenzene	600 sat	--	mg/kg							0.09 U	
	8270C	1,3-Dichlorobenzene	53 nc	--	mg/kg							0.09 U	
	8270C	1,4-Dichlorobenzene	3.4 ca	--	mg/kg							0.09 U	
	8270C	2,2-oxybis (1-chloropropane)	2.9 ca	--	mg/kg							0.09 U	
	8270C	2,4,5-Trichlorophenol	611 nc	--	mg/kg							0.18 U	
	8270C	2,4,6-Trichlorophenol	0.61 nc	--	mg/kg							0.09 U	
	8270C	2,4-Dichlorophenol	18 nc	--	mg/kg							0.18 U	
	8270C	2,4-Dimethylphenol	122 nc	--	mg/kg							0.18 U	
	8270C	2,4-Dinitrophenol	12 nc	--	mg/kg							- R	
	8270C	2,4-Dinitrotoluene	12 nc	--	mg/kg							0.018 U	
	8270C	2,6-Dinitrotoluene	6.1 nc	--	mg/kg							0.018 U	
	8270C	2-Chloronaphthalene	494 nc	--	mg/kg							0.09 U	
	8270C	2-Chlorophenol	6.3 nc	--	mg/kg							0.09 U	
	8270C	2-Methylnaphthalene	--	--	mg/kg							0.018 U	
	8270C	2-Methylphenol	306 nc	--	mg/kg							0.0365 U	
	8270C	2-Nitroaniline	18.3 nc	--	mg/kg							0.09 U	
	8270C	2-Nitrophenol	--	--	mg/kg							0.18 U	
	8270C	3,3'-Dichlorobenzidine	1.1 ca	--	mg/kg							0.09 U	
	8270C	3-Nitroaniline	1.8 nc	--	mg/kg							0.365 U	
	8270C	4,6-Dinitro-2-methylphenol	0.61 nc	--	mg/kg							0.365 U	
	8270C	4-Bromophenyl phenyl ether	--	--	mg/kg							0.09 U	
	8270C	4-Chloro-3-methylphenol	--	--	mg/kg							0.18 U	
	8270C	4-Chloroaniline	24 nc	--	mg/kg							0.365 U	
	8270C	4-Chlorophenyl phenyl ether	--	--	mg/kg							0.09 U	
	8270C	4-Methylphenol	31 nc	--	mg/kg							0.0365 U	
	8270C	4-Nitroaniline	23 ca	--	mg/kg							0.365 U	
	8270C	4-Nitrophenol	--	--	mg/kg							0.365 U	
	8270C	Acenaphthene	368 nc	--	mg/kg							0.018 U	
	8270C	Acenaphthylene	--	--	mg/kg							0.018 U	
	8270C	Anthracene	2189 nc	--	mg/kg							0.018 U	
	8270C	Benzo(a)anthracene	0.62 ca	--	mg/kg							0.017 J	
	8270C	Benzo(a)pyrene	0.062 ca	--	mg/kg							0.018 U	
	8270C	Benzo(b)fluoranthene	0.62 ca	--	mg/kg							0.036 J	
	8270C	Benzo(g,h,i)perylene	--	--	mg/kg							0.019 J	
	8270C	Benzo(k)fluoranthene	6.2 ca	--	mg/kg							0.019 J	
	8270C	Benzoic acid	100000 max	--	mg/kg							- R	
	8270C	Benzyl alcohol	1833 nc	--	mg/kg							0.365 U	
	8270C	Bis(2-chloroethoxy)methane	--	--	mg/kg							0.0365 U	
	8270C	Bis(2-chloroethyl) ether	0.22 ca	--	mg/kg							0.0365 U	

Table CBL-6
C-Block Quarry Summary of All Surface Soil (0-1 ft) Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLss-001M-SO	CBLss-002M-SO	CBLss-003M-DUP	CBLss-003M-SO	CBLss-004M-SO	CBLss-005D-SO	CBLss-005M-SO	CBLss-006M-SO
					Sample Date:	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004
					Sample Depth:	0-1 ft	0-1 ft	0-1 ft	0-1 ft	0-0.5 ft	0-1 ft	0-1 ft	0-1 ft
Group	Method	Parameter	Region 9 PRG (Res Soil)	Surface Soil Background Criteria	Units								
	8270C	Bis(2-ethylhexyl) phthalate	35 ca	--	mg/kg							0.054 J	
	8270C	Butylbenzyl phthalate	1222 nc	--	mg/kg							0.0365 U	
	8270C	Carbazole	24 ca	--	mg/kg							0.09 U	
	8270C	Chrysene	62 ca	--	mg/kg							0.028 J	
	8270C	Dibenzo(a,h)anthracene	0.062 ca	--	mg/kg							0.018 U	
	8270C	Dibenzofuran	15 nc	--	mg/kg							0.0365 U	
	8270C	Diethyl phthalate	4888 nc	--	mg/kg							0.0365 U	
	8270C	Dimethyl phthalate	100000 max	--	mg/kg							0.0365 U	
	8270C	Di-n-butyl phthalate	611 nc	--	mg/kg							0.09 U	
	8270C	Di-n-octyl phthalate	244 nc	--	mg/kg							0.18 U	
	8270C	Fluoranthene	229 nc	--	mg/kg							0.036 J	
	8270C	Fluorene	275 nc	--	mg/kg							0.018 U	
	8270C	Hexachlorobenzene	0.30 ca	--	mg/kg							0.018 U	
	8270C	Hexachlorobutadiene	6.2 ca	--	mg/kg							0.09 U	
	8270C	Hexachlorocyclopentadiene	37 nc	--	mg/kg							0.55 U	
	8270C	Hexachloroethane	35 ca	--	mg/kg							0.09 U	
	8270C	Indeno(1,2,3-cd)pyrene	0.62 ca	--	mg/kg							0.018 U	
	8270C	Isophorone	512 ca	--	mg/kg							0.09 U	
	8270C	Naphthalene	5.6 nc	--	mg/kg							0.018 U	
	8270C	Nitrobenzene	2 nc	--	mg/kg							0.018 U	
	8270C	n-Nitroso-di-n-propylamine	0.069 ca	--	mg/kg							0.0365 U	
	8270C	n-Nitrosodiphenylamine	99 ca	--	mg/kg							0.018 U	
	8270C	Pentachlorophenol	3.0 ca	--	mg/kg							0.18 U	
	8270C	Phenanthrene	--	--	mg/kg							0.017 J	
	8270C	Phenol	1833 nc	--	mg/kg							0.09 U	
	8270C	Pyrene	232 nc	--	mg/kg							0.027 J	
Explosives	8330	1,3,5-Trinitrobenzene	183 nc	--	mg/kg	0.049 U	0.049 U	0.0495 U	0.05 U	0.05 U		0.0495 U	0.05 U
	8330	1,3-Dinitrobenzene	0.61 nc	--	mg/kg	0.049 U	0.049 U	0.0495 U	0.05 U	0.05 U		0.0495 U	0.05 U
	8330	2,4,6-TNT	16 ca	--	mg/kg	0.049 U	0.049 U	0.085 J	0.092 J	**22**		0.15	0.05 U
	8330	2,4-Dinitrotoluene	12 nc	--	mg/kg	0.049 U	0.049 U	0.0495 U	0.05 U	0.05 U		0.0495 U	0.05 U
	8330	2,6-Dinitrotoluene	6.1 nc	--	mg/kg	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U		0.1 U	0.1 U
	8330	2-Amino-4,6-Dinitrotoluene	--	--	mg/kg	0.1 U	0.1 U	0.1 U	0.1 U	0.54		0.19 J	0.1 U
	8330	2-Nitrotoluene	0.88 ca	--	mg/kg	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U		0.1 U	0.1 U
	8330	3-Nitrotoluene	73 nc	--	mg/kg	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U		0.1 U	0.1 U
	8330	4-Amino-2,6-Dinitrotoluene	--	--	mg/kg	0.145 U	0.145 U	0.15 U	0.15 U	0.64		0.12 J	0.15 U
	8330	4-Nitrotoluene	12 ca	--	mg/kg	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U		0.1 U	0.1 U
	8330	HMX	306 nc	--	mg/kg	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U		0.1 U	0.1 U
	8330	Nitrobenzene	2 nc	--	mg/kg	0.049 U	0.049 U	0.0495 U	0.05 U	0.05 U		0.0495 U	0.05 U
	8330	RDX	4.4 ca	--	mg/kg	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U		0.1 U	0.1 U
	8330	Tetryl	61 nc	--	mg/kg	0.195 U	0.195 U	0.195 U	0.2 U	0.2 U		0.195 U	0.2 U
Propellants	353.2 Modified	Nitrocellulose	--	--	mg/kg							1.3	
	8332	Nitroglycerine	35 ca	--	mg/kg							0.25 U	
	SW8330 Modified	Nitroguanidine	611 nc	--	mg/kg							0.125 U	

Table CBL-6
C-Block Quarry Summary of All Surface Soil (0-1 ft) Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLss-001M-SO	CBLss-002M-SO	CBLss-003M-DUP	CBLss-003M-SO	CBLss-004M-SO	CBLss-005D-SO	CBLss-005M-SO	CBLss-006M-SO
					Sample Date:	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004	11/4/2004
					Sample Depth:	0-1 ft	0-1 ft	0-1 ft	0-1 ft	0-0.5 ft	0-1 ft	0-1 ft	0-1 ft
Group	Method	Parameter	Region 9 PRG (Res Soil)	Surface Soil Background Criteria	Units								

Notes:
-- - no background/PRG value is available for this analyte
blank cells indicated the analyte was a non-detect (with "U" qualifier) or analysis was not performed
mg/kg - means milligrams per Kilogram (parts per million - ppm)
PRG - preliminary remediation goals
nc - non-cancer basis, value is 1/10 the published PRG
ca - cancer basis
pbk - based on PBK modeling
mcl - based on CWA maximum contaminant level
max - ceiling limit
sat - soil saturation
[n] - nutrient
U - analyte not detected
J - estimated value
R - result rejected during ADR validation
If Result = or > Background, then the value is presented with a shaded/highlighted style
If Result = or > Background & PRG, then result is presented with a bold + shaded/highlighted style
If Result = or > PRG, then the value is presented with a bold style
If Result < PRG & Background, then the value is presented with a normal style.

Table CBL-7
C-Block Quarry Summary of All Sediment Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLsd-001M-SD	CBLsd-002D-DUP	CBLsd-002D-SD	CBLsd-002M-SD	CBLsd-003M-SD	CBLsd-004M-DUP	CBLsd-004M-SD
					Sample Date:	11/9/2004	11/9/2004	11/9/2004	11/9/2004	11/8/2004	11/11/2004	11/11/2004
					Sample Depth:	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft
Group	Method	Parameter	Region 9 PRG (Res Soil)	Sediment Background Criteria	Units							
Metals	6010B	Aluminum	7614 nc	13900	mg/kg	**13000**			**10000**	14000	**12000**	**11000**
	6010B	Arsenic	0.39 ca	19.5	mg/kg	**15**			**15**	**9.4**	**4.4**	**6.4**
	6010B	Barium	538 nc	123	mg/kg	52			63	77	96	82
	6010B	Beryllium	15 nc	0.38	mg/kg	0.78			0.77	0.76	0.8	1.2
	6010B	Cadmium	3.7 nc	0.00	mg/kg	0.115 U			0.12	0.215 U	0.19 U	0.21 U
	6010B	Calcium	--[n]	5510	mg/kg	310			2200	910	380	560
	6010B	Chromium	1000 nc	18.1	mg/kg	15			14	16	14	13
	6010B	Cobalt	30 ca	9.1	mg/kg	9.3			14	9	3.6	2.9
	6010B	Copper	313 nc	27.6	mg/kg	9.3			14	18	7	7.8
	6010B	Iron	2346 nc	28200	mg/kg	**26000**			**23000**	**21000**	**11000**	**15000**
	6010B	Lead	400 pbk	27.4	mg/kg	15			22	15	18	21
	6010B	Magnesium	--[n]	2760	mg/kg	1600			2100	2300	1500	1200
	6010B	Manganese	176 nc	1950	mg/kg	**970**			**550**	**200**	76	81
	6010B	Nickel	156 nc	17.7	mg/kg	11			16	17	11	11
	6010B	Potassium	--[n]	1950	mg/kg	950			780	1100	860	780
	6010B	Selenium	39 nc	1.7	mg/kg	1.1			0.6	1	0.85	0.97
	6010B	Silver	39 nc	0.00	mg/kg	0.45 U			0.75 U	0.85 U	0.75 U	0.85 U
	6010B	Sodium	--[n]	112	mg/kg	350			220 U	240	310	350
	6010B	Vanadium	7.8 nc	26.1	mg/kg	**29**			**20**	**27**	**25**	**24**
	6010B	Zinc	2346 nc	532	mg/kg	39			62	60	47	45
	7041	Antimony	3.1 nc	0.00	mg/kg	0.65 U			0.95 U	1.1 U	1.05 U	1.15 U
	7196A	Hexavalent Chromium	30 ca	27.6	mg/kg	- R			1.2 U	1.5 U	1.4 U	1.45 U
	7471A	Mercury	2.3 nc	0.06	mg/kg	0.019			0.015	0.062	0.054	0.0225 U
	7841	Thallium	0.52 nc	0.89	mg/kg	0.18			0.415 U	**0.64**	0.45 U	0.5 U
Pesticides	8081A	4,4'-DDD	2.4 ca	--	mg/kg				0.012 U			
	8081A	4,4'-DDE	1.7 ca	--	mg/kg				0.014 U			
	8081A	4,4'-DDT	1.7 ca	--	mg/kg				0.012 U			
	8081A	Aldrin	0.029 ca	--	mg/kg				0.012 UJ			
	8081A	alpha-BHC	0.09 sat	--	mg/kg				0.012 U			
	8081A	alpha-Chlordane	1.6 ca	--	mg/kg				0.012 U			
	8081A	beta-BHC	0.32 ca	--	mg/kg				0.012 U			
	8081A	delta-BHC	--	--	mg/kg				0.012 U			
	8081A	Dieldrin	0.030 ca	--	mg/kg				0.012 U			
	8081A	Endosulfan I	37 nc	--	mg/kg				0.012 UJ			
	8081A	Endosulfan II	37 nc	--	mg/kg				0.012 U			
	8081A	Endosulfan sulfate	37 nc	--	mg/kg				0.012 U			
	8081A	Endrin	1.8 nc	--	mg/kg				0.012 U			
	8081A	Endrin aldehyde	--	--	mg/kg				0.012 U			
	8081A	Endrin ketone	--	--	mg/kg				0.012 U			
	8081A	gamma-BHC	0.44 ca	--	mg/kg				0.012 U			
	8081A	gamma-Chlordane	1.6 ca	--	mg/kg				0.012 U			
	8081A	Heptachlor	0.11 ca	--	mg/kg				0.012 UJ			
	8081A	Heptachlor epoxide	0.053 ca	--	mg/kg				0.012 U			
	8081A	Methoxychlor	31 nc	--	mg/kg				0.06 U			

Table CBL-7
C-Block Quarry Summary of All Sediment Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBL.sd-001M-SD	CBL.sd-002D-DUP	CBL.sd-002D-SD	CBL.sd-002M-SD	CBL.sd-003M-SD	CBL.sd-004M-DUP	CBL.sd-004M-SD
					Sample Date:	11/9/2004	11/9/2004	11/9/2004	11/9/2004	11/8/2004	11/11/2004	11/11/2004
					Sample Depth:	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft
Group	Method	Parameter	Region 9 PRG (Res Soil)	Sediment Background Criteria	Units							
	8081A	Toxaphene	0.44 ca	--	mg/kg				0.115 U			
PCBs	8082	Aroclor 1016	0.39 nc	--	mg/kg				0.023 U			
	8082	Aroclor 1221	0.22 ca	--	mg/kg				0.023 U			
	8082	Aroclor 1232	0.22 ca	--	mg/kg				0.0115 U			
	8082	Aroclor 1242	0.22 ca	--	mg/kg				0.023 U			
	8082	Aroclor 1248	0.22 ca	--	mg/kg				0.0115 U			
	8082	Aroclor 1254	0.22 ca	--	mg/kg				0.023 U			
	8082	Aroclor 1260	0.22 ca	--	mg/kg				0.023 U			
VOCs	8260B	1,1,1-Trichloroethane	1200 sat	--	mg/kg		0.00325 U	0.0036 U				
	8260B	1,1,2,2-Tetrachloroethane	0.41 ca	--	mg/kg		0.00325 U	0.0036 U				
	8260B	1,1,2-Trichloroethane	0.73 ca	--	mg/kg		0.00325 U	0.0036 U				
	8260B	1,1-Dichloroethane	51 nc	--	mg/kg		0.00325 U	0.0036 U				
	8260B	1,1-Dichloroethene	12 nc	--	mg/kg		0.00325 U	0.0036 U				
	8260B	1,2-Dibromoethane	0.032 ca	--	mg/kg		0.00325 U	0.0036 U				
	8260B	1,2-Dichloroethane	0.28 ca	--	mg/kg		0.00325 U	0.0036 U				
	8260B	1,2-Dichloroethene (total)	6.9 nc	--	mg/kg		0.0065 U	0.007 U				
	8260B	1,2-Dichloropropane	0.34 ca	--	mg/kg		0.00325 U	0.0036 U				
	8260B	2-Butanone	2231 nc	--	mg/kg		0.01 U	0.011 U				
	8260B	2-Hexanone	530 nc	--	mg/kg		0.0065 U	0.007 U				
	8260B	4-Methyl-2-pentanone	528 nc	--	mg/kg		0.0065 U	0.007 U				
	8260B	Acetone	1412 nc	--	mg/kg		0.01 U	0.011 J				
	8260B	Benzene	0.64 ca	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Bromochloromethane	--	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Bromodichloromethane	0.82 ca	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Bromoform	62 ca	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Bromomethane	0.39 nc	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Carbon disulfide	36 nc	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Carbon tetrachloride	0.25 ca	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Chlorobenzene	15 nc	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Chloroethane	3.0 ca	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Chloroform	0.22 ca	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Chloromethane	4.7 nc	--	mg/kg		0.00325 U	0.0036 U				
	8260B	cis-1,2-Dichloroethene	4.3 nc	--	mg/kg		0.00325 U	0.0036 U				
	8260B	cis-1,3-Dichloropropene	0.78 ca	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Dibromochloromethane	1.1 ca	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Ethylbenzene	395 sat	--	mg/kg		0.00325 U	0.0036 U				
	8260B	m&p-Xylenes	27 nc	--	mg/kg		0.0065 U	0.007 U				
	8260B	Methylene chloride	9.1 ca	--	mg/kg		0.0065 U	0.007 U				
	8260B	o-Xylene	27 nc	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Styrene	1700 sat	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Tetrachloroethene	0.48 ca	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Toluene	520 sat	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Total Xylenes	27 nc	--	mg/kg		0.0065 U	0.007 U				

Table CBL-7
C-Block Quarry Summary of All Sediment Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLsd-001M-SD	CBLsd-002D-DUP	CBLsd-002D-SD	CBLsd-002M-SD	CBLsd-003M-SD	CBLsd-004M-DUP	CBLsd-004M-SD
					Sample Date:	11/9/2004	11/9/2004	11/9/2004	11/9/2004	11/8/2004	11/11/2004	11/11/2004
					Sample Depth:	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft
Group	Method	Parameter	Region 9 PRG (Res Soil)	Sediment Background Criteria	Units							
	8260B	trans-1,2-Dichloroethene	6.9 nc	--	mg/kg		0.00325 U	0.0036 U				
	8260B	trans-1,3-Dichloropropene	0.78 ca	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Trichloroethene	0.053 ca	--	mg/kg		0.00325 U	0.0036 U				
	8260B	Vinyl chloride	0.079 ca	--	mg/kg		0.00325 U	0.0036 U				
SVOCs	8270C	1,2,4-Trichlorobenzene	6.2 nc	--	mg/kg				0.12 U			
	8270C	1,2-Dichlorobenzene	600 sat	--	mg/kg				0.12 U			
	8270C	1,3-Dichlorobenzene	53 nc	--	mg/kg				0.12 U			
	8270C	1,4-Dichlorobenzene	3.4 ca	--	mg/kg				0.12 U			
	8270C	2,2-oxybis (1-chloropropane)	2.9 ca	--	mg/kg				0.12 U			
	8270C	2,4,5-Trichlorophenol	611 nc	--	mg/kg				0.235 U			
	8270C	2,4,6-Trichlorophenol	0.61 nc	--	mg/kg				0.12 U			
	8270C	2,4-Dichlorophenol	18 nc	--	mg/kg				0.235 U			
	8270C	2,4-Dimethylphenol	122 nc	--	mg/kg				0.235 U			
	8270C	2,4-Dinitrophenol	12 nc	--	mg/kg				- R			
	8270C	2,4-Dinitrotoluene	12 nc	--	mg/kg				0.0235 U			
	8270C	2,6-Dinitrotoluene	6.1 nc	--	mg/kg				0.0235 U			
	8270C	2-Chloronaphthalene	494 nc	--	mg/kg				0.12 U			
	8270C	2-Chlorophenol	6.3 nc	--	mg/kg				0.12 U			
	8270C	2-Methylnaphthalene	--	--	mg/kg				0.0235 U			
	8270C	2-Methylphenol	306 nc	--	mg/kg				0.048 U			
	8270C	2-Nitroaniline	18.3 nc	--	mg/kg				0.12 U			
	8270C	2-Nitrophenol	--	--	mg/kg				0.235 U			
	8270C	3,3'-Dichlorobenzidine	1.1 ca	--	mg/kg				0.12 U			
	8270C	3-Nitroaniline	1.8 nc	--	mg/kg				0.48 U			
	8270C	4,6-Dinitro-2-methylphenol	0.61 nc	--	mg/kg				0.48 U			
	8270C	4-Bromophenyl phenyl ether	--	--	mg/kg				0.12 U			
	8270C	4-Chloro-3-methylphenol	--	--	mg/kg				0.235 U			
	8270C	4-Chloroaniline	24 nc	--	mg/kg				0.48 U			
	8270C	4-Chlorophenyl phenyl ether	--	--	mg/kg				0.12 U			
	8270C	4-Methylphenol	31 nc	--	mg/kg				0.048 U			
	8270C	4-Nitroaniline	23 ca	--	mg/kg				0.48 U			
	8270C	4-Nitrophenol	--	--	mg/kg				0.48 U			
	8270C	Acenaphthene	368 nc	--	mg/kg				0.0235 U			
	8270C	Acenaphthylene	--	--	mg/kg				0.0235 U			
	8270C	Anthracene	2189 nc	--	mg/kg				0.0235 U			
	8270C	Benzo(a)anthracene	0.62 ca	--	mg/kg				0.0235 U			
	8270C	Benzo(a)pyrene	0.062 ca	--	mg/kg				0.0235 U			
	8270C	Benzo(b)fluoranthene	0.62 ca	--	mg/kg				0.014 J			
	8270C	Benzo(g,h,i)perylene	--	--	mg/kg				0.0235 U			
	8270C	Benzo(k)fluoranthene	6.2 ca	--	mg/kg				0.0235 U			
	8270C	Benzoic acid	100000 max	--	mg/kg				- R			
	8270C	Benzyl alcohol	1833 nc	--	mg/kg				0.48 U			
	8270C	Bis(2-chloroethoxy)methane	--	--	mg/kg				0.048 U			
	8270C	Bis(2-chloroethyl) ether	0.22 ca	--	mg/kg				0.048 U			

Table CBL-7
C-Block Quarry Summary of All Sediment Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLsd-001M-SD	CBLsd-002D-DUP	CBLsd-002D-SD	CBLsd-002M-SD	CBLsd-003M-SD	CBLsd-004M-DUP	CBLsd-004M-SD
					Sample Date:	11/9/2004	11/9/2004	11/9/2004	11/9/2004	11/8/2004	11/11/2004	11/11/2004
					Sample Depth:	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft
Group	Method	Parameter	Region 9 PRG (Res Soil)	Sediment Background Criteria	Units							
	8270C	Bis(2-ethylhexyl) phthalate	35 ca	--	mg/kg				0.12 U			
	8270C	Butylbenzyl phthalate	1222 nc	--	mg/kg				0.048 U			
	8270C	Carbazole	24 ca	--	mg/kg				0.12 U			
	8270C	Chrysene	62 ca	--	mg/kg				0.0235 U			
	8270C	Dibenzo(a,h)anthracene	0.062 ca	--	mg/kg				0.0235 U			
	8270C	Dibenzofuran	15 nc	--	mg/kg				0.048 U			
	8270C	Diethyl phthalate	4888 nc	--	mg/kg				0.048 U			
	8270C	Dimethyl phthalate	100000 max	--	mg/kg				0.048 U			
	8270C	Di-n-butyl phthalate	611 nc	--	mg/kg				0.12 U			
	8270C	Di-n-octyl phthalate	244 nc	--	mg/kg				0.235 U			
	8270C	Fluoranthene	229 nc	--	mg/kg				0.017 J			
	8270C	Fluorene	275 nc	--	mg/kg				0.0235 U			
	8270C	Hexachlorobenzene	0.30 ca	--	mg/kg				0.0235 U			
	8270C	Hexachlorobutadiene	6.2 ca	--	mg/kg				0.12 U			
	8270C	Hexachlorocyclopentadiene	37 nc	--	mg/kg				0.7 U			
	8270C	Hexachloroethane	35 ca	--	mg/kg				0.12 U			
	8270C	Indeno(1,2,3-cd)pyrene	0.62 ca	--	mg/kg				0.0235 U			
	8270C	Isophorone	512 ca	--	mg/kg				0.12 U			
	8270C	Naphthalene	5.6 nc	--	mg/kg				0.0235 U			
	8270C	Nitrobenzene	2 nc	--	mg/kg				0.0235 U			
	8270C	n-Nitroso-di-n-propylamine	0.069 ca	--	mg/kg				0.048 U			
	8270C	n-Nitrosodiphenylamine	99 ca	--	mg/kg				0.0235 U			
	8270C	Pentachlorophenol	3.0 ca	--	mg/kg				0.235 U			
	8270C	Phenanthrene	--	--	mg/kg				0.036 U			
	8270C	Phenol	1833 nc	--	mg/kg				0.12 U			
	8270C	Pyrene	232 nc	--	mg/kg				0.036 U			
Explosives	8330	1,3,5-Trinitrobenzene	183 nc	--	mg/kg	0.05 U			0.0495 U	0.0495 U	0.049 U	0.0495 U
	8330	1,3-Dinitrobenzene	0.61 nc	--	mg/kg	0.05 U			0.0495 U	0.0495 U	0.049 U	0.0495 U
	8330	2,4,6-TNT	16 ca	--	mg/kg	0.05 U			0.0495 U	0.0495 U	0.049 U	0.0495 U
	8330	2,4-Dinitrotoluene	12 nc	--	mg/kg	0.05 U			0.0495 U	0.0495 U	0.049 U	0.0495 U
	8330	2,6-Dinitrotoluene	6.1 nc	--	mg/kg	0.1 U			0.1 U	0.1 U	0.1 U	0.1 U
	8330	2-Amino-4,6-Dinitrotoluene	--	--	mg/kg	0.1 U			0.1 U	0.1 U	0.1 U	0.1 U
	8330	2-Nitrotoluene	0.88 ca	--	mg/kg	0.1 U			0.1 U	0.1 U	0.1 U	0.1 U
	8330	3-Nitrotoluene	73 nc	--	mg/kg	0.1 U			0.1 U	0.1 U	0.1 U	0.1 U
	8330	4-Amino-2,6-Dinitrotoluene	--	--	mg/kg	0.15 U			0.15 U	0.15 U	0.145 U	0.15 U
	8330	4-Nitrotoluene	12 ca	--	mg/kg	0.1 U			0.1 U	0.1 U	0.1 U	0.1 U
	8330	HMX	306 nc	--	mg/kg	0.1 U			0.1 U	0.1 U	0.1 U	0.1 U
	8330	Nitrobenzene	2 nc	--	mg/kg	0.05 U			0.0495 U	0.0495 U	0.049 U	0.0495 U
	8330	RDX	4.4 ca	--	mg/kg	0.1 U			0.1 U	0.1 U	0.1 U	0.1 U
	8330	Tetryl	61 nc	--	mg/kg	0.2 U			0.2 U	0.195 U	0.195 U	0.2 U
Propellants	353.2 Modified	Nitrocellulose	--	--	mg/kg				0.405 U			
	8332	Nitroglycerine	35 ca	--	mg/kg				0.25 U			
	SW8330 Modified	Nitroguanidine	611 nc	--	mg/kg				0.125 U			

Table CBL-7
C-Block Quarry Summary of All Sediment Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLsd-001M-SD	CBLsd-002D-DUP	CBLsd-002D-SD	CBLsd-002M-SD	CBLsd-003M-SD	CBLsd-004M-DUP	CBLsd-004M-SD
					Sample Date:	11/9/2004	11/9/2004	11/9/2004	11/9/2004	11/8/2004	11/11/2004	11/11/2004
					Sample Depth:	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft
Group	Method	Parameter	Region 9 PRG (Res Soil)	Sediment Background Criteria	Units							

Notes:
-- - no background/PRG value is available for this analyte
blank cells indicated the analyte was a non-detect (with "U" qualifier) or analysis was not performed
mg/kg - means milligrams per Kilogram (parts per million - ppm)
PRG - preliminary remediation goals
nc - non-cancer basis, value is 1/10 the published PRG
ca - cancer basis
pbk - based on PBK modeling
mcl - based on CWA maximum contaminant level
max - ceiling limit
sat - soil saturation
[n] - nutrient
U - analyte not detected
J - estimated value
R - result rejected during ADR validation
If Result = or > Background, then the value is presented with a shaded/highlighted style
If Result = or > Background & PRG, then result is presented with a bold + shaded/highlighted style
If Result = or > PRG, then the value is presented with a bold style
If Result < PRG & Background, then the value is presented with a normal style

Table CBL-8
C-Block Quarry Summary of All Surface Water Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						Sample ID:	CBLsw-001-SW	CBLsw-002-DUP	CBLsw-002-SW	CBLsw-003-SW	CBLsw-004-SW
						Sample Date:	11/9/2004	11/9/2004	11/9/2004	11/8/2004	11/11/2004
						Sample Depth:	surface	surface	surface	surface	surface
Group	Method	Parameter	Region 9 PRG (Tap Water)		Surface Water Background Criteria	Units					
Metals	6010B	Aluminum	36499	nc	3370	ug/l	480	160	160	350	200
	6010B	Barium	2555	nc	47.5	ug/l	49	28	32	120	36
	6010B	Beryllium	73	nc	0.00	ug/l	1 U	1 U	1 U	1 U	1 U
	6010B	Cadmium	18	nc	0.00	ug/l	1 U	1 U	1 U	1 U	1 U
	6010B	Calcium	--[n]		41400	ug/l	4500	11000	11000	17000	4900
	6010B	Chromium	109	nc	0.00	ug/l	1.8	5 U	5 U	2	5 U
	6010B	Cobalt	730	nc	0.00	ug/l	4.7	1.9	2	9	3.4
	6010B	Copper	1460	nc	7.9	ug/l	4.5	2.3	2.1	3.4	5 U
	6010B	Iron	10950	nc	2560	ug/l	7200	2700	2900	**23000**	4500
	6010B	Magnesium	--[n]		10800	ug/l	1700	2300	2300	3500	1500
	6010B	Manganese	876	nc	391	ug/l	**2400**	**1400**	**1400**	**4100**	690
	6010B	Nickel	730	nc	0.00	ug/l	7.4	5 U	5 U	3.9	3
	6010B	Potassium	--[n]		3170	ug/l	6700	4400	4500	12000	1400
	6010B	Selenium	182	nc	0.00	ug/l	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U
	6010B	Silver	182	nc	0.00	ug/l	5 U	5 U	5 U	5 U	5 U
	6010B	Sodium	--[n]		21300	ug/l	750 U	750 U	750 U	750 U	1600
	6010B	Vanadium	36	nc	0.00	ug/l	2.7	5 U	5 U	5 U	5 U
	6010B	Zinc	10950	nc	42	ug/l	23	15 U	15 U	19	15 U
	7041	Antimony	15	nc	0.00	ug/l	3.75 U	3.75 U	3.75 U	3.75 U	3.75 U
	7060A	Arsenic	0.045	ca	3.2	ug/l	**11**	**4**	**4.4**	**11**	1 U
	7196A	Hexavalent Chromium	109	nc	7.9	ug/l	5 U	5 U	5 U	22	5 UJ
	7421	Lead	15	mcl	0.00	ug/l	1	1.5 U	1.5 U	1.5 U	1.5 U
	7470A	Mercury	11	nc	0.00	ug/l	0.066	0.1 U	0.1 U	0.056	0.1 U
	7841	Thallium	2.4	nc	0.00	ug/l	2 U	2 U	1.7	2 U	2 U
Pesticides	8081A	4,4'-DDD	0.28	ca	--	ug/l	0.11 U	0.055 U	0.055 U	0.105 U	0.105 U
	8081A	4,4'-DDE	0.20	ca	--	ug/l	0.1 U	0.0485 U	0.05 U	0.095 U	0.095 U
	8081A	4,4'-DDT	0.20	ca	--	ug/l	0.15 U	0.075 U	0.075 U	0.145 U	0.145 U
	8081A	Aldrin	0.0040	ca	--	ug/l	0.1 U	0.0485 U	0.05 U	0.095 U	0.095 U
	8081A	alpha-BHC	0.011	nc	--	ug/l	0.15 U	0.075 U	0.075 U	0.145 U	0.145 U
	8081A	alpha-Chlordane	0.19	ca	--	ug/l	0.0495 U	0.0245 U	0.025 U	0.048 U	0.048 U
	8081A	beta-BHC	0.037	ca	--	ug/l	0.1 U	0.0485 U	0.05 U	0.095 U	0.095 U
	8081A	delta-BHC	--		--	ug/l	0.1 U	0.0485 U	0.05 U	0.095 U	0.095 U
	8081A	Dieldrin	0.0042	ca	--	ug/l	0.1 U	0.0485 U	0.05 U	0.095 U	0.095 U
	8081A	Endosulfan I	220	nc	--	ug/l	0.1 U	0.0485 U	0.05 U	0.095 U	0.095 U
	8081A	Endosulfan II	220	nc	--	ug/l	0.15 U	0.075 U	0.075 U	0.145 U	0.145 U
	8081A	Endosulfan sulfate	220	nc	--	ug/l	0.15 U	0.075 U	0.075 U	0.145 U	0.145 U
	8081A	Endrin	11	nc	--	ug/l	0.1 U	0.0485 U	0.05 U	0.095 U	0.095 U
	8081A	Endrin aldehyde	--		--	ug/l	0.15 U	0.075 U	0.075 U	0.145 U	0.145 U
	8081A	Endrin ketone	--		--	ug/l	0.1 U	0.0485 U	0.05 U	0.095 U	0.095 U
	8081A	gamma-BHC	0.052	ca	--	ug/l	0.15 U	0.075 U	0.075 U	0.145 U	0.145 U
	8081A	gamma-Chlordane	0.19	ca	--	ug/l	0.1 U	0.0485 U	0.05 U	0.095 U	0.095 U
	8081A	Heptachlor	0.015	ca	--	ug/l	0.15 U	0.075 U	0.075 U	0.145 U	0.145 U
	8081A	Heptachlor epoxide	0.0074	ca	--	ug/l	0.15 U	0.075 U	0.075 U	0.145 U	0.145 U
	8081A	Methoxychlor	182	nc	--	ug/l	0.6 U	0.29 U	0.3 U	0.6 U	0.6 U
	8081A	Toxaphene	0.061	ca	--	ug/l	0.495 U	0.245 U	0.25 U	0.48 U	0.48 U
PCBs	8082	Aroclor 1016	0.96	ca	--	ug/l	0.295 U	0.29 U	0.3 U	0.29 UJ	0.29 U
	8082	Aroclor 1221	0.034	ca	--	ug/l	0.65 U	0.65 U	0.65 U	0.6 UJ	0.6 U
	8082	Aroclor 1232	0.034	ca	--	ug/l	0.65 U	0.65 U	0.65 U	0.6 UJ	0.6 U
	8082	Aroclor 1242	0.034	ca	--	ug/l	0.65 U	0.65 U	0.65 U	0.6 UJ	0.6 U
	8082	Aroclor 1248	0.034	ca	--	ug/l	0.75 U	0.75 U	0.75 U	0.7 UJ	0.7 U

Table CBL-8
C-Block Quarry Summary of All Surface Water Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLsw-001-SW	CBLsw-002-DUP	CBLsw-002-SW	CBLsw-003-SW	CBLsw-004-SW
					Sample Date:	11/9/2004	11/9/2004	11/9/2004	11/8/2004	11/11/2004
					Sample Depth:	surface	surface	surface	surface	surface
Group	Method	Parameter	Region 9 PRG (Tap Water)	Surface Water Background Criteria	Units					
	8082	Aroclor 1254	0.034 ca	--	ug/l	0.65 U	0.65 U	0.65 U	0.6 UJ	0.6 U
	8082	Aroclor 1260	0.034 ca	--	ug/l	0.295 U	0.29 U	0.3 U	0.29 UJ	0.29 U
VOCs	8260B	1,1,1-Trichloroethane	3172 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,1,2,2-Tetrachloroethane	0.055 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,1,2-Trichloroethane	0.20 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,1-Dichloroethane	811 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,1-Dichloroethene	339 nc	--	ug/l	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ
	8260B	1,2-Dibromoethane	0.0056 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,2-Dichloroethane	0.12 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,2-Dichloroethene (total)	120 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,2-Dichloropropane	0.16 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	2-Butanone	6968 nc	--	ug/l	5 U	5 U	5 U	5 U	5 U
	8260B	2-Hexanone	2000 nc	--	ug/l	5 U	5 U	5 U	5 U	5 U
	8260B	4-Methyl-2-pentanone	1993 nc	--	ug/l	5 U	5 U	5 U	5 U	5 U
	8260B	Acetone	5475 nc	--	ug/l	8.6 J	8.2 J	8.6 J	14	5 UJ
	8260B	Benzene	0.35 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Bromochloromethane	--	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Bromodichloromethane	0.18 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Bromoform	8.5 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Bromomethane	8.7 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Carbon disulfide	1043 nc	--	ug/l	2.5 UJ	2.5 UJ	2.5 UJ	3.7 J	- R
	8260B	Carbon tetrachloride	0.17 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Chlorobenzene	106 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Chloroethane	4.6 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Chloroform	0.17 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Chloromethane	158 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	cis-1,2-Dichloroethene	61 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	cis-1,3-Dichloropropene	0.40 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Dibromochloromethane	0.13 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Ethylbenzene	1340 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	m&p-Xylenes	206 nc	--	ug/l	1 U	1 U	1 U	1 U	1 U
	8260B	Methylene chloride	4.3 ca	--	ug/l	0.75 U	0.75 U	0.75 U	0.75 U	**6.4**
	8260B	o-Xylene	206 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Styrene	1641 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Tetrachloroethene	0.10 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Toluene	723 nc	--	ug/l	8.6	0.5 U	0.5 U	64	14
	8260B	Total Xylenes	206 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	trans-1,2-Dichloroethene	122 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
	8260B	trans-1,3-Dichloropropene	0.40 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Trichloroethene	0.028 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Vinyl chloride	0.020 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
SVOCs	8270C	1,2,4-Trichlorobenzene	7.2 nc	--	ug/l	0.95 U	1 U	1 U	1 U	0.95 U
	8270C	1,2-Dichlorobenzene	370 nc	--	ug/l	0.95 U	1 U	1 U	1 U	0.95 U
	8270C	1,3-Dichlorobenzene	182 nc	--	ug/l	0.95 U	1 U	1 U	1 U	0.95 U
	8270C	1,4-Dichlorobenzene	0.50 ca	--	ug/l	0.95 U	1 U	1 U	1 U	0.95 U
	8270C	2,2-oxybis (1-chloropropane)	0.27 ca	--	ug/l	0.95 U	1 U	1 U	1 UJ	0.95 U
	8270C	2,4,5-Trichlorophenol	3650 nc	--	ug/l	4.85 U	4.9 U	5 U	4.95 U	4.8 U
	8270C	2,4,6-Trichlorophenol	3.6 nc	--	ug/l	2.45 U	2.45 U	2.55 U	2.5 U	2.4 U
	8270C	2,4-Dichlorophenol	109 nc	--	ug/l	4.85 U	4.9 U	5 U	4.95 U	4.8 U
	8270C	2,4-Dimethylphenol	730 nc	--	ug/l	4.85 U	4.9 U	5 U	88	4.8 U

Table CBL-8
C-Block Quarry Summary of All Surface Water Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLsw-001-SW	CBLsw-002-DUP	CBLsw-002-SW	CBLsw-003-SW	CBLsw-004-SW
					Sample Date:	11/9/2004	11/9/2004	11/9/2004	11/8/2004	11/11/2004
					Sample Depth:	surface	surface	surface	surface	surface
Group	Method	Parameter	Region 9 PRG (Tap Water)	Surface Water Background Criteria	Units					
	8270C	2,4-Dinitrophenol	73 nc	--	ug/l	9.5 U	10 U	10 U	10 U	9.5 U
	8270C	2,4-Dinitrotoluene	73 nc	--	ug/l	0.485 U	0.49 U	0.5 U	0.495 U	0.48 U
	8270C	2,6-Dinitrotoluene	36 nc	--	ug/l	0.245 U	0.245 U	0.255 U	0.25 U	0.24 U
	8270C	2-Chloronaphthalene	487 nc	--	ug/l	0.95 U	1 U	1 U	1 U	0.95 U
	8270C	2-Chlorophenol	30 nc	--	ug/l	2.45 U	2.45 U	2.55 U	2.5 U	2.4 U
	8270C	2-Methylnaphthalene	--	--	ug/l	0.245 U	0.245 U	0.255 U	0.25 U	0.24 U
	8270C	2-Methylphenol	1825 nc	--	ug/l	28	1 U	1 U	72	0.95 U
	8270C	2-Nitroaniline	109 nc	--	ug/l	2.45 U	2.45 U	2.55 U	2.5 U	2.4 U
	8270C	2-Nitrophenol	--	--	ug/l	4.85 U	4.9 U	5 U	4.95 U	4.8 U
	8270C	3,3'-Dichlorobenzidine	0.15 ca	--	ug/l	2.45 U	2.45 U	2.55 U	2.5 U	2.4 U
	8270C	3-Nitroaniline	3.2 ca	--	ug/l	4.85 U	4.9 U	5 U	4.95 U	4.8 U
	8270C	4,6-Dinitro-2-methylphenol	3.6 nc	--	ug/l	9.5 U	10 U	10 U	10 U	9.5 U
	8270C	4-Bromophenyl phenyl ether	--	--	ug/l	2.45 U	2.45 U	2.55 U	2.5 U	2.4 U
	8270C	4-Chloro-3-methylphenol	--	--	ug/l	4.85 U	4.9 U	5 U	4.95 U	4.8 U
	8270C	4-Chloroaniline	146 nc	--	ug/l	4.85 U	4.9 U	5 U	4.95 U	4.8 U
	8270C	4-Chlorophenyl phenyl ether	--	--	ug/l	2.45 U	2.45 U	2.55 U	2.5 U	2.4 U
	8270C	4-Methylphenol	182 nc	--	ug/l	0.95 U	1 U	1 U	86	32
	8270C	4-Nitroaniline	3.2 ca	--	ug/l	4.85 U	4.9 U	5 U	4.95 U	4.8 U
	8270C	4-Nitrophenol	--	--	ug/l	9.5 U	10 U	10 U	10 U	9.5 U
	8270C	Acenaphthene	365 nc	--	ug/l	0.485 U	0.49 U	0.5 U	0.495 U	0.48 U
	8270C	Acenaphthylene	--	--	ug/l	0.485 U	0.49 U	0.5 U	0.495 U	0.48 U
	8270C	Anthracene	1825 nc	--	ug/l	0.485 U	0.49 U	0.5 U	0.495 U	0.48 U
	8270C	Benzo(a)anthracene	0.092 ca	--	ug/l	0.095 U	0.1 U	0.1 U	0.1 U	0.095 U
	8270C	Benzo(a)pyrene	0.0092 ca	--	ug/l	0.195 U	0.195 U	0.2 U	0.2 U	0.19 U
	8270C	Benzo(b)fluoranthene	0.092 ca	--	ug/l	0.195 U	0.195 U	0.2 U	0.2 U	0.19 U
	8270C	Benzo(g,h,i)perylene	--	--	ug/l	0.485 U	0.49 U	0.5 U	0.495 U	0.48 U
	8270C	Benzo(k)fluoranthene	0.92 ca	--	ug/l	0.195 U	0.195 U	0.2 U	0.2 U	0.19 U
	8270C	Benzoic acid	145979 nc	--	ug/l	9.5 U	10 U	10 U	410	9.5 U
	8270C	Benzyl alcohol	10950 nc	--	ug/l	9.5 U	10 U	10 U	12 J	8.6 J
	8270C	Bis(2-chloroethoxy)methane	--	--	ug/l	0.95 U	1 U	1 U	1 U	0.95 U
	8270C	Bis(2-chloroethyl) ether	0.010 ca	--	ug/l	0.95 U	1 U	1 U	1 U	0.95 U
	8270C	Bis(2-ethylhexyl) phthalate	4.8 ca	--	ug/l	**130**	7.5 U	7.5 U	7.5 U	7 U
	8270C	Butylbenzyl phthalate	7300 nc	--	ug/l	0.95 U	1 U	1 U	1 U	0.95 U
	8270C	Carbazole	3.4 ca	--	ug/l	2.45 U	2.45 U	2.55 U	2.5 U	2.4 U
	8270C	Chrysene	9.2 ca	--	ug/l	0.245 U	0.245 U	0.255 U	0.25 U	0.24 U
	8270C	Dibenzo(a,h)anthracene	0.0092 ca	--	ug/l	0.195 U	0.195 U	0.2 U	0.2 U	0.19 U
	8270C	Dibenzofuran	12 nc	--	ug/l	0.95 U	1 U	1 U	1 U	0.95 U
	8270C	Diethyl phthalate	29199 nc	--	ug/l	0.95 U	1 U	1 U	1 U	0.95 U
	8270C	Dimethyl phthalate	364867 nc	--	ug/l	0.95 U	1 U	1 U	1 U	0.95 U
	8270C	Di-n-butyl phthalate	3650 nc	--	ug/l	2.45 U	2.45 U	2.55 U	2.5 U	2.4 U
	8270C	Di-n-octyl phthalate	1460 nc	--	ug/l	4.85 U	4.9 U	5 U	4.95 U	4.8 U
	8270C	Fluoranthene	1460 nc	--	ug/l	0.485 U	0.49 U	0.5 U	0.495 U	0.48 U
	8270C	Fluorene	243 nc	--	ug/l	0.485 U	0.49 U	0.5 U	0.495 U	0.48 U
	8270C	Hexachlorobenzene	0.042 ca	--	ug/l	0.245 U	0.245 U	0.255 U	0.25 U	0.24 U

Table CBL-8
C-Block Quarry Summary of All Surface Water Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLsw-001-SW	CBLsw-002-DUP	CBLsw-002-SW	CBLsw-003-SW	CBLsw-004-SW
					Sample Date:	11/9/2004	11/9/2004	11/9/2004	11/8/2004	11/11/2004
					Sample Depth:	surface	surface	surface	surface	surface
Group	Method	Parameter	Region 9 PRG (Tap Water)	Surface Water Background Criteria	Units					
	8270C	Hexachlorobutadiene	0.86 ca	--	ug/l	2.45 U	2.45 U	2.55 U	2.5 U	2.4 U
	8270C	Hexachlorocyclopentadiene	219 nc	--	ug/l	- R	- R	- R	- R	- R
	8270C	Hexachloroethane	4.8 ca	--	ug/l	2.45 U	2.45 U	2.55 U	2.5 U	2.4 U
	8270C	Indeno(1,2,3-cd)pyrene	0.092 ca	--	ug/l	0.195 U	0.195 U	0.2 U	0.2 U	0.19 U
	8270C	Isophorone	71 ca	--	ug/l	0.95 U	1 U	1 U	2.2	0.95 U
	8270C	Naphthalene	6.2 nc	--	ug/l	0.485 U	0.49 U	0.5 U	0.495 U	0.48 U
	8270C	Nitrobenzene	3.4 nc	--	ug/l	0.485 U	0.49 U	0.5 U	0.495 U	0.48 U
	8270C	n-Nitroso-di-n-propylamine	0.0096 ca	--	ug/l	0.245 U	0.245 U	0.255 U	0.25 U	0.24 U
	8270C	n-Nitrosodiphenylamine	14 ca	--	ug/l	0.485 U	0.49 U	0.5 U	0.495 U	0.48 U
	8270C	Pentachlorophenol	0.56 ca	--	ug/l	4.85 U	4.9 U	5 U	4.95 U	4.8 U
	8270C	Phenanthrene	--	--	ug/l	0.485 U	0.49 U	0.5 U	0.495 U	0.48 U
	8270C	Phenol	10950 nc	--	ug/l	2.45 U	2.45 U	2.55 U	68	4.3 J
	8270C	Pyrene	182 nc	--	ug/l	0.485 U	0.49 U	0.5 U	0.495 U	0.48 U
Explosives	8330	1,3,5-Trinitrobenzene	1095 nc	--	ug/l	0.125 U	0.1 U	0.115 U	0.105 U	0.1 U
	8330	1,3-Dinitrobenzene	3.6 nc	--	ug/l	0.125 U	0.1 U	0.115 U	0.105 U	0.1 U
	8330	2,4,6-TNT	2.2 ca	--	ug/l	0.155 U	0.125 U	0.14 U	0.135 U	0.125 U
	8330	2,4-Dinitrotoluene	73 nc	--	ug/l	0.225 U	0.18 U	0.205 U	0.19 U	0.18 U
	8330	2,6-Dinitrotoluene	36 nc	--	ug/l	0.27 U	0.215 U	0.245 U	0.23 U	0.215 U
	8330	2-Amino-4,6-Dinitrotoluene	--	--	ug/l	0.225 U	0.18 U	0.205 U	0.19 U	0.18 U
	8330	2-Nitrotoluene	0.049 ca	--	ug/l	0.195 U	0.155 U	0.175 U	0.165 U	0.155 U
	8330	3-Nitrotoluene	122 nc	--	ug/l	0.195 U	0.155 U	0.175 U	0.165 U	0.155 U
	8330	4-Amino-2,6-Dinitrotoluene	--	--	ug/l	0.205 U	0.165 U	0.185 U	0.175 U	0.165 U
	8330	4-Nitrotoluene	0.66 ca	--	ug/l	0.195 U	0.155 U	0.175 U	0.165 U	0.155 U
	8330	HMX	1825 nc	--	ug/l	0.195 U	0.155 U	0.175 U	0.165 U	0.155 U
	8330	Nitrobenzene	3.4 nc	--	ug/l	0.1 U	0.08 U	0.09 U	0.085 U	0.08 U
	8330	RDX	0.61 ca	--	ug/l	0.125 U	0.1 U	0.115 U	0.105 U	0.1 U
	8330	Tetryl	365 nc	--	ug/l	0.49 U	0.39 U	0.44 U	0.415 U	0.39 U
Propellants	353.2 Modified	Nitrocellulose	--	--	ug/l	250 U	250 U	250 U	250 UJ	250 U
	8332	Nitroglycerine	4.8 ca	--	ug/l	0.6 U	0.5 U	0.55 U	5.5 U	0.5 UJ
	SW8330 Modified	Nitroguanidine	3650 nc	--	ug/l	10 U	10 U	10 U	10 U	10 U

Notes:
-- - no background/PRG value is available for this analyte
blank cells indicated the analyte was a non-detect (with "U" qualifier) or analysis was not performed
ug/l means micrograms per Liter (parts per billion - ppb)
PRG - preliminary remediation goals (The screeing value for lead is the Maximum Contaminant level (MCL) from the safe Drinking Water Act)
nc - non-cancer basis
ca - cancer basis
pbk - based on PBK modeling
mcl - based on CWA maximum contaminant level
max - ceiling limit
sat - soil saturation
[n] - nutrient
U - analyte not detected
J - estimated value
R - result rejected during ADR validation
If Result = or > Background, then the value is presented with a shaded/highlighted style
If Result = or > Background & PRG, then result is presented with a bold + shaded/highlighted style
If Result = or > PRG, then the value is presented with a bold style
If Result < PRG & Background, then the value is presented with a normal style

Table CBL-9
C-Block Quarry Summary of All Groundwater Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLmw-001-DUP	CBLmw-001-GW	CBLmw-002-GW	CBLmw-003-GW	CBLmw-004-GW
					Sample Date:	1/20/2005	1/20/2005	1/12/2005	1/12/2005	1/17/2005
					Sample Depth:	39.8 ft.	39.8 ft.	41.3 ft.	38.1 ft.	41 ft.
					Description	C/Filtered	C/Filtered	C/Filtered	C/Filtered	C/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)	Consolidated Filtered Groundwater Background	Units					
Metals	6010B	Aluminum	36499 nc	--	ug/l	75 U	75 U	30	75 U	25
	6010B	Barium	2555 nc	256	ug/l	31	31	64	39	32
	6010B	Beryllium	73 nc	0.00	ug/l	1 U	1 U	1 U	1 U	1 U
	6010B	Cadmium	18 nc	0.00	ug/l	1 U	1 U	1 U	1 U	1 U
	6010B	Calcium	--[n]	53100	ug/l	3200	3200	8000	13000	6000
	6010B	Chromium	109 nc	0.00	ug/l	5 U	5 U	5 U	5 U	5 U
	6010B	Cobalt	730 nc	0.00	ug/l	1.6	1.3	2.5 U	2.5 U	2.6
	6010B	Copper	1460 nc	0.00	ug/l	11	11	2.7	5 U	2.2
	6010B	Iron	10950 nc	1430	ug/l	60 U	60 U	60 U	60 U	43
	6010B	Magnesium	--[n]	15000	ug/l	1500	1500	4500	2800	2300
	6010B	Manganese	876 nc	1340	ug/l	190	190	35	3.8	140
	6010B	Nickel	730 nc	83.4	ug/l	6.4	6	10	4.7	14
	6010B	Potassium	--[n]	5770	ug/l	1000	950	1500	1100	1300
	6010B	Selenium	182 nc	0.00	ug/l	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U
	6010B	Silver	182 nc	0.00	ug/l	5 U	5 U	5 U	5 U	5 U
	6010B	Sodium	--[n]	51400	ug/l	980	890	2700	1400	1000 U
	6010B	Vanadium	36 nc	0.00	ug/l	5 U	5 U	5 U	5 U	5 U
	6010B	Zinc	10950 nc	52.3	ug/l	25	26	35	17	13
	7041	Antimony	15 nc	0.00	ug/l	3.75 U	3.75 U	3.75 U	3.75 U	3.75 U
	7060A	Arsenic	0.045 ca	0.00	ug/l	1 U	1 U	1 U	1 U	1 U
	7196A	Hexavalent Chromium	109 nc	0.00	ug/l	7.7	5.2	6.7	5.3	5 U
	7421	Lead	15 mcl	0.00	ug/l	1.5 U	1.5 U	1.5 U	0.475 U	1.5 U
	7470A	Mercury	11 nc	0.00	ug/l	0.1 U	0.1 UJ	0.1 U	0.1 U	0.1 U
	7841	Thallium	2.4 nc	0.00	ug/l	2 U	2 U	2 U	2 U	2 U
Pesticides	8081A	4,4'-DDD	0.28 ca	--	ug/l	0.055 U	0.055 U	0.055 U	0.055 U	0.06 U
	8081A	4,4'-DDE	0.20 ca	--	ug/l	0.0485 U	0.048 U	0.05 U	0.0485 U	0.055 U
	8081A	4,4'-DDT	0.20 ca	--	ug/l	0.075 U	0.07 U	0.075 U	0.075 U	0.08 U
	8081A	Aldrin	0.0040 ca	--	ug/l	0.0485 U	0.048 U	0.05 U	0.0485 U	0.055 U
	8081A	alpha-BHC	0.011 nc	--	ug/l	0.075 U	0.07 U	0.075 U	0.075 U	0.08 U
	8081A	alpha-Chlordane	0.19 ca	--	ug/l	0.0245 U	0.024 U	0.0255 U	0.0245 U	0.0265 U
	8081A	beta-BHC	0.037 ca	--	ug/l	0.0485 U	0.048 U	0.05 U	0.0485 U	0.055 U
	8081A	delta-BHC	--	--	ug/l	0.0485 U	0.048 U	0.05 U	0.0485 U	0.055 U
	8081A	Dieldrin	0.0042 ca	--	ug/l	0.0485 U	0.048 U	0.05 U	0.0485 U	0.055 U
	8081A	Endosulfan I	220 nc	--	ug/l	0.0485 U	0.048 U	0.05 U	0.0485 U	0.055 U
	8081A	Endosulfan II	220 nc	--	ug/l	0.075 U	0.07 U	0.075 U	0.075 U	0.08 U
	8081A	Endosulfan sulfate	220 nc	--	ug/l	0.075 U	0.07 U	0.075 U	0.075 U	0.08 U
	8081A	Endrin	11 nc	--	ug/l	0.0485 U	0.048 U	0.05 U	0.0485 U	0.055 U
	8081A	Endrin aldehyde	--	--	ug/l	0.075 U	0.07 U	0.075 U	0.075 U	0.08 U
	8081A	Endrin ketone	--	--	ug/l	0.0485 U	0.048 U	0.05 UJ	0.0485 UJ	0.055 U
	8081A	gamma-BHC	0.052 ca	--	ug/l	0.075 U	0.07 U	0.075 U	0.075 U	0.08 U
	8081A	gamma-Chlordane	0.19 ca	--	ug/l	0.0485 U	0.048 U	0.05 U	0.0485 U	0.055 U
	8081A	Heptachlor	0.015 ca	--	ug/l	0.075 U	0.07 U	0.075 U	0.075 U	0.08 U

Table CBL-9
C-Block Quarry Summary of All Groundwater Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLmw-001-DUP	CBLmw-001-GW	CBLmw-002-GW	CBLmw-003-GW	CBLmw-004-GW
					Sample Date:	1/20/2005	1/20/2005	1/12/2005	1/12/2005	1/17/2005
					Sample Depth:	39.8 ft.	39.8 ft.	41.3 ft.	38.1 ft.	41 ft.
					Description	C/Filtered	C/Filtered	C/Filtered	C/Filtered	C/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)	Consolidated Filtered Groundwater Background	Units					
	8081A	Heptachlor epoxide	0.0074 ca	--	ug/l	0.075 U	0.07 U	0.075 U	0.075 U	0.08 U
	8081A	Methoxychlor	182 nc	--	ug/l	0.29 U	0.29 U	0.305 U	0.29 U	0.315 U
	8081A	Toxaphene	0.061 ca	--	ug/l	0.245 U	0.24 U	0.255 U	0.245 U	0.265 U
PCBs	8082	Aroclor 1016	0.96 ca	--	ug/l	0.29 U	0.29 U	0.305 U	0.29 U	0.315 U
	8082	Aroclor 1221	0.034 ca	--	ug/l	0.65 U	0.6 U	0.65 U	0.65 U	0.7 U
	8082	Aroclor 1232	0.034 ca	--	ug/l	0.65 U	0.6 U	0.65 U	0.65 U	0.7 U
	8082	Aroclor 1242	0.034 ca	--	ug/l	0.65 U	0.6 U	0.65 U	0.65 U	0.7 U
	8082	Aroclor 1248	0.034 ca	--	ug/l	0.75 U	0.7 U	0.75 U	0.75 U	0.8 U
	8082	Aroclor 1254	0.034 ca	--	ug/l	0.65 U	0.6 U	0.65 U	0.65 U	0.7 U
	8082	Aroclor 1260	0.034 ca	--	ug/l	0.29 U	0.29 U	0.305 U	0.29 U	0.315 U
VOCs	8260B	1,1,1-Trichloroethane	3172 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,1,2,2-Tetrachloroethane	0.055 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,1,2-Trichloroethane	0.20 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,1-Dichloroethane	811 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,1-Dichloroethene	339 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,2-Dibromoethane	0.0056 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,2-Dichloroethane	0.12 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,2-Dichloroethene (total)	120 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,2-Dichloropropane	0.16 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	2-Butanone	6968 nc	--	ug/l	5 U	5 U	5 U	5 U	5 U
	8260B	2-Hexanone	2000 nc	--	ug/l	5 U	5 U	5 U	5 U	5 U
	8260B	4-Methyl-2-pentanone	1993 nc	--	ug/l	5 U	5 U	5 U	5 U	5 U
	8260B	Acetone	5475 nc	--	ug/l	5 U	5 U	5 U	5 U	5 U
	8260B	Benzene	0.35 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Bromochloromethane	--	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Bromodichloromethane	0.18 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Bromoform	8.5 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Bromomethane	8.7 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Carbon disulfide	1043 nc	--	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	8260B	Carbon tetrachloride	0.17 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Chlorobenzene	106 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Chloroethane	4.6 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Chloroform	0.17 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Chloromethane	158 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	cis-1,2-Dichloroethene	61 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	cis-1,3-Dichloropropene	0.40 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Dibromochloromethane	0.13 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Ethylbenzene	1340 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	m&p-Xylenes	206 nc	--	ug/l	1 U	1 U	1 U	1 U	1 U
	8260B	Methylene chloride	4.3 ca	--	ug/l	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
	8260B	o-Xylene	206 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Table CBL-9
C-Block Quarry Summary of All Groundwater Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLmw-001-DUP	CBLmw-001-GW	CBLmw-002-GW	CBLmw-003-GW	CBLmw-004-GW
					Sample Date:	1/20/2005	1/20/2005	1/12/2005	1/12/2005	1/17/2005
					Sample Depth:	39.8 ft.	39.8 ft.	41.3 ft.	38.1 ft.	41 ft.
					Description	C/Filtered	C/Filtered	C/Filtered	C/Filtered	C/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)	Consolidated Filtered Groundwater Background	Units					
	8260B	Styrene	1641 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Tetrachloroethene	0.10 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Toluene	723 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Total Xylenes	206 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	trans-1,2-Dichloroethene	122 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	trans-1,3-Dichloropropene	0.40 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Trichloroethene	0.028 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Vinyl chloride	0.020 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SVOCs	8270C	1,2,4-Trichlorobenzene	7.2 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1.05 U
	8270C	1,2-Dichlorobenzene	370 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1.05 U
	8270C	1,3-Dichlorobenzene	182 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1.05 U
	8270C	1,4-Dichlorobenzene	0.50 ca	--	ug/l	0.95 U	1 U	1 U	1 U	1.05 U
	8270C	2,2-oxybis (1-chloropropane)	0.27 ca	--	ug/l	0.95 U	1 U	1 U	1 U	1.05 U
	8270C	2,4,5-Trichlorophenol	3650 nc	--	ug/l	4.8 U	4.95 U	5 U	5 U	5 U
	8270C	2,4,6-Trichlorophenol	3.6 nc	--	ug/l	2.4 U	2.5 U	2.55 U	2.55 U	2.6 U
	8270C	2,4-Dichlorophenol	109 nc	--	ug/l	4.8 U	4.95 U	5 U	5 U	5 U
	8270C	2,4-Dimethylphenol	730 nc	--	ug/l	4.8 U	4.95 U	5 U	5 U	5 U
	8270C	2,4-Dinitrophenol	73 nc	--	ug/l	9.5 U	10 U	10 U	10 U	10.5 U
	8270C	2,4-Dinitrotoluene	73 nc	--	ug/l	0.48 U	0.495 U	0.5 U	0.5 U	0.5 U
	8270C	2,6-Dinitrotoluene	36 nc	--	ug/l	0.24 U	0.25 U	0.255 U	0.255 U	0.26 U
	8270C	2-Chloronaphthalene	487 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1.05 U
	8270C	2-Chlorophenol	30 nc	--	ug/l	2.4 U	2.5 U	2.55 U	2.55 U	2.6 U
	8270C	2-Methylnaphthalene	--	--	ug/l	0.24 U	0.25 U	0.25 J	0.255 U	0.26 U
	8270C	2-Methylphenol	1825 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1.05 U
	8270C	2-Nitroaniline	109 nc	--	ug/l	2.4 U	2.5 U	2.55 U	2.55 U	2.6 U
	8270C	2-Nitrophenol	--	--	ug/l	4.8 U	4.95 U	5 U	5 U	5 U
	8270C	3,3'-Dichlorobenzidine	0.15 ca	--	ug/l	2.4 U	2.5 U	2.55 U	2.55 U	2.6 U
	8270C	3-Nitroaniline	3.2 ca	--	ug/l	4.8 U	4.95 U	5 U	5 U	5 U
	8270C	4,6-Dinitro-2-methylphenol	3.6 nc	--	ug/l	9.5 U	10 U	10 U	10 U	10.5 U
	8270C	4-Bromophenyl phenyl ether	--	--	ug/l	2.4 U	2.5 U	2.55 U	2.55 U	2.6 U
	8270C	4-Chloro-3-methylphenol	--	--	ug/l	4.8 U	4.95 U	5 U	5 U	5 U
	8270C	4-Chloroaniline	146 nc	--	ug/l	4.8 U	4.95 U	5 U	5 U	5 U
	8270C	4-Chlorophenyl phenyl ether	--	--	ug/l	2.4 U	2.5 U	2.55 U	2.55 U	2.6 U
	8270C	4-Methylphenol	182 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1.05 U
	8270C	4-Nitroaniline	3.2 ca	--	ug/l	4.8 U	4.95 U	5 U	5 U	5 U
	8270C	4-Nitrophenol	--	--	ug/l	9.5 U	10 U	10 U	10 U	10.5 U
	8270C	Acenaphthene	365 nc	--	ug/l	0.48 U	0.495 U	0.5 U	0.5 U	0.5 U
	8270C	Acenaphthylene	--	--	ug/l	0.48 U	0.495 U	0.5 U	0.5 U	0.5 U
	8270C	Anthracene	1825 nc	--	ug/l	0.48 U	0.495 U	0.5 U	0.5 U	0.5 U
	8270C	Benzo(a)anthracene	0.092 ca	--	ug/l	0.095 U	**0.16 J**	0.1 U	0.1 U	0.105 U
	8270C	Benzo(a)pyrene	0.0092 ca	--	ug/l	0.19 U	**0.17 J**	0.205 U	0.2 U	0.205 U
	8270C	Benzo(b)fluoranthene	0.092 ca	--	ug/l	0.19 U	**0.13 J**	0.205 U	0.2 U	0.205 U

Table CBL-9
C-Block Quarry Summary of All Groundwater Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLmw-001-DUP	CBLmw-001-GW	CBLmw-002-GW	CBLmw-003-GW	CBLmw-004-GW
					Sample Date:	1/20/2005	1/20/2005	1/12/2005	1/12/2005	1/17/2005
					Sample Depth:	39.8 ft.	39.8 ft.	41.3 ft.	38.1 ft.	41 ft.
					Description	C/Filtered	C/Filtered	C/Filtered	C/Filtered	C/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)	Consolidated Filtered Groundwater Background	Units					
	8270C	Benzo(g,h,i)perylene	--	--	ug/l	0.48 U	0.495 U	0.5 U	0.5 U	0.5 U
	8270C	Benzo(k)fluoranthene	0.92 ca	--	ug/l	0.19 U	0.22 J	0.205 U	0.2 U	0.205 U
	8270C	Benzoic acid	145979 nc	--	ug/l	9.5 U	10 U	10 U	10 U	10.5 U
	8270C	Benzyl alcohol	10950 nc	--	ug/l	9.5 U	10 U	10 U	10 U	10.5 U
	8270C	Bis(2-chloroethoxy)methane	--	--	ug/l	0.95 U	1 U	1 U	1 U	1.05 U
	8270C	Bis(2-chloroethyl) ether	0.010 ca	--	ug/l	0.95 U	1 U	1 U	1 U	1.05 U
	8270C	Bis(2-ethylhexyl) phthalate	4.8 ca	--	ug/l	7 U	7.5 U	**400**	**31**	7.5 U
	8270C	Butylbenzyl phthalate	7300 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1.05 U
	8270C	Carbazole	3.4 ca	--	ug/l	2.4 U	2.5 U	2.55 U	2.55 U	2.6 U
	8270C	Chrysene	9.2 ca	--	ug/l	0.24 U	0.14 J	0.12 J	0.255 U	0.26 U
	8270C	Dibenzo(a,h)anthracene	0.0092 ca	--	ug/l	0.19 U	0.2 U	0.205 U	0.2 U	0.205 U
	8270C	Dibenzofuran	12 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1.05 U
	8270C	Diethyl phthalate	29199 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1.05 U
	8270C	Dimethyl phthalate	364867 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1.05 U
	8270C	Di-n-butyl phthalate	3650 nc	--	ug/l	2.4 U	2.5 U	2.55 U	2.55 U	2.6 U
	8270C	Di-n-octyl phthalate	1460 nc	--	ug/l	4.8 U	4.95 U	5 U	5 U	5 U
	8270C	Fluoranthene	1460 nc	--	ug/l	0.48 U	0.495 U	0.32 J	0.5 U	0.5 U
	8270C	Fluorene	243 nc	--	ug/l	0.48 U	0.495 U	0.5 U	0.5 U	0.5 U
	8270C	Hexachlorobenzene	0.042 ca	--	ug/l	0.24 U	0.25 U	0.255 U	0.255 U	0.26 U
	8270C	Hexachlorobutadiene	0.86 ca	--	ug/l	2.4 U	2.5 U	2.55 U	2.55 U	2.6 U
	8270C	Hexachlorocyclopentadiene	219 nc	--	ug/l	9.5 U	10 U	10 U	10 U	10.5 U
	8270C	Hexachloroethane	4.8 ca	--	ug/l	2.4 U	2.5 U	2.55 U	2.55 U	2.6 U
	8270C	Indeno(1,2,3-cd)pyrene	0.092 ca	--	ug/l	0.19 U	**0.14 J**	0.205 U	0.2 U	0.205 U
	8270C	Isophorone	71 ca	--	ug/l	0.95 U	1 U	1 U	1 U	1.05 U
	8270C	Naphthalene	6.2 nc	--	ug/l	0.48 U	0.495 U	0.5 U	0.5 U	0.5 U
	8270C	Nitrobenzene	3.4 nc	--	ug/l	0.48 U	0.495 U	0.5 U	0.5 U	0.5 U
	8270C	n-Nitroso-di-n-propylamine	0.0096 ca	--	ug/l	0.24 U	0.25 U	0.255 U	0.255 U	0.26 U
	8270C	n-Nitrosodiphenylamine	14 ca	--	ug/l	0.48 U	0.495 U	0.5 U	0.5 U	0.5 U
	8270C	Pentachlorophenol	0.56 ca	--	ug/l	4.8 U	4.95 U	5 U	5 U	5 U
	8270C	Phenanthrene	--	--	ug/l	0.48 U	0.495 U	0.24 J	0.5 U	0.5 U
	8270C	Phenol	10950 nc	--	ug/l	2.4 U	2.5 U	2.55 U	2.55 U	2.6 U
	8270C	Pyrene	182 nc	--	ug/l	0.48 U	0.495 U	0.4 J	0.5 U	0.5 U
Explosives	8330	1,3,5-Trinitrobenzene	1095 nc	--	ug/l	0.11 U	0.15 U	0.145 U	0.105 U	0.12 U
	8330	1,3-Dinitrobenzene	3.6 nc	--	ug/l	0.11 U	0.15 U	0.145 U	0.105 U	0.12 U
	8330	2,4,6-TNT	2.2 ca	--	ug/l	0.135 U	0.19 U	0.18 U	0.13 U	0.15 U
	8330	2,4-Dinitrotoluene	73 nc	--	ug/l	0.195 U	0.27 U	0.26 U	0.185 U	0.215 U
	8330	2,6-Dinitrotoluene	36 nc	--	ug/l	0.235 U	0.32 U	0.31 U	0.22 U	0.26 U
	8330	2-Amino-4,6-Dinitrotoluene	--	--	ug/l	0.195 U	0.27 U	0.26 U	0.185 U	0.215 U
	8330	2-Nitrotoluene	0.049 ca	--	ug/l	0.17 U	0.23 U	0.225 U	0.16 U	0.185 U
	8330	3-Nitrotoluene	122 nc	--	ug/l	0.17 U	0.23 U	0.225 U	0.16 U	0.185 U
	8330	4-Amino-2,6-Dinitrotoluene	--	--	ug/l	0.18 U	0.25 U	0.24 U	0.17 U	0.2 U
	8330	4-Nitrotoluene	0.66 ca	--	ug/l	0.17 U	0.23 U	0.225 U	0.16 U	0.185 U

Table CBL-9
C-Block Quarry Summary of All Groundwater Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						CBLmw-001-DUP	CBLmw-001-GW	CBLmw-002-GW	CBLmw-003-GW	CBLmw-004-GW
					Sample Date:	1/20/2005	1/20/2005	1/12/2005	1/12/2005	1/17/2005
					Sample Depth:	39.8 ft.	39.8 ft.	41.3 ft.	38.1 ft.	41 ft.
					Description	C/Filtered	C/Filtered	C/Filtered	C/Filtered	C/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)	Consolidated Filtered Groundwater Background	Units					
	8330	HMX	1825 nc	--	ug/l	0.17 U	0.23 U	0.225 U	0.16 U	0.185 U
	8330	Nitrobenzene	3.4 nc	--	ug/l	0.085 U	0.12 U	0.115 U	0.085 U	0.095 U
	8330	RDX	0.61 ca	--	ug/l	0.11 U	0.15 U	0.145 U	0.105 U	0.12 U
	8330	Tetryl	365 nc	--	ug/l	0.425 U	0.6 U	0.55 U	0.405 U	0.47 U
Propellants	353.2 Modified	Nitrocellulose	--	--	ug/l	250 U	250 U	250 U	250 U	65 U
	8332	Nitroglycerine	4.8 ca	--	ug/l	0.55 U	0.75 U	0.75 U	0.5 U	0.6 U
	SW8330 Modified	Nitroguanidine	3650 nc	--	ug/l	10 U	10 U	10 U	10 U	10 U

Notes:
-- - no background/PRG value is available for this analyte
blank cells indicated the analyte was a non-detect (with "U" qualifier) or analysis was not performed
ug/l means micrograms per Liter (parts per billion - ppb)
PRG - preliminary remediation goals (The screeing value for lead is the Maximum Contaminant level (MCL) from the safe Drinking Water Act)
nc - non-cancer basis
ca - cancer basis
pbk - based on PBK modeling
mcl - based on CWA maximum contaminant level
max - ceiling limit
sat - soil saturation
UC/Filtered – GW sample was filtered for metals and taken from an unconsolidated MW
C/Filtered – GW sample was filtered for metals and taken from a consolidated (bedrock) MW
[n] - nutrient
U - analyte not detected
J - estimated value
R - result rejected during ADR validation
If Result = or > Background, then the value is presented with a shaded/highlighted style
If Result = or > Background & PRG, then result is presented with a bold + shaded/highlighted style
If Result = or > PRG, then the value is presented with a bold style
If Result < PRG & Background, then the value is presented with a normal style

Table CBL-13
C-Block Quarry Human Health Risk Screening Tables for Groundwater
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

Parameter	Region 9 PRG (Tap Water)		Consolidated Filtered Groundwater Background	Maximum Detected C/Filtered	Frequency of Detection	COPC
Aluminum	36499	nc	--	30	2 / 5	No
Barium	2555	nc	256	64	5 / 5	No
Calcium	--[n]		53100	13000	5 / 5	No
Cobalt	730	nc	0.00	2.6	3 / 5	No
Copper	1460	nc	0.00	11	4 / 5	No
Iron	10950	nc	1430	43	1 / 5	No
Magnesium	--[n]		15000	4500	5 / 5	No
Manganese	876	nc	1340	190	5 / 5	No
Nickel	730	nc	83.4	14	5 / 5	No
Potassium	--[n]		5770	1500	5 / 5	No
Sodium	--[n]		51400	2700	4 / 5	No
Zinc	10950	nc	52.3	35	5 / 5	No
Hexavalent Chromium	109	nc	0.00	7.7	4 / 5	No
2-Methylnaphthalene	--		--	0.25	1 / 5	Yes, NTX
Benzo(a)anthracene	0.092	ca	--	0.16	1 / 5	Yes, > PRG
Benzo(a)pyrene	0.0092	ca	--	0.17	1 / 5	Yes, > PRG
Benzo(b)fluoranthene	0.092	ca	--	0.13	1 / 5	Yes, > PRG
Benzo(k)fluoranthene	0.92	ca	--	0.22	1 / 5	No
Bis(2-ethylhexyl) phthalate	4.8	ca	--	400	2 / 5	Yes, > PRG
Chrysene	9.2	ca	--	0.14	2 / 5	No
Fluoranthene	1460	nc	--	0.32	1 / 5	No
Indeno(1,2,3-cd)pyrene	0.092	ca	--	0.14	1 / 5	Yes, > PRG
Phenanthrene	--		--	0.24	1 / 5	Yes, NTX
Pyrene	182	nc	--	0.4	1 / 5	No

Notes:
-- - no value available
BKG - site specific background
PRG - USEPA Region 9 Preliminary Remediation Goals
NTX - no toxicity screening value available
nc - non-cancer basis
ca - cancer basis
pbk - based on PBK modeling
mcl - based on CWA maximum contaminant level
max - ceiling limit
sat - soil saturation
[n] - nutrient
*Concentration Units ug/L

Table CBL-12
C-Block Quarry Human Health Risk Screening Tables for SurfaceWater
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

Parameter	Region 9 PRG (Tap Water)		Surface Water Background	Maximum Detected	Frequency of Detection	COPC
Aluminum	36499	nc	3370	480	5 / 5	No
Barium	2555	nc	47.5	120	5 / 5	No
Calcium	--[n]		41400	17000	5 / 5	No
Chromium	109	nc	0.00	2	2 / 5	No
Cobalt	730	nc	0.00	9	5 / 5	No
Copper	1460	nc	7.9	4.5	4 / 5	No
Iron	10950	nc	2560	23000	5 / 5	Yes, > BKG & PRG
Magnesium	--[n]		10800	3500	5 / 5	No
Manganese	876	nc	391	4100	5 / 5	Yes, > BKG & PRG
Nickel	730	nc	0.00	7.4	3 / 5	No
Potassium	--[n]		3170	12000	5 / 5	No
Sodium	--[n]		21300	1600	1 / 5	No
Vanadium	36	nc	0.00	2.7	1 / 5	No
Zinc	10950	nc	42	23	2 / 5	No
Arsenic	0.045	ca	3.2	11	4 / 5	Yes, > BKG & PRG
Hexavalent Chromium	109	nc	7.9	22	1 / 5	No
Lead	15	mcl	0.00	1	1 / 5	No
Mercury	11	nc	0.00	0.066	2 / 5	No
Thallium	2.4	nc	0.00	1.7	1 / 5	No
Acetone	5475	nc	--	14	4 / 5	No
Carbon disulfide	1043	nc	--	3.7	1 / 4	No
Methylene chloride	4.3	ca	--	6.4	1 / 5	Yes, > PRG
Toluene	723	nc	--	64	3 / 5	No
2,4-Dimethylphenol	730	nc	--	88	1 / 5	No
2-Methylphenol	1825	nc	--	72	2 / 5	No
4-Methylphenol	182	nc	--	86	2 / 5	No
Benzoic acid	145979	nc	--	410	1 / 5	No
Benzyl alcohol	10950	nc	--	12	2 / 5	No
Bis(2-ethylhexyl) phthalate	4.8	ca	--	130	1 / 5	Yes, > PRG
Isophorone	71	ca	--	2.2	1 / 5	No
Phenol	10950	nc	--	68	2 / 5	No

Notes:
-- - no value available
BKG - site specific background
PRG - USEPA Region 9 Preliminary Remediation Goals
NIX - no toxicity screening value available
nc - non-cancer basis
ca - cancer basis
pbk - based on PBK modeling
mcl - based on CWA maximum contaminant level
max - ceiling limit
sat - soil saturation
[n] - nutrient
*Concentration Units ug/L

Table CBL-11
C-Block Quarry Human Health Risk Screening Tables for Sediment
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

Parameter	Region 9 PRG (Res Soil)		Sediment Background	Maximum Detected	Frequency of Detection	COPC
Aluminum	7614	nc	13900	14000	5 / 5	Yes, > BKG & PRG
Arsenic	0.39	ca	19.5	15	5 / 5	No
Barium	538	nc	123	96	5 / 5	No
Beryllium	15	nc	0.38	1.2	5 / 5	No
Cadmium	3.7	nc	0.00	0.12	1 / 5	No
Calcium	--[n]		5510	2200	5 / 5	No
Chromium	1000	nc	18.1	16	5 / 5	No
Cobalt	30	ca	9.1	14	5 / 5	No
Copper	313	nc	27.6	18	5 / 5	No
Iron	2346	nc	28200	26000	5 / 5	No
Lead	400	pbk	27.4	22	5 / 5	No
Magnesium	--[n]		2760	2300	5 / 5	No
Manganese	176	nc	1950	970	5 / 5	No
Nickel	156	nc	17.7	17	5 / 5	No
Potassium	--[n]		1950	1100	5 / 5	No
Selenium	39	nc	1.7	1.1	5 / 5	No
Sodium	--[n]		112	350	4 / 5	No
Vanadium	7.8	nc	26.1	29	5 / 5	Yes, > BKG & PRG
Zinc	2346	nc	532	62	5 / 5	No
Mercury	2.3	nc	0.06	0.062	4 / 5	No
Thallium	0.52	nc	0.89	0.64	2 / 5	No
Acetone	1412	nc	--	0.011	1 / 2	No
Benzo(b)fluoranthene	0.62	ca	--	0.014	1 / 1	No
Fluoranthene	229	nc	--	0.017	1 / 1	No

Notes:
-- - no value available
BKG - site specific background
PRG - USEPA Region 9 Preliminary Remediation Goals, non-cancer values adjusted to 1/10 the published value
NTX - no toxicity screening value available
nc - non-cancer basis, value is 1/10 the published PRG
ca - cancer basis
pbk - based on PBK modeling
mcl - based on CWA maximum contaminant level
max - ceiling limit
sat - soil saturation
[n] - nutrient
*Concentration Units mg/kg

Table CBL-10
C-Block Quarry Human Health Risk Screening Tables for Surface Soil (0-1 ft)
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

Parameter	Region 9 PRG (Res Soil)		Surface Soil Background	Maximum Detected	Frequency of Detection	COPC
Aluminum	7614	nc	17700	12000	7 / 7	No
Arsenic	0.39	ca	15.4	19	7 / 7	Yes, > BKG & PRG
Barium	538	nc	88.4	84	7 / 7	No
Beryllium	15	nc	0.88	0.71	7 / 7	No
Calcium	--[n]		15800	1300	7 / 7	No
Chromium	1000	nc	17.4	920	7 / 7	No
Cobalt	30	ca	10.4	9.6	7 / 7	No
Copper	313	nc	17.7	78	7 / 7	No
Iron	2346	nc	23100	22000	7 / 7	No
Lead	400	pbk	26.1	43	7 / 7	No
Magnesium	--[n]		3030	2100	7 / 7	No
Manganese	176	nc	1450	950	7 / 7	No
Nickel	156	nc	21.1	16	7 / 7	No
Potassium	--[n]		927	960	7 / 7	No
Selenium	39	nc	1.4	0.85	5 / 7	No
Sodium	--[n]		123	310	7 / 7	No
Vanadium	7.8	nc	31.1	24	7 / 7	No
Zinc	2346	nc	61.8	59	7 / 7	No
Hexavalent Chromium	30	ca	17.4	5.4	1 / 6	No
Mercury	2.3	nc	0.04	0.073	4 / 7	No
Thallium	0.52	nc	0.00	0.36	2 / 7	No
Benzo(a)anthracene	0.62	ca	--	0.017	1 / 1	No
Benzo(b)fluoranthene	0.62	ca	--	0.036	1 / 1	No
Benzo(g,h,i)perylene	--		--	0.019	1 / 1	Yes, NTX
Benzo(k)fluoranthene	6.2	ca	--	0.019	1 / 1	No
Bis(2-ethylhexyl) phthalate	35	ca	--	0.054	1 / 1	No
Chrysene	62	ca	--	0.028	1 / 1	No
Fluoranthene	229	nc	--	0.036	1 / 1	No
Phenanthrene	--		--	0.017	1 / 1	Yes, NTX
Pyrene	232	nc	--	0.027	1 / 1	No
2,4,6-TNT	16	ca	--	22	4 / 7	Yes, > PRG
2-Amino-4,6-Dinitrotoluene	--		--	0.54	2 / 7	Yes, NTX
4-Amino-2,6-Dinitrotoluene	--		--	0.64	2 / 7	Yes, NTX
Nitrocellulose	--		--	1.3	1 / 1	Yes, NTX

Notes:
-- - no value available
BKG - site specific background
PRG - USEPA Region 9 Preliminary Remediation Goals, non-cancer values adjusted to 1/10 the published value
NTX - no toxicity screening value available
nc - non-cancer basis, value is 1/10 the published PRG
ca - cancer basis
pbk - based on PBK modeling
mcl - based on CWA maximum contaminant level
max - ceiling limit
sat - soil saturation
[n] - nutrient
*Concentration Units mg/kg

Table CBL-14
C-Block Quarry Ecological Risk Screening Tables for Surface Soil (0-1 ft)
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

Group	Parameter	Frequency of Detection	Average Concentration	Maximum Detected Concentration	Units	Surface Soil Background Concentration	Maximum Concentration > Background	Screening Value	Maximum Concentration > Screening value	PBT	COPC	COPC Rationale
Metals	Aluminum	7 / 7	8671	12000	mg/kg	17700	No	600 ss2	Yes	No	No	BLBKG
	Arsenic	7 / 7	13	19	mg/kg	15.4	Yes	9.9 ss1	Yes	No	Yes	ASL
	Barium	7 / 7	65	84	mg/kg	88.4	No	283 ss1	No	No	No	BLBKG
	Beryllium	7 / 7	0.57	0.71	mg/kg	0.88	No	10 ss1	No	No	No	BLBKG
	Calcium	7 / 7	760	1300	mg/kg	15800	No	NUT	No	No	No	BLBKG
	Chromium	7 / 7	289	920	mg/kg	17.4	Yes	0.4 ss1	Yes	No	Yes	ASL
	Cobalt	7 / 7	7.0	9.6	mg/kg	10.4	No	20 ss1	No	No	No	BLBKG
	Copper	7 / 7	32	78	mg/kg	17.7	Yes	60 ss1	Yes	No	Yes	ASL
	Iron	7 / 7	18700	22000	mg/kg	23100	No	200 ss2	Yes	No	No	BLBKG
	Lead	7 / 7	24	43	mg/kg	26.1	Yes	40.5 ss1	Yes	No	Yes	ASL
	Magnesium	7 / 7	1510	2100	mg/kg	3030	No	NUT	No	No	No	BLBKG
	Manganese	7 / 7	616	950	mg/kg	1450	No	100 ss2	Yes	No	No	BLBKG
	Nickel	7 / 7	15	16	mg/kg	21.1	No	30 ss1	No	No	No	BLBKG
	Potassium	7 / 7	754	960	mg/kg	927	Yes	NUT	No	No	No	BSL
	Selenium	5 / 7	0.74	0.85	mg/kg	1.4	No	0.21 ss1	Yes	No	No	BLBKG
	Sodium	7 / 7	256	310	mg/kg	123	Yes	NUT	No	No	No	BSL
	Vanadium	7 / 7	18	24	mg/kg	31.1	No	2 ss1	Yes	No	No	BLBKG
	Zinc	7 / 7	51	59	mg/kg	61.8	No	8.5 ss1	Yes	No	No	BLBKG
	Hexavalent Chromium	1 / 6	1.8	5.4	mg/kg	17.4	No	--	NSL	No	No	BLBKG
	Mercury	4 / 7	0.047	0.073	mg/kg	0.04	Yes	0.00051 ss1	Yes	Yes	Yes	ASL
	Thallium	2 / 7	0.30	0.36	mg/kg	0.00	Yes	1 ss1	No	No	No	BSL
SVOCs	Benzo(a)anthracene	1 / 1	0.017	0.017	mg/kg	--	NA	5.21 ss4	No	No	No	BSL
	Benzo(b)fluoranthene	1 / 1	0.036	0.036	mg/kg	--	NA	59.8 ss4	No	No	No	BSL
	Benzo(g,h,i)perylene	1 / 1	0.019	0.019	mg/kg	--	NA	119 ss4	No	No	No	BSL
	Benzo(k)fluoranthene	1 / 1	0.019	0.019	mg/kg	--	NA	148 ss4	No	No	No	BSL
	Bis(2-ethylhexyl) phthalate	1 / 1	0.054	0.054	mg/kg	--	NA	0.925 ss4	No	No	No	BSL
	Chrysene	1 / 1	0.028	0.028	mg/kg	--	NA	4.73 ss4	No	No	No	BSL
	Fluoranthene	1 / 1	0.036	0.036	mg/kg	--	NA	122 ss4	No	No	No	BSL
	Phenanthrene	1 / 1	0.017	0.017	mg/kg	--	NA	45.7 ss4	No	No	No	BSL
	Pyrene	1 / 1	0.027	0.027	mg/kg	--	NA	78.5 ss4	No	No	No	BSL
Explosives	2,4,6-TNT	4 / 7	3.2	22	mg/kg	--	NA	--	NSL	No	Yes	NSL
	2-Amino-4,6-Dinitrotoluene	2 / 7	0.18	0.54	mg/kg	--	NA	--	NSL	No	Yes	NSL
	4-Amino-2,6-Dinitrotoluene	2 / 7	0.21	0.64	mg/kg	--	NA	--	NSL	No	Yes	NSL
Propellants	Nitrocellulose	1 / 1	1.3	1.3	mg/kg	--	NA	--	NSL	No	Yes	NSL

Notes:
-- - no value available
mg/kg - means milligrams per Kilogram (parts per million - ppm)
ss1 - Preliminary Remediation Goals (Efroymson et al , 1997a)
ss2 - Toxiclogolgical Benchmarks for Soil and Litter Invertebrates (Efrymonson et al 1997b)
ss3 - Toxiclogolgical Benchmarks for Terrestrial Plants (Efrymonson et al 1997c)
ss4- Ecological Data Quality Level (USEPA Region 5, 1999)
NA - not applicable
NUT - nutrient
BLBKG - below background concentration
PBT- persistent, bioaccumulative and toxic
NSL - no screening level
ASL- above screening level
BSL - below screening level

Table CBL-15
C-Block Quarry Ecological Risk Screening Tables for Sediment
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

Group	Parameter	Frequency of Detection	Average Concentration	Maximum Detected Concentration	Units	Sediment Background Concentration	Maximum Concentration > Background	SRV	Maximum Concentration > SRV	Screening Value	Maximum Concentration > Screening value	PBT	COPC	COPC Rationale
Metals	Aluminum	5 / 5	12000	14000	mg/kg	13900	Yes	29000	No	--	NSL	No	No	BLSRV
	Arsenic	5 / 5	10	15	mg/kg	19.5	No	25	No	9.79 sd1	Yes	No	No	BLBKG
	Barium	5 / 5	74	96	mg/kg	123	No	190	No	--	NSL	No	No	BLBKG
	Beryllium	5 / 5	0.86	1.2	mg/kg	0.38	Yes	0.8	Yes	--	NSL	No	Yes	NSL
	Cadmium	1 / 5	0.17	0.12	mg/kg	0.00	Yes	0.79	No	0.99 sd1	No	No	No	BLSRV
	Calcium	5 / 5	872	2200	mg/kg	5510	No	21000	No	NUT	No	No	No	BLBKG
	Chromium	5 / 5	14	16	mg/kg	18.1	No	29	No	43.4 sd1	No	No	No	BLBKG
	Cobalt	5 / 5	7.8	14	mg/kg	9.1	Yes	12	Yes	50 sd2	No	No	No	BSL
	Copper	5 / 5	11	18	mg/kg	27.6	No	32	No	31.6 sd1	No	No	No	BLBKG
	Iron	5 / 5	19200	26000	mg/kg	28200	No	41000	No	--	NSL	No	No	BLBKG
	Lead	5 / 5	18	22	mg/kg	27.4	No	47	No	35.8 sd1	No	No	No	BLBKG
	Magnesium	5 / 5	1740	2300	mg/kg	2760	No	7100	No	NUT	No	No	No	BLBKG
	Manganese	5 / 5	375	970	mg/kg	1950	No	1500	No	--	NSL	No	No	BLBKG
	Nickel	5 / 5	13	17	mg/kg	17.7	No	33	No	22.7 sd1	No	No	No	BLBKG
	Potassium	5 / 5	894	1100	mg/kg	1950	No	6800	No	NUT	No	No	No	BLBKG
	Selenium	5 / 5	0.90	1.1	mg/kg	1.7	No	1.7	No	--	NSL	No	No	BLBKG
	Sodium	4 / 5	294	350	mg/kg	112	Yes	--	NA	NUT	No	No	No	BSL
	Vanadium	5 / 5	25	29	mg/kg	26.1	Yes	40	No	--	NSL	No	No	BLSRV
	Zinc	5 / 5	51	62	mg/kg	532	No	160	No	121 sd1	No	No	No	BLBKG
	Mercury	4 / 5	0.034	0.062	mg/kg	0.06	Yes	0.12	No	0.18 sd1	No	Yes	No	BLSRV
	Thallium	2 / 5	0.44	0.64	mg/kg	0.89	No	4.7	No	--	NSL	No	No	BLBKG
VOCs	Acetone	1 / 2	0.010	0.011	mg/kg	--	NA	--	NA	0.0099 sd2	Yes	No	Yes	ASL
SVOCs	Benzo(b)fluoranthene	1 / 1	0.014	0.014	mg/kg	--	NA	--	NA	10.4 sd2	No	No	No	BSL
	Fluoranthene	1 / 1	0.017	0.017	mg/kg	--	NA	--	NA	0.423 sd1	No	No	No	BSL
	Total PAHs (1)	1 / 1	0.39	0.031	mg/kg	--	NA	--	NA	1.610 sd1	No	No	No	BSL

Notes:
-- - no value available
mg/kg - means milligrams per Kilogram (parts per million - ppm)
sd1 - Threshold Effects Concentration from McDonald et al , (2000)
sd2 - Ecological Data Quality Level (USEPA Region 5, 1999)
NUT - nutrient
NA - not applicable
BLBKG - below background concentration
PBT- persistent, bioaccumulative and toxic
NSL - no screening level
ASL- above screening level
BSL - below screening level
SRV-Sediment Reference Value (OEPA, 2003)
BLSRV-Below Sediment Reference Value
(1) - maximum detected concentration of total PAHs was calculated by summing positive detections

Table CBL-16
C-Block Quarry Ecological Risk Screening Tables for Surface Water
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

Group	Parameter	Frequency of Detection	Average Concentration	Maximum Detected Concentration	Units	Surface Water Background Concentration	Maximum Concentration > Background	Screening Value	Maximum Concentration > Screening value	PBT	COPC	COPC Rationale
Metals	Aluminum	5 / 5	270	480	ug/l	3370	No	--	NSL	No	No	BLBKG
	Barium	5 / 5	53	120	ug/l	47.5	Yes	2000 sw1	No	No	No	BSL
	Calcium	5 / 5	9680	17000	ug/l	41400	No	NUT	No	No	No	BLBKG
	Chromium	2 / 5	3.8	2	ug/l	0.00	Yes	727 sw1[H]	No	No	No	BSL
	Cobalt	5 / 5	4.2	9	ug/l	0.00	Yes	220 sw1	No	No	No	BSL
	Copper	4 / 5	3.5	4.5	ug/l	7.9	No	4.9 sw1[H]	No	No	No	BLBKG
	Iron	5 / 5	8060	23000	ug/l	2560	Yes	--	NSL	No	Yes	NSL
	Magnesium	5 / 5	2260	3500	ug/l	10800	No	NUT	No	No	No	BLBKG
	Manganese	5 / 5	1998	4100	ug/l	391	Yes	--	NSL	No	Yes	NSL
	Nickel	3 / 5	4.9	7.4	ug/l	0.00	Yes	184 sw1[H]	No	No	No	BSL
	Potassium	5 / 5	5800	12000	ug/l	3170	Yes	NUT	No	No	No	BSL
	Sodium	1 / 5	920	1600	ug/l	21300	No	NUT	No	No	No	BLBKG
	Vanadium	1 / 5	4.5	2.7	ug/l	0.00	Yes	150 sw1	No	No	No	BSL
	Zinc	2 / 5	17	23	ug/l	42	No	47 sw1[H]	No	No	No	BLBKG
	Arsenic	4 / 5	6.3	11	ug/l	3.2	Yes	340 sw1	No	No	No	BSL
	Hexavalent Chromium	1 / 5	8.4	22	ug/l	7.9	Yes	16 sw1	Yes	No	Yes	ASL
	Lead	1 / 5	1.4	1	ug/l	0.00	Yes	30 sw1[H]	No	No	No	BSL
	Mercury	2 / 5	0.084	0.066	ug/l	0.00	Yes	1.7 sw1	No	Yes	Yes	PBT
	Thallium	1 / 5	1.9	1.7	ug/l	0.00	Yes	79 sw1	No	No	No	BSL
VOCs	Acetone	4 / 5	8.9	14	ug/l	--	NA	--	NSL	No	Yes	NSL
	Carbon disulfide	1 / 4	2.8	3.7	ug/l	--	NA	130 sw1	No	No	No	BSL
	Methylene chloride	1 / 5	1.9	6.4	ug/l	--	NA	11000 sw1	No	No	No	BSL
	Toluene	3 / 5	18	64	ug/l	--	NA	560 sw1	No	No	No	BSL
SVOCs	2,4-Dimethylphenol	1 / 5	22	88	ug/l	--	NA	140 sw1	No	No	No	BSL
	2-Methylphenol	2 / 5	21	72	ug/l	--	NA	600 sw1	No	No	No	BSL
	4-Methylphenol	2 / 5	24	86	ug/l	--	NA	480 sw1	No	No	No	BSL
	Benzoic acid	1 / 5	90	410	ug/l	--	NA	--	NSL	No	Yes	NSL
	Benzyl alcohol	2 / 5	10	12	ug/l	--	NA	--	NSL	No	Yes	NSL
	Bis(2-ethylhexyl) phthalate	1 / 5	32	130	ug/l	--	NA	1100 sw1	No	No	No	BSL
	Isophorone	1 / 5	1.2	2.2	ug/l	--	NA	7500 sw1	No	No	No	BSL
	Phenol	2 / 5	16	68	ug/l	--	NA	4700 sw1	No	No	No	BSL

Notes:
-- - no value available
ug/l - means micrograms per Liter (parts per billion - ppb)
sw1 - Ohio Water Quality Criteria (Reg 3745-1-07)
sw1[H] - Ohio Water Quality Criteria (Reg 3745-1-07) based on a site specific hardness of 33 (mg/l)
NA - not applicable
ID - insufficient data to calculate screening value
NUT - nutrient
BLBKG - below background concentration
PBT- persistent, bioaccumulative and toxic
NSL - no screening level
ASL- above screening level

Table CBL-17
C-Block Quarry Ecological Risk Summary of Quantitative and Qualitative COPECs for Environmental Media
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

Group	Parameter	Shallow Soil	Sediment	Surface Water
Metals	Aluminum			
	Beryllium			
	Chromium	X		
	Copper	X		
	Iron			Q
	Lead	X		
	Manganese			Q
	Vanadium			
	Hexavalent Chromium			X
	Lead	X		
	Mercury	X		X
	Thallium			
VOCs	Acetone			Q
SVOCs	Benzoic acid			Q
	Benzyl alcohol			Q
Explosives	2,4,6-TNT	Q		
	2-Amino-4,6-Dinitrotoluene	Q		
	4-Amino-2,6-Dinitrotoluene	Q		
Propellants	Nitrocellulose	Q		

Notes
COPEC - chemical of potential ecological concern
X - quantitative COPEC
Q - qualitatative COPEC
blank cell indicates that the analyte was not identified as a COPEC for the media

LOAD LINE 12 TABLE OF CONTENTS

LOAD LINE 12 FIGURES

LOAD LINE 12 TABLES

1.0 INTRODUCTION

This report documents the results of Load Line 12 (LL12) (AOC-12) sampling effort that was completed as part of the characterization of the 14 Ravenna Army Ammunition Plant (RVAAP) Area of Concern (AOCs). This document summarizes the results of the field activities conducted from October 2004 to May 2005.

1.1 PURPOSE AND SCOPE

Characterization activities were conducted at LL12 to collect sufficient data for all applicable media to allow efficient planning and execution of future environmental actions.
The characterization effort for the LL12 was undertaken to accomplish the following:

- Develop and/or update the Conceptual Site Model to identify the key elements that should be considered in future actions;
- Assess AOC-specific physical characteristics;
- Assess potential sources of contamination;
- Allow initial assessment of the nature and lateral extent of groundwater contamination (the depth of contamination was not evaluated for this characterization effort)

The rationale for the AOC-specific sampling plan was biased based on historical information including past usage, past investigations, ecological settings, climatic conditions, and geological and hydrologic characteristics. The field program was conducted in general accordance with the revised (USACE, 2001a) and the Final Sampling and Analysis Plan Addendum FSAP for the characterization of 14 RVAAP AOCs (MKM, 2004).

1.2 BACKGROUND INFORMATION

This section briefly describes the previous investigations conducted at LL12 and the regulatory status of LL12.

1.2.1 AOC Description and History

LL12 is 30.4 ha (75 acre) that is located in the southeastern part of the facility at the northeast corner of the intersection of South Service Road and Paris-Windham Road. LL12 was constructed in 1940 to 1941 as an ammonium nitrate plant. Figure 1-2, Volume I shows the location of LL12 in relation to the RVAAP facility. The plant was operated by the Atlas Powder Company from 1941 to May, 1943. After the termination of ammonium nitrate production, LL12 was used for various production, renovation and demilitarization operations.

The Ammonium Nitrate Plant (at LL12) was operated to produce ammonium nitrate for explosives and fertilizers. There were no wash water collection tanks or settling ponds in LL12 during these operations. All residues, dusts and spills were washed into the storm drainage system.

Load Line 12 was leased by the Silas Mason Company from 1946 to 1949 for the production of fertilizer-grade ammonium nitrate. In 1944, Buildings 900, 904 and 905 were converted and used for the demilitarization of munitions. From 1965 to 1967, Hercules Alcor, Inc. leased Building FF-19 for the production of aluminum chloride. In the late 1970s, contaminated pink water washout was collected in settling sumps and treated through sawdust filters. In 1981, the Army constructed the L12 Pink Water Treatment Plant. The Army declared L12 inactive in 1992. Demolition and salvage operations were completed by MKM in June 2000. All buildings, associated structures, including the pink water plant, and walkways were removed.

The LL12 Pink Water Treatment Plant consisted of a dual mode activated carbon filtration system for filtering pink water. Twin 907.2-kilogram (2000 pound) carbon units were enclosed in a 6 by 13.2 meter (20 by 40 foot) steel girder and metal-sided building which rested on a concrete slab. The spent carbon was stored in Building 1601 until transported off site for disposal. The AOC was constructed in 1981, within the confines of LL12, and was fully operational for two years. During operation, plant effluent was stored in a 38,000-liter (10,000 gallon) concrete holding tank. When processing, the effluent was pumped through a bag prefilter that removed the particulate matter. After the prefilter, the effluent was pumped through a series of two activated carbon units to another holding tank. Approximately 30 minutes of carbon bed contact time was maintained during the treatment process.

1.2.2 Previous Investigation

The specific findings and conclusions for these previous investigations at LL12 are presented below.

1.2.2.1 1996 USACHPPM Relative Risk Site Evaluation

This assessment identified the following conditions at RVAAP:

- Potential chemicals of concern (PCOCs) at RVAAP sites were identified explosives (TNT, RDX, HMX, RDXX, composition B, and lead azide) and heavy metals (lead and mercury).
- The primary sources of potential contamination at RVAAP were identified as wastewater effluent from munitions assembly and demilitarization process, open burning and detonation of explosives, and landfill operations.
- Primary contaminant release mechanisms from load lines were process effluent discharges to surface water (drainage ditches, settling ponds, and streams) and process building wastewater wash-out on to surface soils. Media of concern were identified as a soil, sediment, groundwater and surface water.
- The greatest potential for release of contaminants to groundwater from load lines likely was identified as wastewater effluent discharge to unlined earthen settling ponds. Concrete settling tanks, open drainage ditches, and storm sewers were also identified as a concern relative to groundwater.
- The primary contaminant release mechanism from open burning and detonation areas resulted from the burning and detonation of off-specification explosives on the ground surface. Media of concern was identified as soils, groundwater, surface water and sediment.

- The primary release mechanism at landfills was identified as a result of potential leaching of contaminants from buried/disposal materials. Groundwater and soils were selected as media of concern.
- Known releases of contamination to surface water and soils have occurred from load line (assembly and demilitarization) operations and from open burning and detonation operations.
- Known releases of contamination to groundwater were noted to have occurred from quarry landfill operations.
- The greatest potential for off-site migration of contaminants during load line operations was identified as surface water. The greatest potential for current off-site migration of contaminants was identified as groundwater and surface water.

Based on qualitative assessment of the potential hazards, release mechanisms, and environmental conditions at RVAAP, LL-12, Building 1200 and the Landfill N. of Winklepeck Burning Grounds were considered among the higher priority sites in this assessment.

1.2.2.2 Preliminary Assessment for the Ravenna Army Ammunition Plant (USACE 1996)

This assessment identified the following conditions at RVAAP:

- Potential chemicals of concern (PCOCs) at RVAAP sites are predominately explosives (TNT, RDX, HMX, RDXX, composition B, and lead azide) and heavy metals (lead and mercury).
- The primary sources of potential contamination at RVAAP are wastewater effluent from munitions assembly and demilitarization process, open burning and detonation of explosives, and landfill operations.
- Primary contaminant release mechanisms from load lines were process effluent discharges to surface water (drainage ditches, settling ponds, and streams) and process building wastewater wash-out on to surface soils. Media of concern are soil, sediment, groundwater and surface water.
- The greatest potential for release of contaminants to groundwater from load lines likely occurs from wastewater effluent discharge to unlined earthen settling ponds. Concrete settling tanks, open drainage ditches, and storm sewers are also of concern relative to groundwater.
- The primary contaminant release mechanism from open burning and detonation areas resulted from the burning and detonation of off-specification explosives on the ground surface. Media of concern are soils, groundwater, surface water and sediment.
- The primary release mechanism at landfills is a result of potential leaching of contaminants from buried/disposal materials. Media of concern are groundwater and soils.
- Known releases of contamination to surface water and soils have occurred from load line (assembly and demilitarization) operations and from open burning and detonation operations.
- Known releases of contamination to groundwater have occurred from quarry landfill operations.
- The potential impact to groundwater from many sites at RVAAP is currently unknown.
- Hydrogeologic conditions underlying sites at RVAAP are not well defined.

- The greatest potential for off-site migration of contaminants during load line operations was via surface water. The greatest potential for current off-site migration of contaminants is via groundwater and surface water.
- Based on qualitative assessment of the potential hazards, release mechanisms, and environmental conditions at RVAAP, LL-12, Building 1200 and the Landfill N. of Winklepeck Burning Grounds were considered among the higher priority sites in this assessment.
- Based on interviews with former employees of varying expertise, the Pistol Range and NACA Test Area were also cited in this assessment. These sites had no documentation to support their existence and were listed as undocumented sites.

1.2.2.3 Phase I Remedial Investigation for High-Priority Areas of Concern at the Ravenna Army Ammunition Plant (SAIC 1998)

TNT and other explosives, inorganics, and organics occur at elevated concentrations in soil throughout this AOC. Explosives are concentrated around the Building 904 (demilitarization facility), Building 900 ferilizer/demilitarization operations facility, and the Nitrate Settling Basin and Filter Bed Facility. Cadmium, chromium, lead, and mercury are also concentrated at these three areas and Building FF-19. Other organic contaminants detected include PAHs in the Building 904 area, and pesticides/PCBs in the vicinity of Buildings 900 and FF-19. Sediments also exhibited elevated concentrations of the explosives TNT and DNT, inorganics, and organics. Explosive concentrations were several orders of magnitude lower in sediment than in soil, and the maximum concentration was detected in the area of the Nitrate Settling Basin and Filter Beds. The maximum concentration of many inorganics and organic compounds was in the sample adjacent to Building FF-19. There does appear to be some migration of contaminants in sediment, with likely sources at Buildings 904, 900, FF-19 and the Nitrate Settling Basin and Filter Beds. The extent of sediment contamination beyond the AOC boundary was not determined at this AOC during the Phase I RI. There were no detections in the single groundwater sample analyzed for VOCs from this AOC.

1.2.2.4 Phase II Remedial Investigations (SAIC 2004)

This Phase II Remedial Investigation (RI) was conducted to characterizes the nature and extent of contamination, evaluate the fate and transport of contaminants, and assess potential risk to human health and the environment resulting from former operations at Load Line 12. The AOC was spatially subdivided into aggregates based upon the former load line process and function for soils, sediments, and surface water. The findings were as follows:

Western Soil Aggregate

- The primary identified source areas in the Western Soil Aggregate include Buildings 900, 904, 905, and FF-19. Metals (Building FF-19), explosives (Buildings 900, 904, and 905), and PAHs represent the most pervasive SRCs in the former production area. The spatial distribution and concentrations of contaminants were highly variable in the vicinity of these source areas. With respect to vertical distribution, the numbers and concentrations of SRCs in subsurface soil at

these source areas decreased significantly relative to surface soil.

- Sampling of locations around the AOC perimeter indicated a source area north of Load Line 12 in an apparent former staging area (Team Track Area). Other than the Team Track Area, perimeter sampling locations did not indicate substantial contamination outside of the former process area.
- Fate and transport modeling predict that leaching of metals and explosives compounds at Buildings 904, 905, and FF-19 will result in concentrations at the groundwater table in excess of PRGs in the future. The migration of metals and explosives constituents from the source areas to the closest groundwater discharge point at concentrations in excess of MCLs or PRGs is also predicted to occur within a time frame of 1,000 years from Building FF-19 and the Team Track Area. Modeling of groundwater transport from source areas to the AOC boundary shows that RDX is predicted to reach the AOC boundary at concentrations above PRGs/MCLs from Buildings 904 and 905. Migration of most of the constituents is attenuated because of moderate to high retardation factors, as well as degradation of organic compounds; these processes are not reflected in the conservative modeling results.
- Soil contamination in the vicinity of the identified source areas is currently at concentrations sufficient to result in chemical hazards and cancer risks for humans in excess of the minimum acceptable level under the most likely land use scenario (National Guard/managed recreational).
- Comparison of concentrations of COCs in surface soil to preliminary minimum RGOs (1E-06 risk and/or HI=0.1) shows that a total of 10 chemicals exceed their respective criteria for the National Guard, recreational, and residential land use scenarios. A number of the individual exceedances represent cases where the method reporting limit was greater than the minimum RGO. The locations where multiple sample stations had chemicals in excess of minimum RGOs include Buildings 900, 901, 902, 904, 905, and FF-19 and the Team Track Area. Areas having only single sample stations with at least one chemical above RGOs included Buildings 52, 903, and FN-54; two transformer pads; and two bare soil areas located east of Buildings 904 and 905. Building 906 had no chemicals above RGOs in surface soil.
- Fewer contaminants exceed minimum RGOs for subsurface soil, and almost all of the exceedances observed at specific sampling stations are associated with the residential receptor. The majority of exceedances of minimum RGOs in subsurface soil for the residential receptor occurred at sampling
- Stations at Buildings FF-19, 901, 904, 905, and FE-17 (Power House). Four compounds [benzo(*a*)pyrene; dibenz(*a,h*)anthracene; 2,4,6-TNT; and RDX] exceeded minimum RGOs for the National Guard scenario at only nine sampling stations, although several of the exceedances represent method reporting limits in excess of RGOs.
- HQs for terrestrial and aquatic ecological receptors suggest that such receptors are potentially at risk from exposure to surface soil.

Eastern Soil Aggregate

- In the Eastern Soil Aggregate outside of the former production area, no contaminant source areas were identified in the contaminant nature and extent evaluation. Sporadic occurrences of metals may or may not be directly related to past AOC operations; these metals may represent residues from slag.
- Modeling results indicate that chromium and nickel are predicted to leach to groundwater with

concentrations exceeding the groundwater PRGs/MCLs beneath sampling points. Groundwater transport modeling indicates that no constituent will migrate to receptors or the AOC boundary in excess of PRGs within a 1,000-year time frame.

- No COCs were identified for the most likely land use scenario, and only two compounds were identified as COCs under the most conservative potential future land use scenario. Benzo(*a*)pyrene was the only chemical reported above minimum RGOs at three sampling stations for the residential land use scenario; however, two of the reported concentrations represent method reporting limits.
- Some ecological receptors are at risk, but much less so than in the Western Soil Aggregate.

Surface Water and Sediment

- Explosives contamination in sediment is not widespread and occurs near Building 905 and at the station furthest downstream of the process area near Upper Cobb's Pond.
- Ditch sediment near Buildings FF-19 and 905 is most contaminated with metals. The presence of SVOCs (primarily PAHs) was noted in the upgradient sample location (L12-228) and in sediment near Buildings FF-19, 901, 902, and FN-54. Thus, the presence of SVOCs in the Active Area Channel and North of the Active Area may not be due to activities at Load Line 12, but rather due to inputs from the Atlas scrap yard or the roadway at the western AOC boundary. Additionally, controlled open burning of several buildings during demolition work in the 1980s may have contributed to observed PAH contamination. Arochlor-1254 and Arochlor-1260 were detected in sediment near Buildings 902, 905, FF-19, and FN-54, but were absent from the stream channel in the North of the Active Area segment.
- At the exit point from the AOC, 1,3-DNB; antimony; cadmium; cobalt; mercury; nickel; silver; 2-butanone; acetone; benzo(*b*)fluoranthene; and fluoranthene were identified as SRCs, indicating previous migration and deposition of contaminants in the active area channel.
- Explosives were detected in all surface water aggregates; however, surface water in the Active Area Channel has been most impacted by explosives contamination. Explosives were not detected in surface water at the station furthest downstream near Upper Cobb's Pond (L12-229).
- As with sediment, surface water in ditches just downstream of major source areas is most contaminated with metals. Barium, cadmium, chromium, cobalt, copper, nickel, and zinc were detected frequently at concentrations exceeding their respective site background concentrations. Nitrate was detected at times the MCL in surface water near Building 900.
- SVOCs and VOCs are not widespread, and pesticides/PCBs are absent from surface water at Load Line 12. At the AOC exit point, cobalt, nickel, and vanadium exceeded background criteria.
- Sediment and surface water present significantly lower risks than soil under the most likely land use scenarios. A total of nine chemicals exceeded minimum RGOs for sediment at 20 sampling stations. The majority of these exceedances for sediment were related to benzo(*a*)pyrene, and most were for the residential land use scenario. The notable exception was the Main Ditch Aggregate where arsenic and/or PCBs exceeded National Guard, recreational, and residential minimum RGOs at all four stations sampled in this aggregate. In addition, sediment at the upgradient station contained five PAHs in excess of minimum RGOs. For surface water, five

chemicals exceeded minimum RGOs for the residential land use scenario only. A majority of these exceedances relate to bis(2-ethylhexyl)phthalate and 2,4-DNT and represent reporting limits in excess of the minimum residential RGO.

Groundwater

- Groundwater within the AOC contains explosives compounds and metals in excess of background values. Wells in the northern half of the AOC, particularly near Building 900, the northern boundary, and the Team Track Area, are most contaminated.
- Filtered samples show exceedances of primary federal drinking water MCLs for arsenic near Building 904 and for thallium near Building FF-19; these exceedances correspond to hot spots for these metals in either surface or subsurface soil. Nitrate concentrations much greater than federal drinking water MCLs were observed near Buildings 900, FF-19, and 901. The fact that nitrate was detected only in wells adjacent to primary ammonium nitrate production areas suggests that contaminants have not migrated far from source areas.
- SVOCs and PCBs/pesticides are minor contaminants in Load Line 12 groundwater.
- Chemical hazards and risks associated with arsenic and nitrate in groundwater under hypothetical future National Guard and residential land use scenarios exceed the upper bound of the CERCLA risk range.
- Nitrate; aldrin; bis(2-ethylhexyl)phthalate; 2,4-DNT; and RDX exceed minimum RGOs for the National Guard and residential land use scenarios. However, a majority of the exceedances reflect method reporting limits in excess of the minimum RGOs.

Sanitary Sewer Water and Sediment

- Explosive compounds were detected at low concentrations in water samples collected at all locations from the sanitary sewer.
- Sediment and water at stations L12-218 and L12-219 are also contaminated with metals (mercury in particular), SVOCs (primarily PAHs), and pesticides/PCBs. Nitrate was detected in water samples at every station sampled and was detected once in sediment at station L12-219. Cyanide was not detected in water or sediment at any station sampled. Only one pesticide, heptachlor epoxide, was detected in sewer water at 3 stations. No SVOCs or VOCs were detected in sewer water.

Although the sanitary sewer system cannot be confirmed as a secondary source for contaminants to groundwater, the presence of nitrate in both sewer water and groundwater indicates some connection via cracks or seepage points in the pipe system. Therefore, the sewer system may represent a preferential pathway for contaminant movement within the AOC.

1.2.2.5 Phase II Remedial Investigation Supplemental Report for Load Line 12 (RVAAP-12) at the Ravenna Army Ammunition Plant (SAIC 2005).

This document was written to provide an updated assessment of the site conditions at LL12. Data generated since the Phase II Remedial Investigations (SAIC 2004) including the groundwater from the 14 AOC characterization, was compared to a baseline human health risk assessment to determine whether any new COPCs emerged.

1.2.3 Regulatory Authorities

Volume 1, Section 1.2.3 identifies the regulatory authorities that oversee remedial activities for this AOC.

1.2.4 Regulatory Status of Load Line 12

Volume I, Section 1.2.4 identifies the regulatory status for this AOC.

2.0 ENVIRONMENTAL SETTING AT LOAD LINE 12

This section describes the physical characteristics of LL12 that are factors in interpreting the potential contaminant transport pathways, receptor populations, and exposure scenarios with respect to the evaluation of human health and ecological risks. The Load Line is generally open with some wooded areas along the west and southwest borders. The AOC is flat with elevation change across the site being less than 10 feet. All of the load line buildings and structures were removed prior to 2000. Several ponds are located in the central portion of the AOC that were formally used during operations of the facility for settling basins. A large area to the west of the AOC boundary is wet or covered by surface water from biological impoundment. South Service Road is located immediately south of LL 12. Newton Falls Road bounds the AOC to the north.

2.1 SURFACE FEATURES

The topography at LL12 slopes slightly from east to west. Ground elevations adjacent to the five monitoring wells installed at this AOC ranged from 977.50 to 982 ft amsl (Figure L12-6). Surface features at LL12 consist of a one-lane mostly gravel road running throughout the interior of the AOC. All of the former buildings and above-ground structures from the former operations have been removed. There are two former railroad tracks that extend completely through the AOC, running north and south, and several short former spurs in the southern portion of the AOC.

2.2 METEOROLOGY AND CLIMATE

Meteorology and climate are addressed in Volume 1, Section 2.2.

2.3 SURFACE WATER HYDROLOGY

Because the AOC is relatively flat, surface water drainage is localized and ponding is prevalent. However, there are two significant drainage ditches on the AOC. The first ditch runs north and south, and is parallel with the two former railroad tracks that serviced LL12; the other ditch runs east and west intersecting the first ditch (Figure L12-6). There is a smaller ditch between the former railroad tracks that may be seasonally wet. The ditches tend to hold water for extended periods of time due to the low permeability of soils.

2.4 GEOLOGY

Lithologic logs from five borings, advanced during the characterization activities and completed as monitoring wells, were used to characterize the subsurface geology at LL12. The boring logs which detail the vertical lithologic sequences are found in Appendix H.

2.4.1 Glacial Deposits

Subsurface lithology at LL12 consists mostly of silts and silty clays with interbedded sands. These deposits are generally firm with low to moderate plasticity. Cross-sections of the subsurface, based on data from the previous investigations as well as the current characterization effort at LL12, illustrate the lateral distribution and variation of these discontinuous glaciated sediments (Figures L12-1 to L12-5).

2.5 SOIL

According to the Soil Survey of Portage County, Ohio (USDASCS, 1978), RVAAP soils are described as being nearly level to gently sloping, and are poor to moderately well drained. Two soil types are found at LL12: the Mahoning silt loam (0 to 2 percent slopes) and the Trumbull silt loam (0 to 2 percent slopes). The Trumbull silt loam covers the majority of the AOC. The Mahoning silt loam is found in the northeastern and southeastern portions of the AOC.

Trumbull silt loam consists of deep, poorly drained, nearly level soils. These soils formed in silty clay loam, clay loam, or silty clay glacial till. Permeability is very slow in the subsoil and underlying glacial till. Runoff is slow, and ponding is common after heavy rains. Trumbull soils are slow to dry in the spring. Trumbull silt loam (0 to 2 percent slopes) is a nearly level soil mainly along small drainageways or in small depressions adjacent to the better drained Mahoning soils. Seasonal wetness and very slow permeability are limitations.

The Mahoning series consists of deep, somewhat poorly drained, nearly level to gently sloping soils that formed in silty clay loam or clay loam glacial till. The Mahoning Silt Loam (0 to 2 percent slopes) is characterized by nearly level soil in upland areas between drainageways with slow to ponded runoff. Seasonal wetness and slow permeability characterize this soil types.

2.6 HYDROGEOLOGY

All monitoring wells were located in a manner that would allow stratigraphic correlation across the site. Potentiometric maps (figures L12-8 to L12-10) were drafted from the groundwater level information from the newly installed wells.

2.6.1 Unconsolidated Sediments

Saturated soil was encountered at approximately 14 to 25 ft bgs during drilling of the five groundwater monitoring wells.

Because the topography is relatively flat and the top of the bedrock appears to slope to the south (USGS Bedrock Topography Map), the groundwater in the east, south and central portions of the AOC flow toward the southern half of the AOC. In the northwest portion of the AOC groundwater flow is in a northerly direction.

2.6.2 Bedrock

No weathered or competent bedrock was encountered during the drilling of the five monitor wells. Volume I presents a bedrock description for the RVAAP facility.

2.7 DEMOGRAPHY AND LAND USE

A description of demography and land use is discussed in Volume 1, Section 2.7.

2.8 ECOLOGY

Ecology is discussed in Volume 1, Section 2.8.

3.0 CHARACTERIZATION ACTIVITIES AT LOAD LINE 12

This section describes the field and analytical methods identified during the RVAAP 14 AOC characterization activities at LL12. The field and analytical programs were conducted in accordance with the RVAAP Facility Wide Sampling and Analysis Plan (FWSAP) (USACE, 2001), the RVAAP 14 AOC FWSAP Addendum (MKM, 2004) and the Work Plan for the RVAAP 14 AOC (MKM, 2004). Investigation objectives, sampling methods, and sampling locations are briefly discussed in this section.

3.1 FIELD ACTIVITIES

Field activities conducted from October 2004 thru February 2005 included:

- Installing five groundwater monitoring wells (11-09-04 – 11-10-04);
- Collecting geotechnical samples from the borings (11-10-04);
- Conducting well slug tests (01-25-05);
- Collecting groundwater samples from existing and newly installed monitoring wells (10-26-04 – 11-30-04); and
- Conducting a monitoring well survey (01-17-05 – 01-28-05).

Monitoring well locations for the characterization of this AOC were located to assess the impact that LL12 operations may have had on groundwater and to evaluate where contaminants related to the former operations may have impacted the AOC.

Information from previous assessments, evaluations and investigations, plus institutional knowledge about the operations that occurred at L12, were used to determine the monitoring well locations. Table L12-1 summarizes the types and numbers of samples that were collected, rationale for collecting the samples and the analyses conducted on the samples. A photo log of the investigation activities is provided in Appendix C. Figure L12-6 shows the monitoring well locations at this AOC.

3.1.1 Groundwater Investigation Activities

Five boreholes were advanced into unconsolidated materials. Borehole termination depth ranged from 24.0 to 32.0 ft bgs at L12 (Figure 3-3). At four locations, saturation was encountered between 14 ft and 17 ft; at one well (MW-246), saturation was not encountered until 25 ft. Additionally, groundwater samples were collected from all pre-existing groundwater monitoring wells.
The groundwater activities at this AOC were conducted to:

- Determine whether contaminants from the previous operations at LL12 had adversely impacted groundwater quality underlying the AOC;
- Evaluate the quality of groundwater upgradient of LL12; and
- Collect additional data pertaining to the groundwater flow regime at LL12.

One round of groundwater sampling and slug tests were conducted and three rounds of water level data were collected.

3.1.1.1 Monitoring Well Installation and Development

An 11.25 in. OD, HSA was used to advance the borehole through unconsolidated material to an average depth of 8.61 m (28.26 ft) bgs. Bedrock was not encountered in any of the boring locations. Section 4.4.2.4 and 4.4.2.5 of the FWSAP describe the HSA drilling method.

Monitoring wells were constructed in each borehole, following termination of drilling at the appropriate depth. A 3.05 m (10 ft) section of new, pre-cleaned 5.0 cm (2.0 inch) Schedule 40 polyvinyl chloride (PVC) 0.010 slot screen was set to straddle the static water level determined during drilling activities. The well was completed to the surface using new, schedule 40 PVC riser. The screen and riser were placed into the borehole through the drill stem augers during well construction. Placement of clean Global No. 5 sand filter pack was tremied in place from the bottom of the boring to approximately 0.6 m (2 ft) above the top of the well screen. The filter pack was sealed with 0.6 m (2 ft) of bentonite pellets. A Type 1 Portland cement with 7 percent bentonite grout was tremied to complete the remainder of annular space to the surface. Each well was finished at the surface with protective steel surface casing. Three steel posts were installed around each well. At least five borehole volumes (maximum of seven borehole volumes) and five times any hydration volume were removed from each well using a submersible pump. Pre-existing monitoring wells were gauged to determine whether re-development was required. One pre-existing well required re-development (L12mw-113-GW) prior to sample collection. The installation, development, and sampling of monitoring wells were conducted in accordance with the Section 4.3.2 of the FWSAP. Well construction diagrams and well development records are provided in Appendix H.

3.1.1.2 Geotechnical Sample Collection

Geotechnical samples were collected during groundwater monitoring well installation. Four Shelby tubes were advanced at monitoring well locations L12mw-242 (8 to 10 ft. and 12 to 14 ft), L12mw-043 (8 to 10 ft) and L12mw-044 (6 to 8 ft), and sent to the laboratory for analysis. Geotechnical sample collection was conducted in accordance with Section 4.4.2.4.1 of the FWSAP. The geotechnical analytical data can be found in Appendix J.

3.1.1.3 In-Situ Permeability Testing

Slug tests were performed at the five newly installed monitoring wells at LL12 to estimate the hydraulic conductivity of the media surrounding each well screen. A transducer was used to collect the falling and rising head data. First, the rising head test was conducted by inserting a stainless steel slug into the well and recording water levels until the groundwater returned to static levels. After it was determined that the groundwater elevations had stabilized, the falling head test was conducted by removing the slug and collecting data until static conditions were achieved. The monitoring well slug test was conducted in accordance with the Characterization of 14 RVAAP AOCs SOW (May 2004). Slug test data records are provided in Appendix K and resulting hydraulic conductivities arithmetic can be found in Section 5.2.

3.1.1.4 Groundwater Sampling

Before collecting groundwater samples, each newly installed monitoring well's condition was evaluated and noted in accordance with Sections 4.3.2.3.11.4 and 4.3.2.3.13 of the FWSAP. Casing headspace was field screened at each well using a handheld PID. No detections were observed in the PID readings for the wells at LL12. This information is provided on the field forms located in Appendix H. Specific information related to the type of PID used and calibration is included in Section 3.1.5 of Volume 1. The depth to water and depth to the bottom of the well casing were measured and recorded. Each well was purged using micropurge technology. Purging continued until measurements of water quality indicators (pH, temperature, dissolved oxygen, and conductivity) were within 10 percent of each other for three consecutive readings. Analysis of groundwater at L12 included the following parameters: TAL Metals, Explosives, Propellants, VOCs, SVOCs, Nitrate, Pesticides and PCBs.

Groundwater was collected from each of the five newly installed wells and from 14 pre-existing monitoring wells at LL12 and placed into pre-cleaned bottles. Samples that were to be analyzed for TAL dissolved metals were field-filtered during collection. Once they were containerized, samples were immediately placed into a cooler containing ice and submitted to the laboratory under a completed chain of custody. All groundwater sampling was conducted in accordance with the procedures provided in Section 4.3.4 and 4.3.5 of the FWSAP. Section 3.1.10.11 of Volume 1 also discusses the groundwater sampling procedures used for this project.

Two split samples were collected and submitted for analysis to an independent USACE approved laboratory. One split sample was collected from the newly installed wells and one from the preexisting wells. Well purging and sampling records are provided at Appendix H and analytical results from the samples are presented in Appendix L.

3.1.1.5 Water Level Measurements

Static water level and total depth measurements were taken and recorded at each monitoring well (pre-existing and newly installed) on three separate occasions to provide data about the groundwater flow regime underlying the LL12. These water level readings were collected during February, March, and May 2005. Water level measurements were collected in accordance with Section 4.3.2.6 of the FWSAP. Groundwater elevation data are included in Appendix M.

3.1.2 Monitoring Well Survey

Monitoring well survey vertical control was within 0.01 ft accuracy and horizontal control was within 1-ft accuracy. Vertical datum was in 1929 NGVD and Ohio State plane coordinates were in NAD83. Surveying was conducted in accordance with Section 4.3.2.3.12 of the FWSAP. The survey report and sample location survey maps can be found in Appendix N.

3.2 DEVIATIONS FROM THE WORK PLAN

Every effort was made to complete the field activities in accordance with the FWSAP and the approved RVAAP 14 AOC FWSAP Addendum. However, in some instances, circumstances or field conditions necessitated a modification. Changes made during the LL12 characterization are noted below.

- Although the FWSAP specifies that 3 ft of sand be placed above the screen, the depth of sand in three wells deviated from that depth. The deviations were caused by too much sand being poured into the well too quickly, not allowing for the proper gauging for depth.

    - MW-242 was constructed with 3.5 ft of sand above the screen
    - MW-244 was constructed with 3.5 ft of sand above the screen
    - MW-246 was constructed with 4.5 ft of sand above the screen

- L12mw-113-GW (existing well from previous phase) was re-developed due to the presence of 1.3 feet of sediment in the well screen. The MW is a low yield well and required three days to extract seven borehole volumes (Some weather delays were encountered due to electrical storms). The turbidity was consistently at or greater than 1000 NTUs through all seven borehole volumes. The turbidity does not meet the 5 NTU criteria set forth in the FWSAP with no indication of reduction through seven borehole volumes. Based upon the level of effort through purge volumes and the fact that the other water quality parameters were stable, MKM notified the Ohio EPA and received verbal approval to consider development sufficient for proceeding to the purge/sampling phase.

Although deviations were identified, the objectives of the LL12 AOC characterization were still achieved.

4.0 NATURE OF CONTAMINATION AT LOAD LINE 12

This section summarizes the groundwater analytical results obtained from the environmental sampling conducted at LL12. Groundwater was the only media evaluated at this AOC. The number of samples collected and the number of analytical results that exceeded either the RVAAP background criteria or Region 9 residential Preliminary Remediation Goals is listed in each subsection. The evaluation completed in this section is a preliminary comparison and is not intended to be used alone for making risk management decisions.

4.1 GROUNDWATER

Six groundwater samples (five regular and one QC) were collected from five newly installed monitoring wells (MW-242 to MW-246) during the AOC characterization at LL12. Additionally, 15 groundwater samples (14 regular and one QC) were collected from 14 existing monitoring wells (MW-088, MW-107, MW-113, MW-128, MW-153, MW-154, MW-182, MW-183, MW-184, MW-185, MW-186, MW-187, MW-188 and MW-189). Groundwater samples were collected in order to identify any subsurface contamination of the shallow water table. The groundwater analytical results were compared to background values and USEPA Region 9 tap water PRGs.

A summary of results at or above detection limits are presented in Table LL12-2. All groundwater analytical results are presented in Table L12-3. The locations where groundwater analytes were detected at or above background levels and tap water PRGs are illustrated on figure L12-7. Laboratory analytical reports are provided in Appendix L.

Groundwater analytical results are summarized as follows:

- **Barium** exceeded background in six samples with a **maximum concentration of 490 µg/L.**
- **Cadmium** exceeded background in one sample with a **maximum concentration of 0.31 µg/L.**
- **Calcium** exceeded background in 13 samples with a **maximum concentration of 940000 µg/L.**
- **Cobalt** exceeded background in seven samples with a **maximum concentration of 8.0 µg/L.**
- **Copper** exceeded background in nine samples with a **maximum concentration of 3.4 µg/L.**
- **Iron** exceeded background in 16 samples with a **maximum concentration of 5900 mg/kg.**
- **Magnesium** exceeded background in 16 samples with a **maximum concentration of 270000 mg/kg.**
- **Manganese** exceeded background and the Region 9 tap water PRG in three samples with a **maximum concentration of 1800 mg/kg.**
- **Nickel** exceeded background in 11 samples with a **maximum concentration of 16 mg/kg.**
- **Potassium** exceeded background in 18 samples with a **maximum concentration of 60000 mg/kg.**
- **Selenium** exceeded background in six samples with a **maximum concentration of 10 mg/kg.**
- **Sodium** exceeded background in two samples with a **maximum concentration of 54000 mg/kg.**
- **Zinc** exceeded background in one sample with a **maximum concentration of 69 µg/L.**

- **Arsenic** exceeded the Region 9 tap water PRG in six samples and exceeded background and the Region 9 tap water PRG in 13 samples with a **maximum concentration of 61 mg/kg.**
- **Lead** exceeded background in seven samples with a **maximum concentration of 8.6 mg/kg.**
- **Mercury** exceeded background in four samples with a **maximum concentration of 0.19 mg/kg.**
- **Thallium** exceeded background and the Region 9 tap water PRG in one sample with a **maximum concentration of 2.9 mg/kg.**
- **Benzo(a)anthracene** exceeded the Region 9 tap water PRG in two samples with a **maximum concentration of 0.27 µg/L.**
- **Benzo(a)pyrene** exceeded the Region 9 tap water PRG in two samples with a **maximum concentration of 0.29 J µg/L.** J value indicates an estimated result.
- **Benzo(b)fluoranthene** exceeded the Region 9 tap water PRG in one sample with a **maximum concentration of 0.2 J µg/L.** J value indicates an estimated result.
- **Benzo(g,h,i)perylene** exceeded the laboratory detection limit in two samples with a **maximum concentration of 0.81 J.** J value indicates an estimated result.
- **Bis(2-ethylhexyl)phthalate** exceeded the Region 9 tap water PRG in three samples with a **maximum concentration of 59 µg/L.**
- **Dibenzo(a,h)anthracene** exceeded the Region 9 tap water PRG in two samples with a **maximum concentration of 0.95 J µg/L.** J value indicates an estimated result.
- **Indeno(1,2,3-cd)pyrene** exceeded the Region 9 tap water PRG in two samples with a **maximum concentration of 0.81 µg/L.**
- **2,4,6-TNT** exceeded the Region 9 tap water PRG in one sample with a **maximum concentration of 3.0 µg/L.**
- **2-Amino-4,6-Dinitrotoluene** exceeded the laboratory detection limit in one sample with a **maximum concentration of 2.5 µg/L.**
- **4-Amino-2,6-Dinitrotoluene** exceeded the laboratory detection limit in one sample with a **maximum concentration of 3.2 µg/L.**
- **RDX** exceeded the Region 9 tap water PRG in one sample with a **maximum concentration of 1.5 µg/L.**
- **Nitrocellulose** exceeded the laboratory detection limit in three samples with a **maximum concentration of 9400 µg/L.**
- **Nitrate** exceeded the Region 9 tap water PRG in two samples with a **maximum concentration of 1200000 µg/L.**
- **VOCs, pesticides and PCBs** were below Region 9 tap water PRGs and/or laboratory detection limits.

4.2 IN SITU PERMEABILITY TESTING RESULTS

Following installation of the monitoring wells, a slug test was completed to determine the in-situ permeability of the aquifer underlying the LL12. The following table shows the results of the slug tests performed in January to February 2005.

Hydraulic Conductivity in Load Line 12 Monitoring Wells

Monitoring Well ID	Screened Interval Depth (ft)	Total Borehole Depth (ft)	Geologic Material Adjacent to Screen	Hydraulic conductivity (cm/s)
MW-242	15.5-25.5	26.3	clayey silt w/silty sand interbeds	1.20 E-4
MW-243	13-23	24	clayey silt	8.44 E-5
MW-244	19.5-29.5	30	clayey silt w/silty sand interbeds	9.86 E-5
MW-245	18-28	29	clayey silt	2.42 E-4
MW-246	21.5-31.5	32	clayey silt w/silty sand interbeds	1.05 E-4

Based on the results of the slug tests, hydraulic conductivities have an arithmetic average 1.30×10^{-4} cm/s in the soil underlying LL12. The field measurements and test data are provided in Appendix K along with the calculation worksheets for the tests. Previous slug tests performed at wells located at other AOCs within RVAAP indicate average hydraulic conductivities ranging between 3.87×10^{-2} cm/s and 4.46×10^{-6} cm/s (USACE, 1999).

Data from the three rounds of well gauging were used to produce potentiometric surface maps for LL12 (Figures L12-8 through L12-10). The water level data suggests that groundwater potentiometric surface is dominated by two "highs." One of the potentiometric highs is located in the northwest portion of the load line at L12mw-188 with the potentiometric surface decreasing in elevation both to the north and south. The other potentiometric high is located in the south central portion of the load line at L12mw-088. The southern potentiometric surface high decreases in elevation to the northwest and southeast. Potentiometric surface elevations "lows" are located in the lower east side and upper northwest side. Groundwater flow in the northeast component flows at a gradient of approximately 0.007 ft/ft.

5.0 HUMAN HEALTH AND ECOLOGICAL RISK SCREENING FOR LOAD LINE 12

Due to the previous completion of Phase I and II RIs at LL12, Human Health and Ecological Risk Screenings were not included in the SOW for this AOC. Groundwater was the only media sampled during the characterization.

6.0 SUMMARY AND CONCLUSION FOR THE CHARACTERIZATION OF LOAD LINE 12

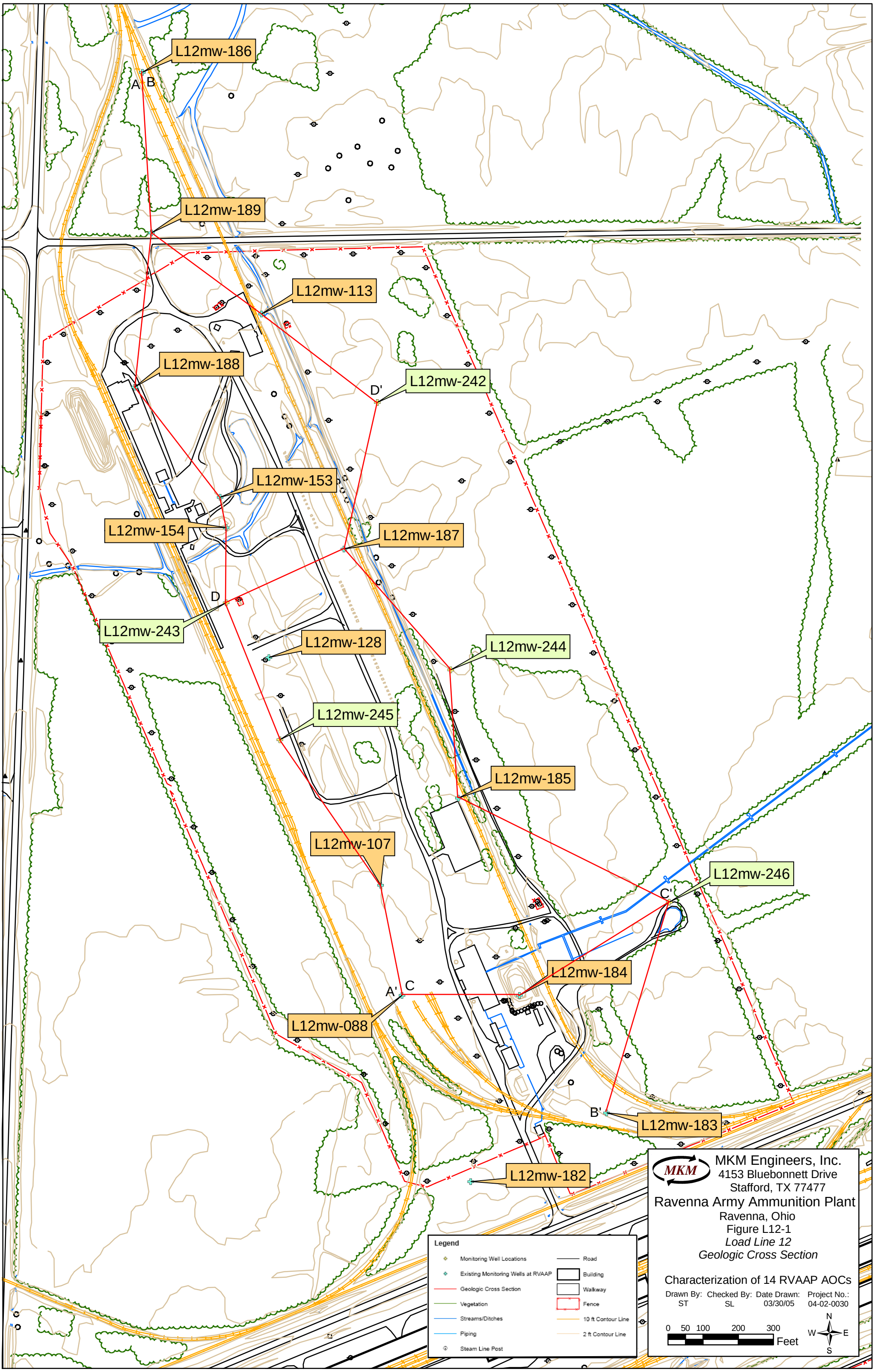
This section briefly summarizes the existing conditions that were found during the AOC characterization at LL12. The 2005 Performance Based Contract addresses the groundwater risk in all of the high risk sites (including LL12).

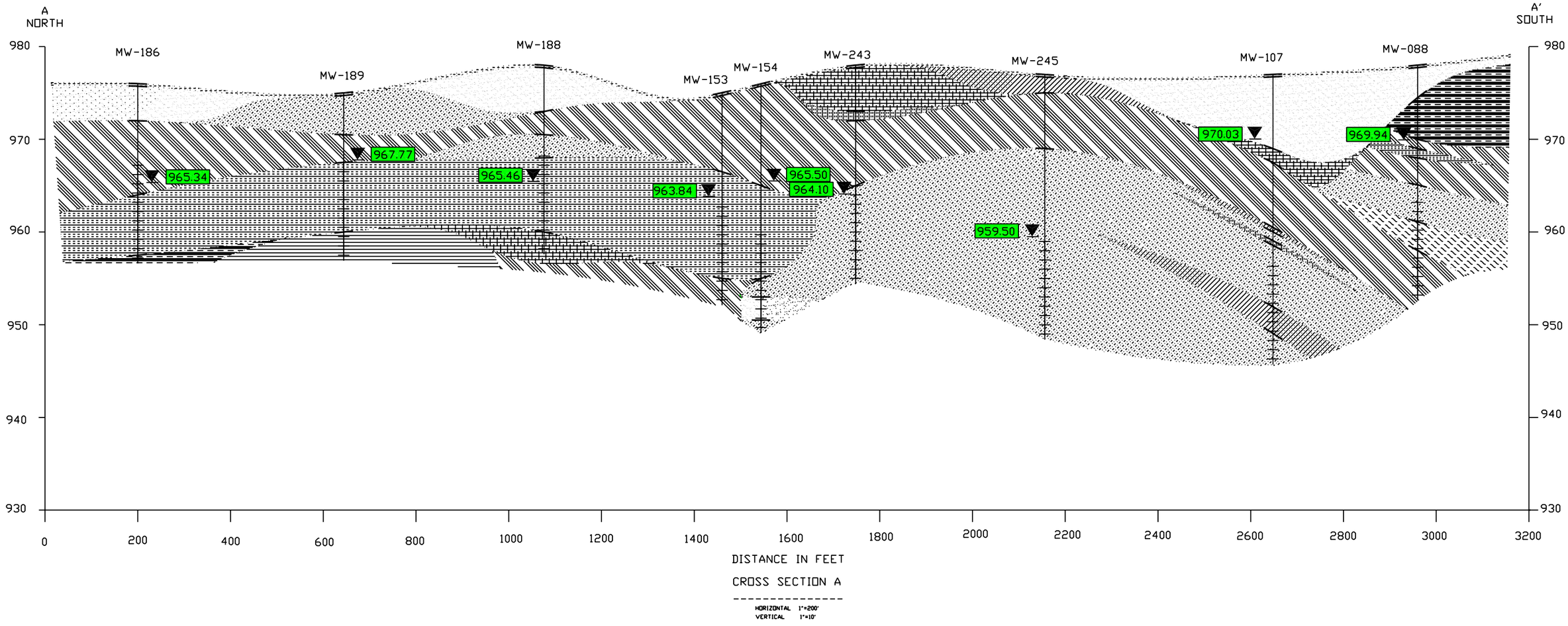
6.1 NATURE OF CONTAMINATION

This characterization examined the nature of contamination in groundwater. Contaminants were detected above screening criteria in all the groundwater samples. Very few constituents other than inorganics were detected above screening criteria in the groundwater samples collected. Most of the organic compounds that were detected were found in very few samples. For example, two explosive compounds were detected above screening criteria in only one sample location, nitrate in two sample locations and SVOCs in five sample locations.

Two explosive compounds were found at location MW-243. RDX was found with a concentration of 1.5 µg/L and 2,4,6-TNT was found with a concentration of 3 µg/L. A high concentration of nitrate (PRG=10000 µg/L) was observed at locations MW-185 with a concentration of 16000 µg/L and MW-187 with a concentration of 20000 µg/L. Only one SVOC Bis(2-ethylhexyl)phthalate (PRG=4.8 µg/L) was detected above the screening level with a value of 59 ug/L at sample location MW-187. An elevated concentration of manganese (PRG=876 µg/L and BKG=1020 µg/L) was detected at locations MW-113 with a concentration of 1400 µg/L, MW-185 with a concentration of 1700 µg/L and MW-187 with a concentration of 1800 µg/L.

Contaminants detected in groundwater above RVAAP background and/or PRG screening values included metals, SVOCs, nitrate, and two explosive compounds (2,4,6-TNT and RDX).


L12mw-186
A
B
L12mw-189
L12mw-113
L12mw-188
D'
L12mw-242
L12mw-153
L12mw-154
L12mw-187
D
L12mw-243
L12mw-128
L12mw-244
L12mw-245
L12mw-185
L12mw-107
L12mw-246
C'
L12mw-184
A'
C
L12mw-088
B'
L12mw-183
L12mw-182
Legend
Monitoring Well Locations
Existing Monitoring Wells at RVAAP
Geologic Cross Section
Vegetation
Streams/Ditches
Piping
Steam Line Post
Road
Building
Walkway
Fence
10 ft Contour Line
2 ft Contour Line
MKM
MKM Engineers, Inc.
4153 Bluebonnet Drive
Stafford, TX 77477
Ravenna Army Ammunition Plant
Ravenna, Ohio
Figure L12-1
Load Line 12
Geologic Cross Section
Characterization of 14 RVAAP AOCs
Drawn By: ST
Checked By: SL
Date Drawn: 03/30/05
Project No.: 04-02-0030
0 50 100 200 300
Feet
N
W
E
S



VERTICAL EXAGGERATION = 10X

LEGEND

- TOP SOIL
- SAND STONE
- SAND & GRAVEL
- CLAYEY SAND
- SAND
- 1140.64 GROUNDWATER ELEVATION (ft)
- SILTY SAND
- CLAYEY SILT
- SILT
- CLAY
- SCREEN INTERVAL
- KNOWN SUBSURFACE SOIL CONDITIONS
- SANDY SILT
- SILTY CLAY
- SANDY CLAY
- SHALE
- DEPTH GROUNDWATER ENCOUNTERED
- EXPECTED SUBSURFACE SOIL CONDITIONS

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
			05/25/06	MS

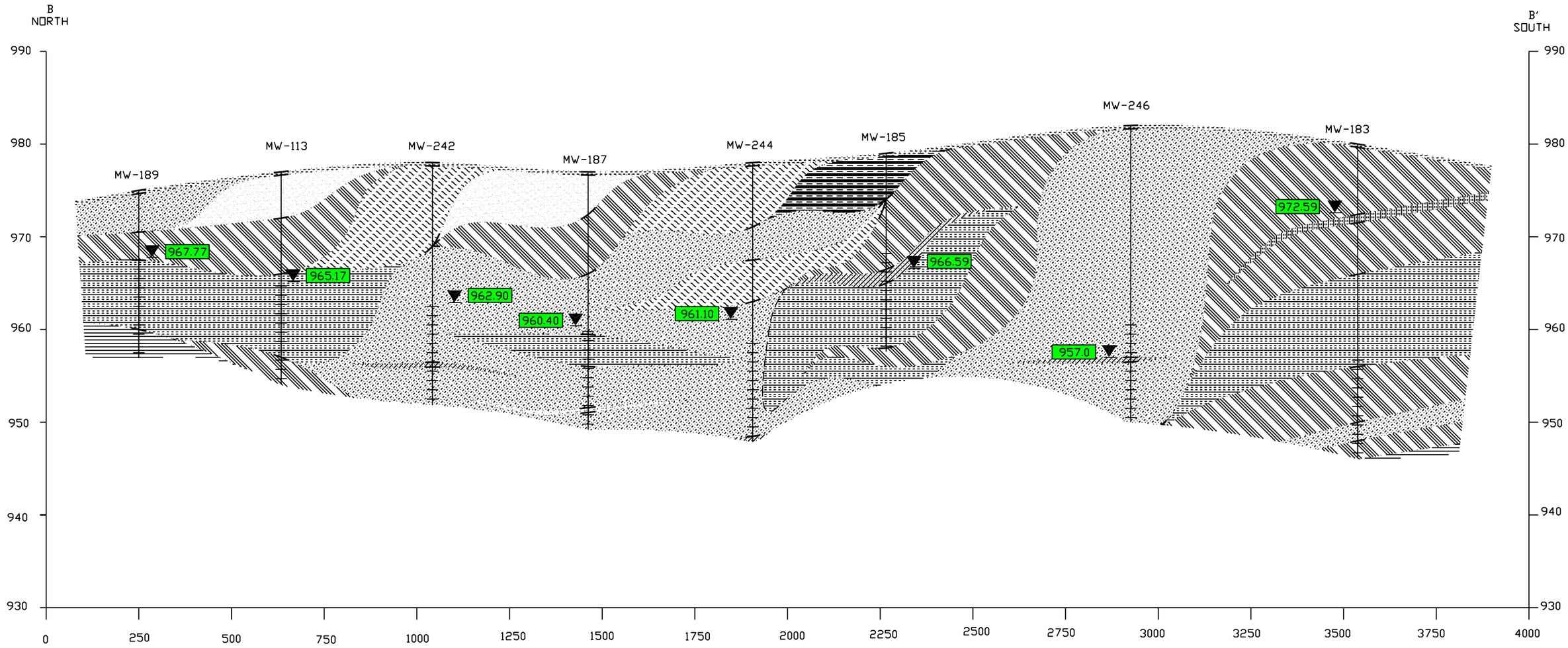
MKM ENGINEERS, INC.

DATE DRAWN 03/18/05

FIGURE LL12-2
LOAD LINE 12 GEOLOGIC CROSS SECTION
GEOLOGIC CROSS SECTION A
RAVENNA ARMY AMMUNITION PLANT, RAVENNA OHIO

SIZE	PROJECT NO.	DWG NO.	REV
D		LL12-2	

DRAWN BY	ST	APPR. BY	SRL



CROSS SECTION B

HORIZONTAL 1"=250'
VERTICAL 1"=10'

VERTICAL EXAGGERATION = 10X

LEGEND

- TOP SOIL
- SAND STONE
- SAND & GRAVEL
- CLAYEY SAND
- SAND
- 1140.64 GROUNDWATER ELEVATION (ft)
- SILTY SAND
- CLAYEY SILT
- SILT
- CLAY
- SCREEN INTERVAL
- KNOWN SUBSURFACE SOIL CONDITIONS
- SANDY SILT
- SILTY CLAY
- SANDY CLAY
- SHALE
- DEPTH GROUNDWATER ENCOUNTERED
- EXPECTED SUBSURFACE SOIL CONDITIONS

REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVED
			05/25/06	MS

MKM ENGINEERS, INC.

DATE DRAWN 03/18/05

FIGURE LL12-3
LOAD LINE 12 GEOLOGIC CROSS SECTION
GEOLOGIC CROSS SECTION B
RAVENNA ARMY AMMUNITION PLANT, RAVENNA OHIO

SIZE	PROJECT NO.	DWG NO.	REV
D		LL12-3	

DRAWN BY	ST	APPR. BY	SRL

C
WEST

C'
EAST

MW-088

MW-184

MW-246

969.94

969.46

957.0

990
980
970
960
950
940
930

ELEVATION IN FEET
(ABOVE MEAN SEA LEVEL)

0
100
200
300
400
500
600
700
800
900
1000
1100
1200

DISTANCE IN FEET

CROSS SECTION C

HORIZONTAL 1"=100'
VERTICAL 1"=10'

VERTICAL EXAGGERATION = 10X

LEGEND

- TOP SOIL
- SAND STONE
- SAND & GRAVEL
- CLAYEY SAND
- SAND
- 1140.64 GROUNDWATER ELEVATION (ft)
- SILTY SAND
- CLAYEY SILT
- SILT
- CLAY
- SCREEN INTERVAL
- KNOWN SUBSURFACE SOIL CONDITIONS
- SANDY SILT
- SILTY CLAY
- SANDY CLAY
- SHALE
- DEPTH GROUNDWATER ENCOUNTERED
- EXPECTED SUBSURFACE SOIL CONDITIONS

REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVED
			05/25/06	MS

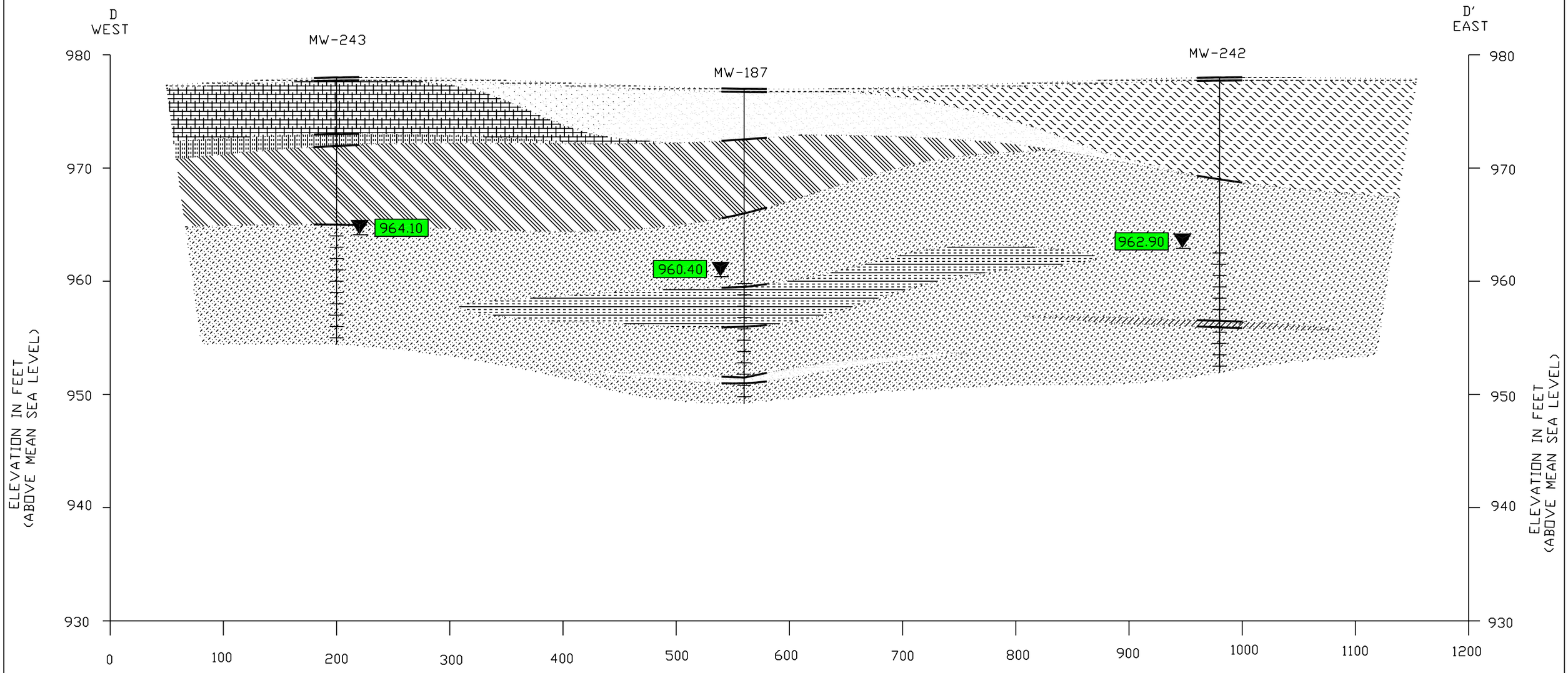
MKM ENGINEERS, INC.

DATE DRAWN 03/18/05

FIGURE LL12-4
LOAD LINE 12 GEOLOGIC CROSS SECTION
GEOLOGIC CROSS SECTION C
RAVENNA ARMY AMMUNITION PLANT, RAVENNA OHIO

SIZE	PROJECT NO.	DWG NO.	REV
D		LL12-4	

DRAWN BY	ST	APPR. BY	SRL



LEGEND

- TOP SOIL
- SAND STONE
- SAND & GRAVEL
- CLAYEY SAND
- SAND
- 1140.64 GROUNDWATER ELEVATION (ft)
- SILTY SAND
- CLAYEY SILT
- SILT
- CLAY
- SCREEN INTERVAL
- KNOWN SUBSURFACE SOIL CONDITIONS
- SANDY SILT
- SILTY CLAY
- SANDY CLAY
- SHALE
- DEPTH GROUNDWATER ENCOUNTERED
- EXPECTED SUBSURFACE SOIL CONDITIONS

REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVED
			05/25/06	MS

MKM ENGINEERS, INC.

DATE DRAWN 03/18/05

FIGURE LL12-5
LOAD LINE 12 GEOLOGIC CROSS SECTION
GEOLOGIC CROSS SECTION D
RAVENNA ARMY AMMUNITION PLANT, RAVENNA OHIO

SIZE	PROJECT NO.	DWG NO.	REV
D		LL12-5	

DRAWN BY	ST	APPR. BY	SRL

L12mw-186
L12mw-189
L12mw-113
L12mw-188
L12mw-242
L12mw-153
L12mw-154
L12mw-187
L12mw-243
L12mw-128
L12mw-244
L12mw-245
L12mw-185
L12mw-107
L12mw-246
L12mw-184
L12mw-088
L12mw-183
L12mw-182

Legend

- Monitoring Well Locations
- Existing Monitoring Wells at RVAAP
- Vegetation
- Streams/Ditches
- Piping
- Steam Line Post
- Road
- Building
- Walkway
- Fence
- 10 ft Contour Line
- 2 ft Contour Line

MKM Engineers, Inc.
4153 Bluebonnet Drive
Stafford, TX 77477

Ravenna Army Ammunition Plant

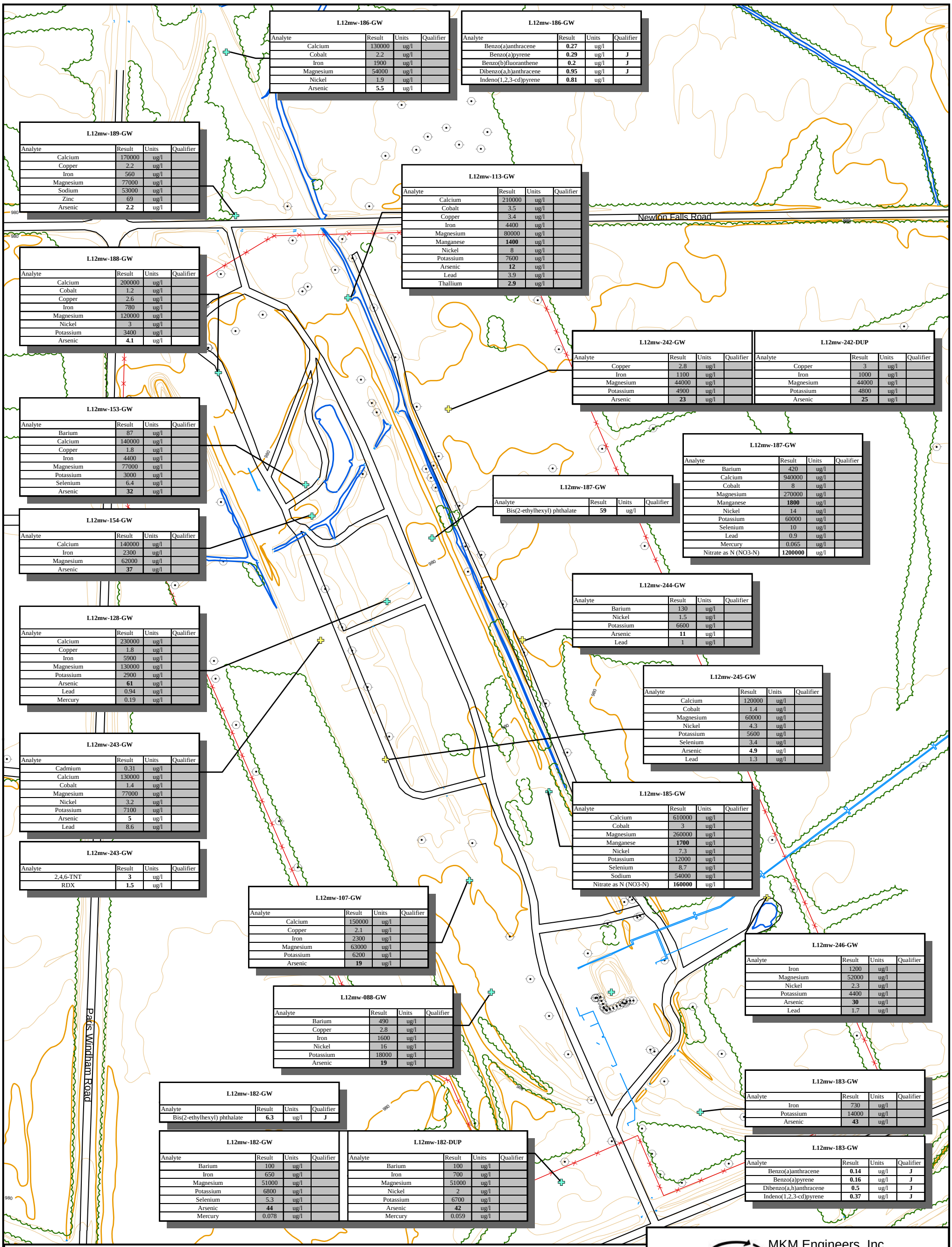
Ravenna, Ohio
Figure L12-6
Load Line 12
Monotoring Well Locations

Characterization of 14 RVAAP AOCs

Drawn By:	Checked By:	Date Drawn:	Project No.:
ST	SL	03/30/05	04-02-0030

0 50 100 200 300 Feet

N
W E
S



L12mw-186-GW

Analyte	Result	Units	Qualifier
Calcium	130000	ug/l	
Cobalt	2.2	ug/l	
Iron	1900	ug/l	
Magnesium	54000	ug/l	
Nickel	1.9	ug/l	
Arsenic	**5.5**	ug/l	

L12mw-186-GW

Analyte	Result	Units	Qualifier
Benzo(a)anthracene	**0.27**	ug/l	
Benzo(a)pyrene	**0.29**	ug/l	**J**
Benzo(b)fluoranthene	**0.2**	ug/l	**J**
Dibenzo(a,h)anthracene	**0.95**	ug/l	**J**
Indeno(1,2,3-cd)pyrene	**0.81**	ug/l	

L12mw-189-GW

Analyte	Result	Units	Qualifier
Calcium	170000	ug/l	
Copper	2.2	ug/l	
Iron	560	ug/l	
Magnesium	77000	ug/l	
Sodium	53000	ug/l	
Zinc	69	ug/l	
Arsenic	**2.2**	ug/l	

L12mw-113-GW

Analyte	Result	Units	Qualifier
Calcium	210000	ug/l	
Cobalt	3.5	ug/l	
Copper	3.4	ug/l	
Iron	4400	ug/l	
Magnesium	80000	ug/l	
Manganese	**1400**	ug/l	
Nickel	8	ug/l	
Potassium	7600	ug/l	
Arsenic	**12**	ug/l	
Lead	3.9	ug/l	
Thallium	**2.9**	ug/l	

L12mw-188-GW

Analyte	Result	Units	Qualifier
Calcium	200000	ug/l	
Cobalt	1.2	ug/l	
Copper	2.6	ug/l	
Iron	780	ug/l	
Magnesium	120000	ug/l	
Nickel	3	ug/l	
Potassium	3400	ug/l	
Arsenic	**4.1**	ug/l	

L12mw-242-GW

Analyte	Result	Units	Qualifier
Copper	2.8	ug/l	
Iron	1100	ug/l	
Magnesium	44000	ug/l	
Potassium	4900	ug/l	
Arsenic	**23**	ug/l	

L12mw-242-DUP

Analyte	Result	Units	Qualifier
Copper	3	ug/l	
Iron	1000	ug/l	
Magnesium	44000	ug/l	
Potassium	4800	ug/l	
Arsenic	**25**	ug/l	

L12mw-153-GW

Analyte	Result	Units	Qualifier
Barium	87	ug/l	
Calcium	140000	ug/l	
Copper	1.8	ug/l	
Iron	4400	ug/l	
Magnesium	77000	ug/l	
Potassium	3000	ug/l	
Selenium	6.4	ug/l	
Arsenic	**32**	ug/l	

L12mw-187-GW

Analyte	Result	Units	Qualifier
Bis(2-ethylhexyl) phthalate	**59**	ug/l	

L12mw-187-GW

Analyte	Result	Units	Qualifier
Barium	420	ug/l	
Calcium	940000	ug/l	
Cobalt	8	ug/l	
Magnesium	270000	ug/l	
Manganese	**1800**	ug/l	
Nickel	14	ug/l	
Potassium	60000	ug/l	
Selenium	10	ug/l	
Lead	0.9	ug/l	
Mercury	0.065	ug/l	
Nitrate as N (NO3-N)	**1200000**	ug/l	

L12mw-154-GW

Analyte	Result	Units	Qualifier
Calcium	140000	ug/l	
Iron	2300	ug/l	
Magnesium	62000	ug/l	
Arsenic	**37**	ug/l	

L12mw-244-GW

Analyte	Result	Units	Qualifier
Barium	130	ug/l	
Nickel	1.5	ug/l	
Potassium	6600	ug/l	
Arsenic	**11**	ug/l	
Lead	1	ug/l	

L12mw-128-GW

Analyte	Result	Units	Qualifier
Calcium	230000	ug/l	
Copper	1.8	ug/l	
Iron	5900	ug/l	
Magnesium	130000	ug/l	
Potassium	2900	ug/l	
Arsenic	**61**	ug/l	
Lead	0.94	ug/l	
Mercury	0.19	ug/l	

L12mw-245-GW

Analyte	Result	Units	Qualifier
Calcium	120000	ug/l	
Cobalt	1.4	ug/l	
Magnesium	60000	ug/l	
Nickel	4.3	ug/l	
Potassium	5600	ug/l	
Selenium	3.4	ug/l	
Arsenic	**4.9**	ug/l	
Lead	1.3	ug/l	

L12mw-243-GW

Analyte	Result	Units	Qualifier
Cadmium	0.31	ug/l	
Calcium	130000	ug/l	
Cobalt	1.4	ug/l	
Magnesium	77000	ug/l	
Nickel	3.2	ug/l	
Potassium	7100	ug/l	
Arsenic	**5**	ug/l	
Lead	8.6	ug/l	

L12mw-185-GW

Analyte	Result	Units	Qualifier
Calcium	610000	ug/l	
Cobalt	3	ug/l	
Magnesium	260000	ug/l	
Manganese	**1700**	ug/l	
Nickel	7.3	ug/l	
Potassium	12000	ug/l	
Selenium	8.7	ug/l	
Sodium	54000	ug/l	
Nitrate as N (NO3-N)	**160000**	ug/l	

L12mw-243-GW

Analyte	Result	Units	Qualifier
2,4,6-TNT	**3**	ug/l	
RDX	**1.5**	ug/l	

L12mw-107-GW

Analyte	Result	Units	Qualifier
Calcium	150000	ug/l	
Copper	2.1	ug/l	
Iron	2300	ug/l	
Magnesium	63000	ug/l	
Potassium	6200	ug/l	
Arsenic	**19**	ug/l	

L12mw-246-GW

Analyte	Result	Units	Qualifier
Iron	1200	ug/l	
Magnesium	52000	ug/l	
Nickel	2.3	ug/l	
Potassium	4400	ug/l	
Arsenic	**30**	ug/l	
Lead	1.7	ug/l	

L12mw-088-GW

Analyte	Result	Units	Qualifier
Barium	490	ug/l	
Copper	2.8	ug/l	
Iron	1600	ug/l	
Nickel	16	ug/l	
Potassium	18000	ug/l	
Arsenic	**19**	ug/l	

L12mw-183-GW

Analyte	Result	Units	Qualifier
Iron	730	ug/l	
Potassium	14000	ug/l	
Arsenic	**43**	ug/l	

L12mw-182-GW

Analyte	Result	Units	Qualifier
Bis(2-ethylhexyl) phthalate	**6.3**	ug/l	**J**

L12mw-183-GW

Analyte	Result	Units	Qualifier
Benzo(a)anthracene	**0.14**	ug/l	**J**
Benzo(a)pyrene	**0.16**	ug/l	**J**
Dibenzo(a,h)anthracene	**0.5**	ug/l	**J**
Indeno(1,2,3-cd)pyrene	**0.37**	ug/l	**J**

L12mw-182-GW

Analyte	Result	Units	Qualifier
Barium	100	ug/l	
Iron	650	ug/l	
Magnesium	51000	ug/l	
Potassium	6800	ug/l	
Selenium	5.3	ug/l	
Arsenic	**44**	ug/l	
Mercury	0.078	ug/l	

L12mw-182-DUP

Analyte	Result	Units	Qualifier
Barium	100	ug/l	
Iron	700	ug/l	
Magnesium	51000	ug/l	
Nickel	2	ug/l	
Potassium	6700	ug/l	
Arsenic	**42**	ug/l	
Mercury	0.059	ug/l	

Legend

- Vegetation
- Road
- Steam Line Post
- Fence
- Streams / Ditches
- 10 ft Contour Lines
- Monitoring Well Locations
- Piping
- 2 ft Contour Lines
- Existing Monitoring Well Locations

Notes:

J - estimated value
If Result = or > Background, then the value is presented with a shaded/highlighted style
If Result = or > Background & PRG, then result is presented with a bold + shaded/highlighted style.
If Result = or > PRG, then the value is presented with a bold style.
Result < PRG & Background, then the value is presented with a normal style.
Ug/L - Micrograms per Liter (parts per billion - ppb)

MKM Engineers, Inc.
4153 Bluebonnett Drive
Stafford, TX 77477

Ravenna Army Ammunition Plant

Ravenna, Ohio

Figure L12-7

Load Line 12

Monitoring Well Exceedences

Drawn By:	Checked By:	Date Drawn:	Project No.:
R. Haverkos	MGS	15 July 06	04-02-0030

0 100 200 400 Feet

N W E S

L12mw-186
973.12

L12mw-189
974.81

L12mw-113
975.28

L12mw-188
976.57

L12mw-242
974.36

L12mw-153
973.21

L12mw-187
972.95

L12mw-154
972.43

L12mw-244
973.10

L12mw-128
NA

L12mw-243
969.57

L12mw-245
972.95

L12mw-185
975.09

L12mw-107
973.07

L12mw-246
971.24

L12mw-184
972.92

L12mw-088
974.86

L12mw-183
973.11

L12mw-182
NA

973 973 974 975 975 974 974 973 972 971 970 970 971 972 975 975 974 973 972 973 974 974 972 973

980

Legend

- Monitoring Well Locations
- Existing Monitoring Wells at RVAAP
- Potentiometric Surface
- Potentiometric Surface (Inferred)
- Direction of GW Flow
- Streams/Ditches
- Piping
- Vegetation
- Steam Line Post
- Road
- Building
- Walkway
- Fence
- 10 ft Contour Line
- 2 ft Contour Line

Mapping Provided By: ARCADIS

MKM Engineers, Inc.
4153 Bluebonnett Drive
Stafford, TX 77477

Ravenna Army Ammunition Plant

Ravenna, Ohio

Figure L12-8

Load Line 12

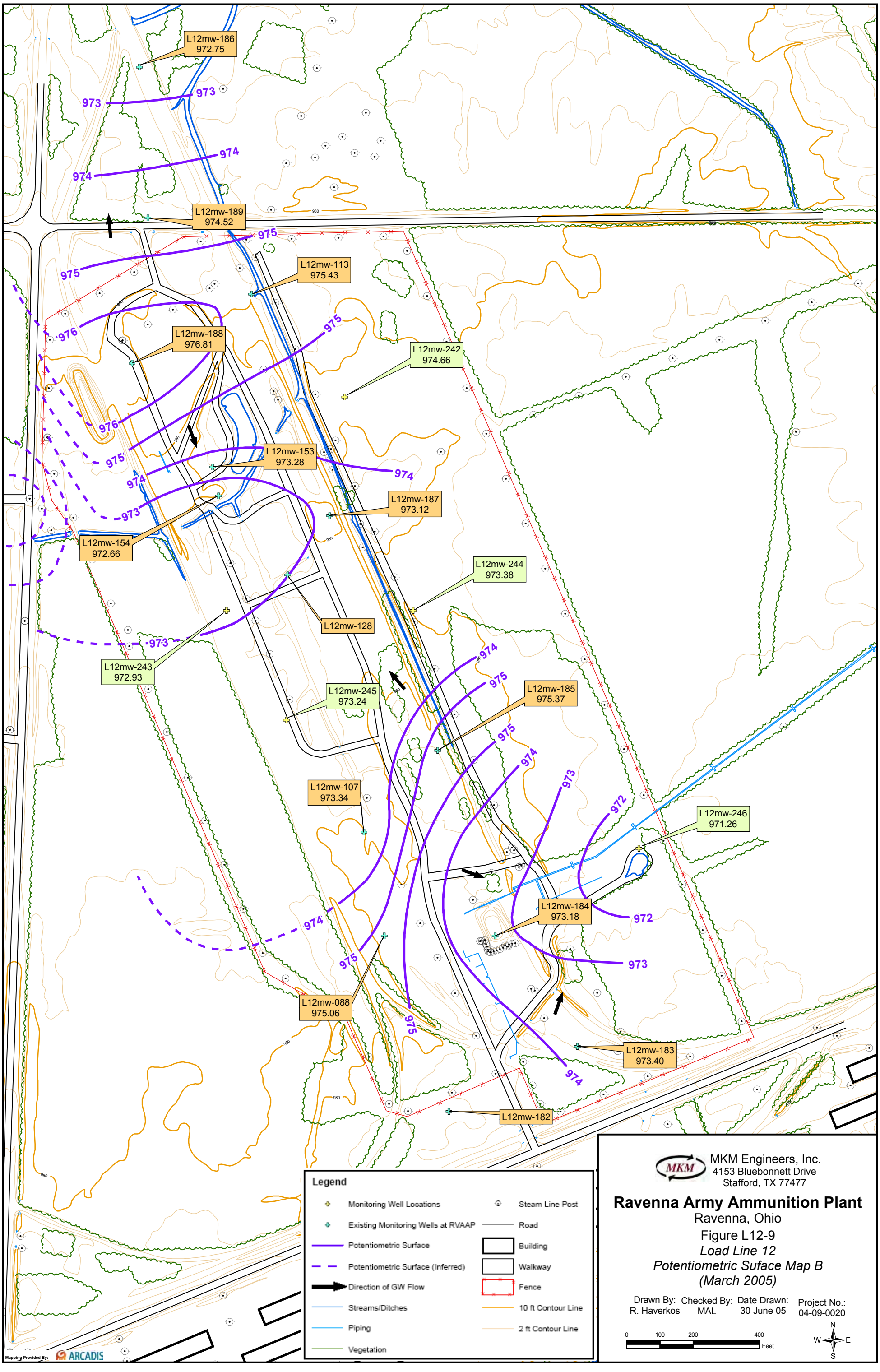
Potentiometric Suface Map A

(February 2005)

Drawn By:	Checked By:	Date Drawn:	Project No.:
R. Haverkos	MAL	30 June 05	04-09-0020

0 100 200 400 Feet

N W E S


L12mw-186
972.75
L12mw-189
974.52
L12mw-113
975.43
L12mw-188
976.81
L12mw-242
974.66
L12mw-153
973.28
L12mw-187
973.12
L12mw-154
972.66
L12mw-244
973.38
L12mw-128
L12mw-243
972.93
L12mw-245
973.24
L12mw-185
975.37
L12mw-107
973.34
L12mw-246
971.26
L12mw-184
973.18
L12mw-088
975.06
L12mw-183
973.40
L12mw-182
973
974
975
976
972
980
Legend
Monitoring Well Locations
Existing Monitoring Wells at RVAAP
Potentiometric Surface
Potentiometric Surface (Inferred)
Direction of GW Flow
Streams/Ditches
Piping
Vegetation
Steam Line Post
Road
Building
Walkway
Fence
10 ft Contour Line
2 ft Contour Line
Mapping Provided By:
ARCADIS
MKM
MKM Engineers, Inc.
4153 Bluebonnett Drive
Stafford, TX 77477
Ravenna Army Ammunition Plant
Ravenna, Ohio
Figure L12-9
Load Line 12
Potentiometric Suface Map B
(March 2005)
Drawn By: R. Haverkos
Checked By: MAL
Date Drawn: 30 June 05
Project No.: 04-09-0020
0
100
200
400
Feet
N
W
E
S

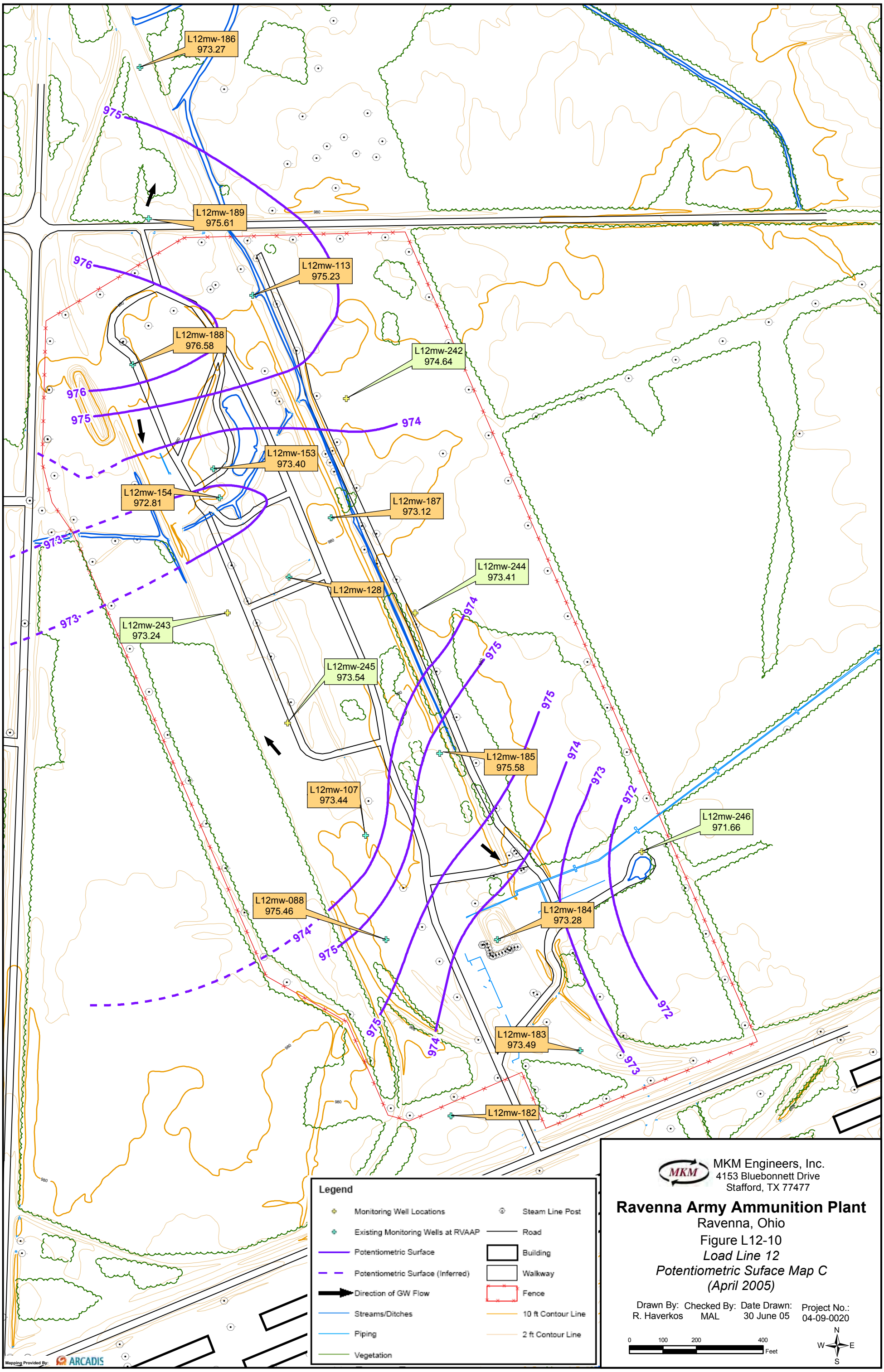

L12mw-186
973.27
L12mw-189
975.61
L12mw-113
975.23
L12mw-188
976.58
L12mw-242
974.64
L12mw-153
973.40
L12mw-154
972.81
L12mw-187
973.12
L12mw-244
973.41
L12mw-128
L12mw-243
973.24
L12mw-245
973.54
L12mw-185
975.58
L12mw-107
973.44
L12mw-246
971.66
L12mw-088
975.46
L12mw-184
973.28
L12mw-183
973.49
L12mw-182
975
976
974
973
972
980
Legend
Monitoring Well Locations
Existing Monitoring Wells at RVAAP
Potentiometric Surface
Potentiometric Surface (Inferred)
Direction of GW Flow
Streams/Ditches
Piping
Vegetation
Steam Line Post
Road
Building
Walkway
Fence
10 ft Contour Line
2 ft Contour Line
Mapping Provided By:
ARCADIS
MKM Engineers, Inc.
4153 Bluebonnett Drive
Stafford, TX 77477
Ravenna Army Ammunition Plant
Ravenna, Ohio
Figure L12-10
Load Line 12
Potentiometric Suface Map C
(April 2005)
Drawn By:
R. Haverkos
Checked By:
MAL
Date Drawn:
30 June 05
Project No.:
04-09-0020
0
100
200
400
Feet
N
W
E
S

Table L12-1
Load Line 12 Summary of Sampling and Analysis
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

SAMPLE PREFIX		VOC	SVOC	Explosives	Propellants	TAL Metals	Chrome +6	Pesticides	PCB	Cyanides	Nitrate	TOC	Geo-Tech	Grain	FIELD QA/QC SAMPLES				
L12	SAMPLE ID	8260B	8270C	8330	3532/8330	6010/7000	7196A	8081A	8082B	9010A/9012A	EPA 353.2	EPA 415.1	Analysis (Various)	Size ASTM D422	Multi-Incremental QA	Duplicate Sample	Equipment Blank	Trip Blank	MS/MSD	USACE Split
GROUNDWATER	MW-242	1	1	1	1	1		1	1		1		2	2		1			1	1
Newly Installed Wells	MW-243	1	1	1	1	1		1	1		1									
	MW-244	1	1	1	1	1		1	1		1		1	1						
	MW-245	1	1	1	1	1		1	1		1									
	MW-246	1	1	1	1	1		1	1		1									
		5	5	5	5	5	0	5	5	0	5	0	3	3	0	1	0	0	1	1
GROUNDWATER	L12MW-088	1	1	1	1	1		1	1		1									
Existing Wells	L12MW-107	1	1	1	1	1		1	1		1									
	L12MW-113	1	1	1	1	1		1	1		1									
	L12MW-128	1	1	1	1	1		1	1		1					NT				
	L12MW-153	1	1	1	1	1		1	1		1									
	L12MW-154	1	1	1	1	1		1	1		1									
	L12MW-182	1	1	1	1	1		1	1		1					1				1
	L12MW-183	1	1	1	1	1		1	1		1									
	L12MW-184	1	1	1	1	1		1	1		1									
	L12MW-185	1	1	1	1	1		1	1		1									
	L12MW-186	1	1	1	1	1		1	1		1									
	L12MW-187	1	1	1	1	1		1	1		1									
	L12MW-188	1	1	1	1	1		1	1		1									
	L12MW-189	1	1	1	1	1		1	1		1									
		14	14	14	14	14	0	14	14	0	14	0	0	0	0	1	0	0	0	1

Notes:

Blank cell indicates that either the sample was not analyzed for that compound and/or the sample did not have a QC or Split sample associated with the regular sample.

Geo-tech analysis consists of Moisture Content (ASTM D2216), Atterburg Limits (ASTM D4318), UCS (ASTM D2487), pH (EPA 150 1) & Specific Gravity (ASTM D854)

Grainsize and TOC are taken at "all major drainageway" sediments

All shelby tubes taken during MW installatinons will have full geo-tech and grainsize analyses

Table L12-2
Load Line 12 Summary of Groundwater Detections
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						L12mw-088-GW	L12mw-107-GW	L12mw-113-GW	L12mw-128-GW	L12mw-153-GW	L12mw-154-GW	L12mw-182-DUP	L12mw-182-GW	L12mw-183-GW	L12mw-184-GW	L12mw-185-GW	L12mw-186-GW	L12mw-187-GW	L12mw-188-GW
					Sample Date:	10/26/2004	10/27/2004	11/5/2004	10/27/2004	10/28/2004	10/28/2004	10/29/2004	10/29/2004	11/1/2004	10/29/2004	11/1/2004	11/1/2004	10/29/2004	10/28/2004
					Sample Depth:	17.5 ft.	21.5 ft.	12.5 ft.	23 ft.	13 ft.	24 ft.	30 ft.	30 ft.	24 ft.	19 ft.	17.5 ft.	11 ft.	9.82 ft.	13 ft
					Description	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)		Unconsolidated Filtered Groundwater Background	Units														
Metals	6010B	Aluminum	36499	nc	--	ug/l	130	61	1400	45	26	31						78		
	6010B	Barium	2555	nc	82.1	ug/l	490	32	44	64	87	64	100	100	64	18	60	42	420	46
	6010B	Cadmium	18	nc	0.00	ug/l														
	6010B	Calcium	--[n]		115000	ug/l	86000	150000	210000	230000	140000	140000	76000	76000	81000	220000	610000	130000	940000	200000
	6010B	Chromium	109	nc	7.3	ug/l	2	2.4	2.4			2								
	6010B	Cobalt	730	nc	0.00	ug/l			3.5								3	2.2	8	1.2
	6010B	Copper	1460	nc	0.00	ug/l	2.8	2.1	3.4	1.8	1.8									2.6
	6010B	Iron	10950	nc	279	ug/l	1600	2300	4400	5900	4400	2300	700	650	730	2600		1900		780
	6010B	Magnesium	--[n]		43300	ug/l	25000	63000	80000	130000	77000	62000	51000	51000	39000	150000	260000	54000	270000	120000
	6010B	Manganese	876	nc	1020	ug/l	150	180	**1400**	200	200	74	43	43	56	550	**1700**	320	**1800**	770
	6010B	Nickel	730	nc	0.00	ug/l	16		8				2				7.3	1.9	14	3
	6010B	Potassium	--[n]		2890	ug/l	18000	6200	7600	2900	3000	2800	6700	6800	14000	5900	12000	2000	60000	3400
	6010B	Selenium	182	nc	0.00	ug/l					6.4			5.3		5.9	8.7		10	
	6010B	Sodium	--[n]		45700	ug/l	19000	18000	27000	26000	25000	23000	25000	24000	30000	40000	54000	15000	35000	35000
	6010B	Zinc	10950	nc	60.9	ug/l			20		30					17	21	15	19	
	7060A	Arsenic	0.045	ca	11.7	ug/l	**19**	**19**	**12**	**61**	**32**	**37**	**42**	**44**	**43**	**19**		**5.5**		**4.1**
	7421	Lead	15	mcl	0.00	ug/l			3.9	0.94									0.9	
	7470A	Mercury	11	nc	0.00	ug/l				0.19			0.059	0.078					0.065	
	7841	Thallium	2.4	nc	0.00	ug/l			**2.9**											
VOCs	8260B	2-Butanone	6968	nc	--	ug/l	8.3 J													
	8260B	4-Methyl-2-pentanone	1993	nc	--	ug/l	8.3 J													
	8260B	Acetone	5475	nc	--	ug/l	74													
	8260B	Methylene chloride	4.3	ca	--	ug/l						1.1 J								
SVOCs	8270C	4-Methylphenol	182	nc	--	ug/l	2.9													
	8270C	Benzo(a)anthracene	0.092	ca	--	ug/l									**0.14 J**			**0.27**		
	8270C	Benzo(a)pyrene	0.0092	ca	--	ug/l									**0.16 J**			**0.29 J**		
	8270C	Benzo(b)fluoranthene	0.092	ca	--	ug/l												**0.2 J**		
	8270C	Benzo(g,h,i)perylene	--		--	ug/l									0.34 J			0.81 J		
	8270C	Benzo(k)fluoranthene	0.92	ca	--	ug/l									0.12 J			0.24 J		
	8270C	Benzoic acid	145979	nc	--	ug/l	15 J													
	8270C	Bis(2-ethylhexyl) phthalate	4.8	ca	--	ug/l								**6.3 J**		**5 J**			**59**	
	8270C	Chrysene	9.2	ca	--	ug/l									0.15 J			0.25 J		
	8270C	Dibenzo(a,h)anthracene	0.0092	ca	--	ug/l									**0.5 J**			**0.95 J**		
	8270C	Indeno(1,2,3-cd)pyrene	0.092	ca	--	ug/l									**0.37 J**			**0.81**		
	8270C	Phenol	10950	nc	--	ug/l	25						11	9.4		2.9 J			2.4 J	
	8270C	Pyrene	182	nc	--	ug/l												0.13 J		
Explosives	8330	2,4,6-TNT	2.2	ca	--	ug/l														
	8330	2-Amino-4,6-Dinitrotoluene	--		--	ug/l														
	8330	4-Amino-2,6-Dinitrotoluene	--		--	ug/l														
	8330	HMX	1825	nc	--	ug/l														
	8330	RDX	0.61	ca	--	ug/l														

Table L12-2
Load Line 12 Summary of Groundwater Detections
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						L12mw-088-GW	L12mw-107-GW	L12mw-113-GW	L12mw-128-GW	L12mw-153-GW	L12mw-154-GW	L12mw-182-DUP	L12mw-182-GW	L12mw-183-GW	L12mw-184-GW	L12mw-185-GW	L12mw-186-GW	L12mw-187-GW	L12mw-188-GW
					Sample Date:	10/26/2004	10/27/2004	11/5/2004	10/27/2004	10/28/2004	10/28/2004	10/29/2004	10/29/2004	11/1/2004	10/29/2004	11/1/2004	11/1/2004	10/29/2004	10/28/2004
					Sample Depth:	17.5 ft.	21.5 ft.	12.5 ft.	23 ft.	13 ft.	24 ft.	30 ft.	30 ft.	24 ft.	19 ft.	17.5 ft.	11 ft.	9.82 ft.	13 ft
					Description	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)		Unconsolidated Filtered Groundwater Background	Units													
Propellants	353.2 Modified	Nitrocellulose	--		--	ug/l									180	300		9400	
	8332	Nitroglycerine	4.8	ca	--	ug/l													
Other Analytes	353.2	Nitrate as N (NO3-N)	10000	nc	--	ug/l		570	510					270	200	**160000**		**1200000**	

Notes:
-- - no background/PRG value is available for this analyte
blank cells indicate that the analyte was a non-detect (with a "U" qualifier) or analysis was not performed
UC/Filtered – GW sample was filtered for metals and taken from an unconsolidated MW
C/Filtered – GW sample was filtered for metals and taken from a consolidated (bedrock) MW
ug/l - means micrograms per Liter (parts per billion - ppb)
PRG - preliminary remediation goals (The screeing value for lead is the Maximum Contaminant level (MCL) from the safe Drinking Water Act)
nc - non-cancer basis
ca - cancer basis
pbk - based on PBK modeling
mcl - based on CWA maximum contaminant level
max - ceiling limit
sat - soil saturation
[n] - nutrient
J - estimated value
If Result = or > Background, then the value is presented with a shaded/highlighted style
If Result = or > Background & PRG, then result is presented with a bold + shaded/highlighted style
If Result = or > PRG, then the value is presented with a bold style
If Result < PRG & Background, then the value is presented with a normal style

Table L12-2
Load Line 12 Summary of Groundwater Detections
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						L12mw-189-GW	L12mw-242-DUP	L12mw-242-GW	L12mw-243-GW	L12mw-244-GW	L12mw-245-GW	L12mw-246-GW
					Sample Date:	10/26/2004	11/30/2004	11/30/2004	11/29/2004	11/29/2004	11/29/2004	11/29/2004
					Sample Depth:	7.83 ft.	20 ft.	20 ft.	10.3 ft.	13.2 ft.	11.7 ft.	17.5 ft.
					Description	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)	Unconsolidated Filtered Groundwater Background	Units							
Metals	6010B	Aluminum	36499 nc	--	ug/l	66			42		140	
	6010B	Barium	2555 nc	82.1	ug/l	20	23	20	62	130	54	47
	6010B	Cadmium	18 nc	0.00	ug/l				0.31			
	6010B	Calcium	--[n]	115000	ug/l	170000	67000	68000	130000	80000	120000	110000
	6010B	Chromium	109 nc	7.3	ug/l							
	6010B	Cobalt	730 nc	0.00	ug/l				1.4		1.4	
	6010B	Copper	1460 nc	0.00	ug/l	2.2	3	2.8				
	6010B	Iron	10950 nc	279	ug/l	560	1000	1100	240	42	240	1200
	6010B	Magnesium	--[n]	43300	ug/l	77000	44000	44000	77000	25000 J	60000	52000
	6010B	Manganese	876 nc	1020	ug/l	390	84	86	250	160	99	78
	6010B	Nickel	730 nc	0.00	ug/l				3.2	1.5	4.3	2.3
	6010B	Potassium	--[n]	2890	ug/l	2600	4800	4900	7100	6600	5600	4400
	6010B	Selenium	182 nc	0.00	ug/l						3.4	
	6010B	Sodium	--[n]	45700	ug/l	53000	34000	35000	21000	11000	22000	23000
	6010B	Zinc	10950 nc	60.9	ug/l	69	7.5	11	40		31	15
	7060A	Arsenic	0.045 ca	11.7	ug/l	**2.2**	**25**	**23**	**5**	**11**	**4.9**	**30**
	7421	Lead	15 mcl	0.00	ug/l				8.6	1	1.3	1.7
	7470A	Mercury	11 nc	0.00	ug/l							
	7841	Thallium	2.4 nc	0.00	ug/l							
VOCs	8260B	2-Butanone	6968 nc	--	ug/l		38	47				
	8260B	4-Methyl-2-pentanone	1993 nc	--	ug/l							
	8260B	Acetone	5475 nc	--	ug/l							
	8260B	Methylene chloride	4.3 ca	--	ug/l							
SVOCs	8270C	4-Methylphenol	182 nc	--	ug/l							
	8270C	Benzo(a)anthracene	0.092 ca	--	ug/l							
	8270C	Benzo(a)pyrene	0.0092 ca	--	ug/l							
	8270C	Benzo(b)fluoranthene	0.092 ca	--	ug/l							
	8270C	Benzo(g,h,i)perylene	--	--	ug/l							
	8270C	Benzo(k)fluoranthene	0.92 ca	--	ug/l							
	8270C	Benzoic acid	145979 nc	--	ug/l							
	8270C	Bis(2-ethylhexyl) phthalate	4.8 ca	--	ug/l							
	8270C	Chrysene	9.2 ca	--	ug/l							
	8270C	Dibenzo(a,h)anthracene	0.0092 ca	--	ug/l							
	8270C	Indeno(1,2,3-cd)pyrene	0.092 ca	--	ug/l							
	8270C	Phenol	10950 nc	--	ug/l							
	8270C	Pyrene	182 nc	--	ug/l							
Explosives	8330	2,4,6-TNT	2.2 ca	--	ug/l				**3**			
	8330	2-Amino-4,6-Dinitrotoluene	--	--	ug/l				2.5			
	8330	4-Amino-2,6-Dinitrotoluene	--	--	ug/l				3.2			
	8330	HMX	1825 nc	--	ug/l				0.78			
	8330	RDX	0.61 ca	--	ug/l				**1.5**			

Table L12-2
Load Line 12 Summary of Groundwater Detections
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						L12mw-189-GW	L12mw-242-DUP	L12mw-242-GW	L12mw-243-GW	L12mw-244-GW	L12mw-245-GW	L12mw-246-GW
					Sample Date:	10/26/2004	11/30/2004	11/30/2004	11/29/2004	11/29/2004	11/29/2004	11/29/2004
					Sample Depth:	7.83 ft.	20 ft.	20 ft.	10.3 ft.	13.2 ft.	11.7 ft.	17.5 ft.
					Description	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)	Unconsolidated Filtered Groundwater Background	Units							
Propellants	353.2 Modified	Nitrocellulose	--	--	ug/l							
	8332	Nitroglycerine	4.8 ca	--	ug/l		0.18 J					
Other Analytes	353.2	Nitrate as N (NO3-N)	10000 nc	--	ug/l							

Notes:
-- - no background/PRG value is available for this analyte
blank cells indicate that the analyte was a non-detect (with a "U" qualifier) or analysis was not performed
UC/Filtered – GW sample was filtered for metals and taken from an unconsolidated MW
C/Filtered – GW sample was filtered for metals and taken from a consolidated (bedrock) MW
ug/l - means micrograms per Liter (parts per billion - ppb)
PRG - preliminary remediation goals (The screeing value for lead is the Maximum Contaminant level (MCL) from the safe Drinking
nc - non-cancer basis
ca - cancer basis
pbk - based on PBK modeling
mcl - based on CWA maximum contaminant level
max - ceiling limit
sat - soil saturation
[n] - nutrient
J - estimated value
If Result = or > Background, then the value is presented with a shaded/highlighted style
If Result = or > Background & PRG, then result is presented with a bold + shaded/highlighted style
If Result = or > PRG, then the value is presented with a bold style
If Result < PRG & Background, then the value is presented with a normal style

Table L12-3
Load Line 12 Summary of All Groundwater Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

							L12mw-088-GW	L12mw-107-GW	L12mw-113-GW	L12mw-128-GW	L12mw-153-GW	L12mw-154-GW	L12mw-182-DUP	L12mw-182-GW	L12mw-183-GW	L12mw-184-GW	L12mw-185-GW	L12mw-186-GW	L12mw-187-GW	L12mw-188-GW
						Sample Date:	10/26/2004	10/27/2004	11/5/2004	10/27/2004	10/28/2004	10/28/2004	10/29/2004	10/29/2004	11/1/2004	10/29/2004	11/1/2004	11/1/2004	10/29/2004	10/28/2004
						Sample Depth:	17.5 ft.	21.5 ft.	12.5 ft.	23 ft.	13 ft.	24 ft.	30 ft.	30 ft.	24 ft.	19 ft.	17.5 ft.	11 ft.	9.82 ft.	13 ft
						Description	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)		Unconsolidated Filtered Groundwater Background	Units														
Metals	6010B	Aluminum	36499	nc	--	ug/l	130	61	1400	45	26	31	75 U	75 U	75 U	12.5 U	75 U	78	27 U	75 U
	6010B	Barium	2555	nc	82.1	ug/l	490	32	44	64	87	64	100	100	64	18	60	42	420	46
	6010B	Beryllium	73	nc	0.00	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	6010B	Cadmium	18	nc	0.00	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	6010B	Calcium	--[n]		115000	ug/l	86000	150000	210000	230000	140000	140000	76000	76000	81000	220000	610000	130000	940000	200000
	6010B	Chromium	109	nc	7.3	ug/l	2	2.4	2.4	5 U	5 U	2	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	6010B	Cobalt	730	nc	0.00	ug/l	2.5 U	2.5 U	3.5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	3	2.2	8	1.2
	6010B	Copper	1460	nc	0.00	ug/l	2.8	2.1	3.4	1.8	1.8	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	2.6
	6010B	Iron	10950	nc	279	ug/l	1600	2300	4400	5900	4400	2300	700	650	730	2600	60 U	1900	60 U	780
	6010B	Magnesium	--[n]		43300	ug/l	25000	63000	80000	130000	77000	62000	51000	51000	39000	150000	260000	54000	270000	120000
	6010B	Manganese	876	nc	1020	ug/l	150	180	**1400**	200	200	74	43	43	56	550	**1700**	320	**1800**	770
	6010B	Nickel	730	nc	0.00	ug/l	16	5 U	8	5 U	5 U	5 U	2	5 U	5 U	5 U	7.3	1.9	14	3
	6010B	Potassium	--[n]		2890	ug/l	18000	6200	7600	2900	3000	2800	6700	6800	14000	5900	12000	2000	60000	3400
	6010B	Selenium	182	nc	0.00	ug/l	7.5 U	7.5 U	7.5 U	7.5 U	6.4	7.5 U	7.5 U	5.3	7.5 U	5.9	8.7	7.5 U	10	7.5 U
	6010B	Silver	182	nc	0.00	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	6010B	Sodium	--[n]		45700	ug/l	19000	18000	27000	26000	25000	23000	25000	24000	30000	40000	54000	15000	35000	35000
	6010B	Vanadium	36	nc	0.00	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	6010B	Zinc	10950	nc	60.9	ug/l	15 U	15 U	20	15 U	30	15 U	15 U	15 U	15 U	17	21	15	19	15 U
	7041	Antimony	15	nc	0.00	ug/l	3.75 U	3.75 U	3.75 U	3.75 U	3.75 U	3.75 U	3.75 U	3.75 U	3.75 U	3.75 U	3.75 U	3.75 U	3.75 U	3.75 U
	7060A	Arsenic	0.045	ca	11.7	ug/l	**19**	**19**	**12**	**61**	**32**	**37**	**42**	**44**	**43**	**19**	1 U	**5.5**	1 U	**4.1**
	7421	Lead	15	mcl	0.00	ug/l	1.5 U	1.5 U	3.9	0.94	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	0.9	1.5 U
	7470A	Mercury	11	nc	0.00	ug/l	0.1 U	0.1 U	0.1 U	0.19	0.1 U	0.1 U	0.059	0.078	0.1 U	0.1 U	0.1 U	0.1 U	0.065	0.1 U
	7841	Thallium	2.4	nc	0.00	ug/l	2 U	2 U	**2.9**	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Pesticides	8081A	4,4'-DDD	0.28	ca	--	ug/l	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.05 U	0.055 U	0.055 U	0.055 U	0.055 U
	8081A	4,4'-DDE	0.20	ca	--	ug/l	0.0495 U	0.0495 U	0.048 U	0.0495 U	0.049 U	0.05 U	0.048 U	0.048 U	0.0495 U	0.0475 U	0.05 U	0.05 U	0.05 U	0.049 U
	8081A	4,4'-DDT	0.20	ca	--	ug/l	0.075 U	0.075 U	0.07 U	0.075 U	0.075 U	0.075 U	0.07 U	0.07 U	0.075 U	0.07 U	0.075 U	0.075 U	0.075 U	0.075 U
	8081A	Aldrin	0.0040	ca	--	ug/l	0.0495 U	0.0495 U	0.048 U	0.0495 U	0.049 U	0.05 U	0.048 U	0.048 U	0.0495 U	0.0475 U	0.05 U	0.05 U	0.05 U	0.049 U
	8081A	alpha-BHC	0.011	nc	--	ug/l	0.075 U	0.075 U	0.07 U	0.075 U	0.075 U	0.075 U	0.07 U	0.07 U	0.075 U	0.07 U	0.075 U	0.075 U	0.075 U	0.075 U
	8081A	alpha-Chlordane	0.19	ca	--	ug/l	0.025 U	0.025 U	0.024 U	0.025 U	0.0245 U	0.025 U	0.024 U	0.024 U	0.025 U	0.024 U	0.0255 U	0.025 U	0.025 U	0.0245 U
	8081A	beta-BHC	0.037	ca	--	ug/l	0.0495 U	0.0495 U	0.048 U	0.0495 U	0.049 U	0.05 U	0.048 U	0.048 U	0.0495 U	0.0475 U	0.05 U	0.05 U	0.05 U	0.049 U
	8081A	delta-BHC	--		--	ug/l	0.0495 U	0.0495 U	0.048 U	0.0495 U	0.049 U	0.05 U	0.048 U	0.048 U	0.0495 U	0.0475 U	0.05 U	0.05 U	0.05 U	0.049 U
	8081A	Dieldrin	0.0042	ca	--	ug/l	0.0495 U	0.0495 U	0.048 U	0.0495 U	0.049 U	0.05 U	0.048 U	0.048 U	0.0495 U	0.0475 U	0.05 U	0.05 U	0.05 U	0.049 U
	8081A	Endosulfan I	220	nc	--	ug/l	0.0495 U	0.0495 U	0.048 U	0.0495 U	0.049 U	0.05 U	0.048 U	0.048 U	0.0495 U	0.0475 U	0.05 U	0.05 U	0.05 U	0.049 U
	8081A	Endosulfan II	220	nc	--	ug/l	0.075 U	0.075 U	0.07 U	0.075 U	0.075 U	0.075 U	0.07 U	0.07 U	0.075 U	0.07 U	0.075 U	0.075 U	0.075 U	0.075 U
	8081A	Endosulfan sulfate	220	nc	--	ug/l	0.075 U	0.075 U	0.07 U	0.075 U	0.075 U	0.075 U	0.07 U	0.07 U	0.075 U	0.07 U	0.075 U	0.075 U	0.075 U	0.075 U
	8081A	Endrin	11	nc	--	ug/l	0.0495 U	0.0495 U	0.048 U	0.0495 U	0.049 U	0.05 U	0.048 U	0.048 U	0.0495 U	0.0475 U	0.05 U	0.05 U	0.05 U	0.049 U
	8081A	Endrin aldehyde	--		--	ug/l	0.075 U	0.075 U	0.07 U	0.075 U	0.075 U	0.075 U	0.07 U	0.07 U	0.075 U	0.07 U	0.075 U	0.075 U	0.075 U	0.075 U
	8081A	Endrin ketone	--		--	ug/l	0.0495 U	0.0495 U	0.048 U	0.0495 U	0.049 U	0.05 U	0.048 U	0.048 U	0.0495 U	0.0475 U	0.05 U	0.05 U	0.05 U	0.049 U
	8081A	gamma-BHC	0.052	ca	--	ug/l	0.075 U	0.075 U	0.07 U	0.075 U	0.075 U	0.075 U	0.07 U	0.07 U	0.075 U	0.07 U	0.075 U	0.075 U	0.075 U	0.075 U
	8081A	gamma-Chlordane	0.19	ca	--	ug/l	0.0495 U	0.0495 U	0.048 U	0.0495 U	0.049 U	0.05 U	0.048 U	0.048 U	0.0495 U	0.0475 U	0.05 U	0.05 U	0.05 U	0.049 U
	8081A	Heptachlor	0.015	ca	--	ug/l	0.075 U	0.075 U	0.07 U	0.075 U	0.075 U	0.075 U	0.07 U	0.07 U	0.075 U	0.07 U	0.075 U	0.075 U	0.075 U	0.075 U
	8081A	Heptachlor epoxide	0.0074	ca	--	ug/l	0.075 U	0.075 U	0.07 U	0.075 U	0.075 U	0.075 U	0.07 U	0.07 U	0.075 U	0.07 U	0.075 U	0.075 U	0.075 U	0.075 U

Table L12-3
Load Line 12 Summary of All Groundwater Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						L12mw-088-GW	L12mw-107-GW	L12mw-113-GW	L12mw-128-GW	L12mw-153-GW	L12mw-154-GW	L12mw-182-DUP	L12mw-182-GW	L12mw-183-GW	L12mw-184-GW	L12mw-185-GW	L12mw-186-GW	L12mw-187-GW	L12mw-188-GW
					Sample Date:	10/26/2004	10/27/2004	11/5/2004	10/27/2004	10/28/2004	10/28/2004	10/29/2004	10/29/2004	11/1/2004	10/29/2004	11/1/2004	11/1/2004	10/29/2004	10/28/2004
					Sample Depth:	17.5 ft.	21.5 ft.	12.5 ft.	23 ft.	13 ft.	24 ft.	30 ft.	30 ft.	24 ft.	19 ft.	17.5 ft.	11 ft.	9.82 ft.	13 ft
					Description	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)	Unconsolidated Filtered Groundwater Background	Units														
	8081A	Methoxychlor	182 nc	--	ug/l	0.295 U	0.295 U	0.29 U	0.295 U	0.295 U	0.3 U	0.29 U	0.29 U	0.295 U	0.285 U	0.305 U	0.3 U	0.3 U	0.295 U
	8081A	Toxaphene	0.061 ca	--	ug/l	0.25 U	0.25 U	0.24 U	0.25 U	0.245 U	0.25 U	0.24 U	0.24 U	0.25 U	0.24 U	0.255 U	0.25 U	0.25 U	0.245 U
PCBs	8082	Aroclor 1016	0.96 ca	--	ug/l	0.295 U	0.295 U	0.29 U	0.295 U	0.295 U	0.3 U	0.29 U	0.29 U	0.295 U	0.285 U	0.305 U	0.3 U	0.3 U	0.295 U
	8082	Aroclor 1221	0.034 ca	--	ug/l	0.65 U	0.65 U	0.6 U	0.65 U	0.65 U	0.65 U	0.6 U	0.6 U	0.65 U	0.6 U	0.65 U	0.65 U	0.65 U	0.65 U
	8082	Aroclor 1232	0.034 ca	--	ug/l	0.65 U	0.65 U	0.6 U	0.65 U	0.65 U	0.65 U	0.6 U	0.6 U	0.65 U	0.6 U	0.65 U	0.65 U	0.65 U	0.65 U
	8082	Aroclor 1242	0.034 ca	--	ug/l	0.65 U	0.65 U	0.6 U	0.65 U	0.65 U	0.65 U	0.6 U	0.6 U	0.65 U	0.6 U	0.65 U	0.65 U	0.65 U	0.65 U
	8082	Aroclor 1248	0.034 ca	--	ug/l	0.75 U	0.75 U	0.7 U	0.75 U	0.75 U	0.75 U	0.7 U	0.7 U	0.75 U	0.7 U	0.75 U	0.75 U	0.75 U	0.75 U
	8082	Aroclor 1254	0.034 ca	--	ug/l	0.65 U	0.65 U	0.6 U	0.65 U	0.65 U	0.65 U	0.6 U	0.6 U	0.65 U	0.6 U	0.65 U	0.65 U	0.65 U	0.65 U
	8082	Aroclor 1260	0.034 ca	--	ug/l	0.295 U	0.295 U	0.29 U	0.295 U	0.295 U	0.3 U	0.29 U	0.29 U	0.295 U	0.285 U	0.305 U	0.3 U	0.3 U	0.295 U
VOCs	8260B	1,1,1-Trichloroethane	3172 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,1,2,2-Tetrachloroethane	0.055 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,1,2-Trichloroethane	0.20 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,1-Dichloroethane	811 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,1-Dichloroethene	339 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,2-Dibromoethane	0.0056 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,2-Dichloroethane	0.12 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,2-Dichloroethene (total)	120 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,2-Dichloropropane	0.16 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	2-Butanone	6968 nc	--	ug/l	8.3 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	8260B	2-Hexanone	2000 nc	--	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	8260B	4-Methyl-2-pentanone	1993 nc	--	ug/l	8.3 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	8260B	Acetone	5475 nc	--	ug/l	74	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	8260B	Benzene	0.35 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Bromochloromethane	--	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Bromodichloromethane	0.18 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Bromoform	8.5 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Bromomethane	8.7 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Carbon disulfide	1043 nc	--	ug/l	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
	8260B	Carbon tetrachloride	0.17 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Chlorobenzene	106 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Chloroethane	4.6 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Chloroform	0.17 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Chloromethane	158 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	cis-1,2-Dichloroethene	61 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	cis-1,3-Dichloropropene	0.40 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Dibromochloromethane	0.13 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Ethylbenzene	1340 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	m&p-Xylenes	206 nc	--	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	8260B	Methylene chloride	4.3 ca	--	ug/l	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	1.1 J	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
	8260B	o-Xylene	206 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Styrene	1641 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Tetrachloroethene	0.10 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Table L12-3
Load Line 12 Summary of All Groundwater Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						L12mw-088-GW	L12mw-107-GW	L12mw-113-GW	L12mw-128-GW	L12mw-153-GW	L12mw-154-GW	L12mw-182-DUP	L12mw-182-GW	L12mw-183-GW	L12mw-184-GW	L12mw-185-GW	L12mw-186-GW	L12mw-187-GW	L12mw-188-GW
					Sample Date:	10/26/2004	10/27/2004	11/5/2004	10/27/2004	10/28/2004	10/28/2004	10/29/2004	10/29/2004	11/1/2004	10/29/2004	11/1/2004	11/1/2004	10/29/2004	10/28/2004
					Sample Depth:	17.5 ft.	21.5 ft.	12.5 ft.	23 ft.	13 ft.	24 ft.	30 ft.	30 ft.	24 ft.	19 ft.	17.5 ft.	11 ft.	9.82 ft.	13 ft
					Description	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)		Unconsolidated Filtered Groundwater Background	Units													
	8260B	Toluene	723	nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Total Xylenes	206	nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	trans-1,2-Dichloroethene	122	nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	trans-1,3-Dichloropropene	0.40	ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Trichloroethene	0.028	ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Vinyl chloride	0.020	ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SVOCs	8270C	1,2,4-Trichlorobenzene	7.2	nc	--	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	0.95 U	0.95 U	1 U	1 U	1 U	1 U	1 U
	8270C	1,2-Dichlorobenzene	370	nc	--	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	0.95 U	0.95 U	1 U	1 U	1 U	1 U	1 U
	8270C	1,3-Dichlorobenzene	182	nc	--	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	0.95 U	0.95 U	1 U	1 U	1 U	1 U	1 U
	8270C	1,4-Dichlorobenzene	0.50	ca	--	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	0.95 U	0.95 U	1 U	1 U	1 U	1 U	1 U
	8270C	2,2-oxybis (1-chloropropane)	0.27	ca	--	ug/l	1 U	1 U	1 UJ	1 U	1 U	1 U	0.95 U	0.95 U	1 U	1 U	1 U	1 U	1 U
	8270C	2,4,5-Trichlorophenol	3650	nc	--	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	4.85 U	4.75 U	5 U	5 U	5 U	5 U	4.9 U	5 U
	8270C	2,4,6-Trichlorophenol	3.6	nc	--	ug/l	2.5 U	2.55 U	2.5 U	2.5 U	2.5 U	2.55 U	2.45 U	2.4 U	2.55 U	2.55 U	2.5 U	2.5 U	2.45 U	2.5 U
	8270C	2,4-Dichlorophenol	109	nc	--	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	4.85 U	4.75 U	5 U	5 U	5 U	5 U	4.9 U	5 U
	8270C	2,4-Dimethylphenol	730	nc	--	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	4.85 U	4.75 U	5 U	5 U	5 U	5 U	4.9 U	5 U
	8270C	2,4-Dinitrophenol	73	nc	--	ug/l	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	9.5 U	10 UJ	10 U	10 UJ	10 UJ	10 U	10 U
	8270C	2,4-Dinitrotoluene	73	nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.485 U	0.475 U	0.5 U	0.5 U	0.5 U	0.5 U	0.49 U	0.5 U
	8270C	2,6-Dinitrotoluene	36	nc	--	ug/l	0.25 U	0.255 U	0.25 U	0.25 U	0.25 U	0.255 U	0.245 U	0.24 U	0.255 U	0.255 U	0.25 U	0.25 U	0.245 U	0.25 U
	8270C	2-Chloronaphthalene	487	nc	--	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	0.95 U	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	2-Chlorophenol	30	nc	--	ug/l	2.5 U	2.55 U	2.5 U	2.5 U	2.5 U	2.55 U	2.45 U	2.4 U	2.55 U	2.55 U	2.5 U	2.5 U	2.45 U	2.5 U
	8270C	2-Methylnaphthalene	--		--	ug/l	0.25 U	0.255 U	0.25 U	0.25 U	0.25 U	0.255 U	0.245 U	0.24 U	0.255 U	0.255 U	0.25 U	0.25 U	0.245 U	0.25 U
	8270C	2-Methylphenol	1825	nc	--	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	0.95 U	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	2-Nitroaniline	109	nc	--	ug/l	2.5 U	2.55 U	2.5 U	2.5 U	2.5 U	2.55 U	2.45 U	2.4 U	2.55 U	2.55 U	2.5 U	2.5 U	2.45 U	2.5 U
	8270C	2-Nitrophenol	--		--	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	4.85 U	4.75 U	5 U	5 U	5 U	5 U	4.9 U	5 U
	8270C	3,3'-Dichlorobenzidine	0.15	ca	--	ug/l	2.5 U	2.55 U	2.5 U	2.5 U	2.5 U	2.55 U	2.45 U	2.4 U	2.55 U	2.55 U	2.5 U	2.5 U	2.45 U	2.5 U
	8270C	3-Nitroaniline	3.2	ca	--	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	4.85 U	4.75 U	5 U	5 U	5 U	5 U	4.9 U	5 U
	8270C	4,6-Dinitro-2-methylphenol	3.6	nc	--	ug/l	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U
	8270C	4-Bromophenyl phenyl ether	--		--	ug/l	2.5 U	2.55 U	2.5 U	2.5 U	2.5 U	2.55 U	2.45 U	2.4 U	2.55 U	2.55 U	2.5 U	2.5 U	2.45 U	2.5 U
	8270C	4-Chloro-3-methylphenol	--		--	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	4.85 U	4.75 U	5 U	5 U	5 U	5 U	4.9 U	5 U
	8270C	4-Chloroaniline	146	nc	--	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	4.85 U	4.75 U	5 U	5 U	5 U	5 U	4.9 U	5 U
	8270C	4-Chlorophenyl phenyl ether	--		--	ug/l	2.5 U	2.55 U	2.5 U	2.5 U	2.5 U	2.55 U	2.45 U	2.4 U	2.55 U	2.55 U	2.5 U	2.5 U	2.45 U	2.5 U
	8270C	4-Methylphenol	182	nc	--	ug/l	2.9	1 U	1 U	1 U	1 U	1 U	0.95 U	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	4-Nitroaniline	3.2	ca	--	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	4.85 U	4.75 U	5 UJ	5 U	5 UJ	5 UJ	4.9 U	5 U
	8270C	4-Nitrophenol	--		--	ug/l	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U
	8270C	Acenaphthene	365	nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.485 U	0.475 U	0.5 U	0.5 U	0.5 U	0.5 U	0.49 U	0.5 U
	8270C	Acenaphthylene	--		--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.485 U	0.475 U	0.5 U	0.5 U	0.5 U	0.5 U	0.49 U	0.5 U
	8270C	Anthracene	1825	nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.485 U	0.475 U	0.5 U	0.5 U	0.5 U	0.5 U	0.49 U	0.5 U
	8270C	Benzo(a)anthracene	0.092	ca	--	ug/l	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.095 U	0.095 U	**0.14 J**	0.1 U	0.1 U	**0.27**	0.1 U	0.1 U
	8270C	Benzo(a)pyrene	0.0092	ca	--	ug/l	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.205 U	0.195 U	0.19 U	**0.16 J**	0.205 U	0.2 U	**0.29 J**	0.195 U	0.2 U
	8270C	Benzo(b)fluoranthene	0.092	ca	--	ug/l	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.205 U	0.195 U	0.19 U	0.205 U	0.205 U	0.2 U	**0.2 J**	0.195 U	0.2 U
	8270C	Benzo(g,h,i)perylene	--		--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.485 U	0.475 U	0.34 J	0.5 U	0.5 U	0.81 J	0.49 U	0.5 U
	8270C	Benzo(k)fluoranthene	0.92	ca	--	ug/l	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.205 U	0.195 U	0.19 U	0.12 J	0.205 U	0.2 U	0.24 J	0.195 U	0.2 U

Table L12-3
Load Line 12 Summary of All Groundwater Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						L12mw-088-GW	L12mw-107-GW	L12mw-113-GW	L12mw-128-GW	L12mw-153-GW	L12mw-154-GW	L12mw-182-DUP	L12mw-182-GW	L12mw-183-GW	L12mw-184-GW	L12mw-185-GW	L12mw-186-GW	L12mw-187-GW	L12mw-188-GW
					Sample Date:	10/26/2004	10/27/2004	11/5/2004	10/27/2004	10/28/2004	10/28/2004	10/29/2004	10/29/2004	11/1/2004	10/29/2004	11/1/2004	11/1/2004	10/29/2004	10/28/2004
					Sample Depth:	17.5 ft.	21.5 ft.	12.5 ft.	23 ft.	13 ft.	24 ft.	30 ft.	30 ft.	24 ft.	19 ft.	17.5 ft.	11 ft.	9.82 ft.	13 ft
					Description	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)		Unconsolidated Filtered Groundwater Background	Units													
	8270C	Benzoic acid	145979	nc	--	ug/l	15 J	10 U	10 U	10 U	10 U	10 U	9.5 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U
	8270C	Benzyl alcohol	10950	nc	--	ug/l	10 U	10 U	10 U	10 U	10 U	10 U	9.5 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U
	8270C	Bis(2-chloroethoxy)methane	--		--	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	0.95 U	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	Bis(2-chloroethyl) ether	0.010	ca	--	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	0.95 U	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	Bis(2-ethylhexyl) phthalate	4.8	ca	--	ug/l	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	**6.3 J**	7.5 U	**5 J**	7.5 U	7.5 U	**59**	7.5 U
	8270C	Butylbenzyl phthalate	7300	nc	--	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	0.95 U	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	Carbazole	3.4	ca	--	ug/l	2.5 U	2.55 U	2.5 U	2.5 U	2.5 U	2.55 U	2.45 U	2.4 U	2.55 U	2.55 U	2.5 U	2.5 U	2.45 U	2.5 U
	8270C	Chrysene	9.2	ca	--	ug/l	0.25 U	0.255 U	0.25 U	0.25 U	0.25 U	0.255 U	0.245 U	0.24 U	0.15 J	0.255 U	0.25 U	0.25 J	0.245 U	0.25 U
	8270C	Dibenzo(a,h)anthracene	0.0092	ca	--	ug/l	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.205 U	0.195 U	0.19 U	**0.5 J**	0.205 U	0.2 UJ	**0.95 J**	0.195 U	0.2 U
	8270C	Dibenzofuran	12	nc	--	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	0.95 U	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	Diethyl phthalate	29199	nc	--	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	0.95 U	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	Dimethyl phthalate	364867	nc	--	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	0.95 U	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	Di-n-butyl phthalate	3650	nc	--	ug/l	2.5 U	2.55 U	2.5 U	2.5 U	2.5 U	2.55 U	2.45 U	2.4 U	2.55 U	2.55 U	2.5 U	2.5 U	2.45 U	2.5 U
	8270C	Di-n-octyl phthalate	1460	nc	--	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	4.85 U	4.75 U	5 UJ	5 U	5 UJ	5 UJ	4.9 U	5 U
	8270C	Fluoranthene	1460	nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.485 U	0.475 U	0.5 U	0.5 U	0.5 U	0.5 U	0.49 U	0.5 U
	8270C	Fluorene	243	nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.485 U	0.475 U	0.5 U	0.5 U	0.5 U	0.5 U	0.49 U	0.5 U
	8270C	Hexachlorobenzene	0.042	ca	--	ug/l	0.25 U	0.255 U	0.25 U	0.25 U	0.25 U	0.255 U	0.245 U	0.24 U	0.255 U	0.255 U	0.25 U	0.25 U	0.245 U	0.25 U
	8270C	Hexachlorobutadiene	0.86	ca	--	ug/l	2.5 U	2.55 U	2.5 U	2.5 U	2.5 U	2.55 U	2.45 U	2.4 U	2.55 U	2.55 U	2.5 U	2.5 U	2.45 U	2.5 U
	8270C	Hexachlorocyclopentadiene	219	nc	--	ug/l	- R	- R	- R	- R	- R	- R	- R	- R	- R	- R	- R	- R	- R	- R
	8270C	Hexachloroethane	4.8	ca	--	ug/l	2.5 U	2.55 U	2.5 U	2.5 U	2.5 U	2.55 U	2.45 U	2.4 U	2.55 U	2.55 U	2.5 U	2.5 U	2.45 U	2.5 U
	8270C	Indeno(1,2,3-cd)pyrene	0.092	ca	--	ug/l	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.205 U	0.195 U	0.19 U	**0.37 J**	0.205 U	0.2 U	**0.81**	0.195 U	0.2 U
	8270C	Isophorone	71	ca	--	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	0.95 U	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	Naphthalene	6.2	nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.485 U	0.475 U	0.5 U	0.5 U	0.5 U	0.5 U	0.49 U	0.5 U
	8270C	Nitrobenzene	3.4	nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.485 U	0.475 U	0.5 U	0.5 U	0.5 U	0.5 U	0.49 U	0.5 U
	8270C	n-Nitroso-di-n-propylamine	0.0096	ca	--	ug/l	0.25 U	0.255 U	0.25 U	0.25 U	0.25 U	0.255 U	0.245 U	0.24 U	0.255 U	0.255 U	0.25 U	0.25 U	0.245 U	0.25 U
	8270C	n-Nitrosodiphenylamine	14	ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.485 U	0.475 U	0.5 U	0.5 U	0.5 U	0.5 U	0.49 U	0.5 U
	8270C	Pentachlorophenol	0.56	ca	--	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	4.85 U	4.75 U	5 U	5 U	5 U	5 U	4.9 U	5 U
	8270C	Phenanthrene	--		--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.485 U	0.475 U	0.5 U	0.5 U	0.5 U	0.5 U	0.49 U	0.5 U
	8270C	Phenol	10950	nc	--	ug/l	25	2.55 U	2.5 U	2.5 U	2.5 U	2.55 U	11	9.4	2.55 U	2.9 J	2.5 U	2.5 U	2.4 J	2.5 U
	8270C	Pyrene	182	nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.485 U	0.475 U	0.5 U	0.5 U	0.5 U	0.13 J	0.49 U	0.5 U
Explosives	8330	1,3,5-Trinitrobenzene	1095	nc	--	ug/l	0.1 U	0.1 U	0.185 U	0.1 U	0.1 U	0.1 UJ	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	8330	1,3-Dinitrobenzene	3.6	nc	--	ug/l	0.1 U	0.1 U	0.185 U	0.1 U	0.1 U	0.1 UJ	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	8330	2,4,6-TNT	2.2	ca	--	ug/l	0.125 U	0.125 U	0.23 U	0.125 U	0.125 U	0.125 UJ	0.125 U	0.125 U	0.125 U	0.125 U	0.125 U	0.125 U	0.125 U	0.125 U
	8330	2,4-Dinitrotoluene	73	nc	--	ug/l	0.18 U	0.18 U	0.33 U	0.18 U	0.18 U	0.18 UJ	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
	8330	2,6-Dinitrotoluene	36	nc	--	ug/l	0.215 U	0.215 U	0.395 U	0.215 U	0.215 U	0.215 UJ	0.215 U	0.215 U	0.215 U	0.215 U	0.215 U	0.215 U	0.215 U	0.215 U
	8330	2-Amino-4,6-Dinitrotoluene	--		--	ug/l	0.18 U	0.18 U	0.33 U	0.18 U	0.18 U	0.18 UJ	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
	8330	2-Nitrotoluene	0.049	ca	--	ug/l	0.155 U	0.155 U	0.285 U	0.155 U	0.155 U	0.155 UJ	0.155 U	0.155 U	0.155 U	0.155 U	0.155 U	0.155 U	0.155 U	0.155 U
	8330	3-Nitrotoluene	122	nc	--	ug/l	0.155 U	0.155 U	0.285 U	0.155 U	0.155 U	0.155 UJ	0.155 U	0.155 U	0.155 U	0.155 U	0.155 U	0.155 U	0.155 U	0.155 U
	8330	4-Amino-2,6-Dinitrotoluene	--		--	ug/l	0.165 U	0.165 U	0.305 U	0.165 U	0.165 U	0.165 UJ	0.165 U	0.165 U	0.165 U	0.165 U	0.165 U	0.165 U	0.165 U	0.165 U
	8330	4-Nitrotoluene	0.66	ca	--	ug/l	0.155 U	0.155 U	0.285 U	0.155 U	0.155 U	0.155 UJ	0.155 U	0.155 U	0.155 U	0.155 U	0.155 U	0.155 U	0.155 U	0.155 U
	8330	HMX	1825	nc	--	ug/l	0.155 U	0.155 U	0.285 U	0.155 U	0.155 U	0.155 UJ	0.155 U	0.155 U	0.155 U	0.155 U	0.155 U	0.155 U	0.155 U	0.155 U
	8330	Nitrobenzene	3.4	nc	--	ug/l	0.08 U	0.08 U	0.145 U	0.08 U	0.08 U	0.08 UJ	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U

Table L12-3
Load Line 12 Summary of All Groundwater Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						L12mw-088-GW	L12mw-107-GW	L12mw-113-GW	L12mw-128-GW	L12mw-153-GW	L12mw-154-GW	L12mw-182-DUP	L12mw-182-GW	L12mw-183-GW	L12mw-184-GW	L12mw-185-GW	L12mw-186-GW	L12mw-187-GW	L12mw-188-GW
					Sample Date:	10/26/2004	10/27/2004	11/5/2004	10/27/2004	10/28/2004	10/28/2004	10/29/2004	10/29/2004	11/1/2004	10/29/2004	11/1/2004	11/1/2004	10/29/2004	10/28/2004
					Sample Depth:	17.5 ft.	21.5 ft.	12.5 ft.	23 ft.	13 ft.	24 ft.	30 ft.	30 ft.	24 ft.	19 ft.	17.5 ft.	11 ft.	9.82 ft.	13 ft
					Description	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)		Unconsolidated Filtered Groundwater Background	Units													
	8330	RDX	0.61	ca	--	ug/l	0.1 U	0.1 U	0.185 U	0.1 U	0.1 U	0.1 UJ	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	8330	Tetryl	365	nc	--	ug/l	0.39 U	0.39 U	0.7 U	0.39 U	0.39 U	0.39 UJ	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
Propellants	353.2 Modified	Nitrocellulose	--		--	ug/l	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	180	300	250 U	9400	250 U
	8332	Nitroglycerine	4.8	ca	--	ug/l	0.5 U	0.5 U	0.9 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U
	SW8330 Modified	Nitroguanidine	3650	nc	--	ug/l	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Other Analytes	353.2	Nitrate as N (NO3-N)	10000	nc	--	ug/l	100 U	570	510	100 U	100 U	100 U	100 U	100 U	270	200	**160000**	100 U	**1200000**	100 U

Notes:
-- - no background/PRG value is available for this analyte
blank cell indicates that the analysis was not performed
ug/l - means micrograms per Liter (parts per billion - ppb)
PRG - preliminary remediation goals (The screeing value for lead is the Maximum Contaminant level (MCL) from the safe Drinking Water Act)
nc - non-cancer basis
ca - cancer basis
pbk - based on PBK modeling
mcl - based on CWA maximum contaminant level
max - ceiling limit
sat - soil saturation
UC/Filtered – GW sample was filtered for metals and taken from an unconsolidated MW
C/Filtered – GW sample was filtered for metals and taken from a consolidated (bedrock) MW
[n] - nutrient
U - analyte not detected
J - estimated value
R - result rejected during ADR validation
If Result = or > Background, then the value is presented with a shaded/highlighted style
If Result = or > Background & PRG, then result is presented with a bold + shaded/highlighted style
If Result = or > PRG, then the value is presented with a bold style
If Result < PRG & Background, then the value is presented with a normal style

Table L12-3
Load Line 12 Summary of All Groundwater Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						L12mw-189-GW	L12mw-242-DUP	L12mw-242-GW	L12mw-243-GW	L12mw-244-GW	L12mw-245-GW	L12mw-246-GW
					Sample Date:	10/26/2004	11/30/2004	11/30/2004	11/29/2004	11/29/2004	11/29/2004	11/29/2004
					Sample Depth:	7.83 ft.	20 ft.	20 ft.	10.3 ft.	13.2 ft.	11.7 ft.	17.5 ft.
					Description	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)	Unconsolidated Filtered Groundwater Background	Units							
Metals	6010B	Aluminum	36499 nc	--	ug/l	66	75 U	75 U	42	75 U	140	75 U
	6010B	Barium	2555 nc	82.1	ug/l	20	23	20	62	130	54	47
	6010B	Beryllium	73 nc	0.00	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	6010B	Cadmium	18 nc	0.00	ug/l	1 U	1 U	1 U	0.31	1 U	1 U	1 U
	6010B	Calcium	--[n]	115000	ug/l	170000	67000	68000	130000	80000	120000	110000
	6010B	Chromium	109 nc	7.3	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	6010B	Cobalt	730 nc	0.00	ug/l	2.5 U	2.5 U	2.5 U	1.4	2.5 U	1.4	2.5 U
	6010B	Copper	1460 nc	0.00	ug/l	2.2	3	2.8	5 U	5 U	5 U	5 U
	6010B	Iron	10950 nc	279	ug/l	560	1000	1100	240	42	240	1200
	6010B	Magnesium	--[n]	43300	ug/l	77000	44000	44000	77000	25000 J	60000	52000
	6010B	Manganese	876 nc	1020	ug/l	390	84	86	250	160	99	78
	6010B	Nickel	730 nc	0.00	ug/l	5 U	5 U	5 U	3.2	1.5	4.3	2.3
	6010B	Potassium	--[n]	2890	ug/l	2600	4800	4900	7100	6600	5600	4400
	6010B	Selenium	182 nc	0.00	ug/l	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	3.4	7.5 U
	6010B	Silver	182 nc	0.00	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	6010B	Sodium	--[n]	45700	ug/l	53000	34000	35000	21000	11000	22000	23000
	6010B	Vanadium	36 nc	0.00	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	6010B	Zinc	10950 nc	60.9	ug/l	69	7.5	11	40	15 U	31	15
	7041	Antimony	15 nc	0.00	ug/l	3.75 U	3.75 U	3.75 U	3.75 U	3.75 U	3.75 U	3.75 U
	7060A	Arsenic	0.045 ca	11.7	ug/l	**2.2**	**25**	**23**	**5**	**11**	**4.9**	**30**
	7421	Lead	15 mcl	0.00	ug/l	1.5 U	1.5 U	1.5 U	8.6	1	1.3	1.7
	7470A	Mercury	11 nc	0.00	ug/l	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	7841	Thallium	2.4 nc	0.00	ug/l	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Pesticides	8081A	4,4'-DDD	0.28 ca	--	ug/l	0.055 UJ	0.055 U	0.055 UJ	0.055 U	0.055 U	0.055 U	0.055 U
	8081A	4,4'-DDE	0.20 ca	--	ug/l	0.049 UJ	0.05 U	0.05 UJ	0.05 U	0.05 U	0.049 U	0.0495 U
	8081A	4,4'-DDT	0.20 ca	--	ug/l	0.075 UJ	0.075 U	0.075 UJ	0.075 U	0.075 U	0.075 U	0.075 U
	8081A	Aldrin	0.0040 ca	--	ug/l	0.049 UJ	0.05 U	0.05 UJ	0.05 U	0.05 U	0.049 U	0.0495 U
	8081A	alpha-BHC	0.011 nc	--	ug/l	0.075 UJ	0.075 U	0.075 UJ	0.075 U	0.075 U	0.075 U	0.075 U
	8081A	alpha-Chlordane	0.19 ca	--	ug/l	0.0245 UJ	0.025 U	0.025 UJ	0.026 U	0.025 U	0.0245 U	0.025 U
	8081A	beta-BHC	0.037 ca	--	ug/l	0.049 UJ	0.05 U	0.05 UJ	0.05 U	0.05 U	0.049 U	0.0495 U
	8081A	delta-BHC	--	--	ug/l	0.049 UJ	0.05 U	0.05 UJ	0.05 U	0.05 U	0.049 U	0.0495 U
	8081A	Dieldrin	0.0042 ca	--	ug/l	0.049 UJ	0.05 U	0.05 UJ	0.05 U	0.05 U	0.049 U	0.0495 U
	8081A	Endosulfan I	220 nc	--	ug/l	0.049 UJ	0.05 U	0.05 UJ	0.05 U	0.05 U	0.049 U	0.0495 U
	8081A	Endosulfan II	220 nc	--	ug/l	0.075 UJ	0.075 U	0.075 UJ	0.075 U	0.075 U	0.075 U	0.075 U
	8081A	Endosulfan sulfate	220 nc	--	ug/l	0.075 UJ	0.075 U	0.075 UJ	0.075 U	0.075 U	0.075 U	0.075 U
	8081A	Endrin	11 nc	--	ug/l	0.049 UJ	0.05 U	0.05 UJ	0.05 U	0.05 U	0.049 U	0.0495 U
	8081A	Endrin aldehyde	--	--	ug/l	0.075 UJ	0.075 U	0.075 UJ	0.075 U	0.075 U	0.075 U	0.075 U
	8081A	Endrin ketone	--	--	ug/l	0.049 UJ	0.05 U	0.05 UJ	0.05 U	0.05 U	0.049 U	0.0495 U
	8081A	gamma-BHC	0.052 ca	--	ug/l	0.075 UJ	0.075 U	0.075 UJ	0.075 U	0.075 U	0.075 U	0.075 U
	8081A	gamma-Chlordane	0.19 ca	--	ug/l	0.049 UJ	0.05 U	0.05 UJ	0.05 U	0.05 U	0.049 U	0.0495 U
	8081A	Heptachlor	0.015 ca	--	ug/l	0.075 UJ	0.075 U	0.075 UJ	0.075 U	0.075 U	0.075 U	0.075 U
	8081A	Heptachlor epoxide	0.0074 ca	--	ug/l	0.075 UJ	0.075 U	0.075 UJ	0.075 U	0.075 U	0.075 U	0.075 U

Table L12-3
Load Line 12 Summary of All Groundwater Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						L12mw-189-GW	L12mw-242-DUP	L12mw-242-GW	L12mw-243-GW	L12mw-244-GW	L12mw-245-GW	L12mw-246-GW
					Sample Date:	10/26/2004	11/30/2004	11/30/2004	11/29/2004	11/29/2004	11/29/2004	11/29/2004
					Sample Depth:	7.83 ft.	20 ft.	20 ft.	10.3 ft.	13.2 ft.	11.7 ft.	17.5 ft.
					Description	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)	Unconsolidated Filtered Groundwater Background	Units							
	8081A	Methoxychlor	182 nc	--	ug/l	0.295 UJ	0.3 U	0.3 UJ	0.31 U	0.3 U	0.295 U	0.295 U
	8081A	Toxaphene	0.061 ca	--	ug/l	0.245 UJ	0.25 U	0.25 U	0.26 U	0.25 U	0.245 U	0.25 U
PCBs	8082	Aroclor 1016	0.96 ca	--	ug/l	0.295 U	0.3 U	0.3 U	0.31 U	0.3 U	0.295 U	0.295 U
	8082	Aroclor 1221	0.034 ca	--	ug/l	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U
	8082	Aroclor 1232	0.034 ca	--	ug/l	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U
	8082	Aroclor 1242	0.034 ca	--	ug/l	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U
	8082	Aroclor 1248	0.034 ca	--	ug/l	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
	8082	Aroclor 1254	0.034 ca	--	ug/l	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U	0.65 U
	8082	Aroclor 1260	0.034 ca	--	ug/l	0.295 U	0.3 U	0.3 U	0.31 U	0.3 U	0.295 U	0.295 U
VOCs	8260B	1,1,1-Trichloroethane	3172 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,1,2,2-Tetrachloroethane	0.055 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,1,2-Trichloroethane	0.20 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,1-Dichloroethane	811 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,1-Dichloroethene	339 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,2-Dibromoethane	0.0056 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,2-Dichloroethane	0.12 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,2-Dichloroethene (total)	120 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	1,2-Dichloropropane	0.16 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	2-Butanone	6968 nc	--	ug/l	5 U	38	47	5 U	5 U	5 U	5 U
	8260B	2-Hexanone	2000 nc	--	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	8260B	4-Methyl-2-pentanone	1993 nc	--	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	8260B	Acetone	5475 nc	--	ug/l	5 U	5 U	5 U	5 U	5 U	5 U	5 U
	8260B	Benzene	0.35 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Bromochloromethane	--	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Bromodichloromethane	0.18 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Bromoform	8.5 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Bromomethane	8.7 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Carbon disulfide	1043 nc	--	ug/l	2.5 U	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ	2.5 UJ
	8260B	Carbon tetrachloride	0.17 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Chlorobenzene	106 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Chloroethane	4.6 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Chloroform	0.17 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Chloromethane	158 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	cis-1,2-Dichloroethene	61 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	cis-1,3-Dichloropropene	0.40 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Dibromochloromethane	0.13 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Ethylbenzene	1340 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	m&p-Xylenes	206 nc	--	ug/l	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	8260B	Methylene chloride	4.3 ca	--	ug/l	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
	8260B	o-Xylene	206 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Styrene	1641 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Tetrachloroethene	0.10 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Table L12-3
Load Line 12 Summary of All Groundwater Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						L12mw-189-GW	L12mw-242-DUP	L12mw-242-GW	L12mw-243-GW	L12mw-244-GW	L12mw-245-GW	L12mw-246-GW
					Sample Date:	10/26/2004	11/30/2004	11/30/2004	11/29/2004	11/29/2004	11/29/2004	11/29/2004
					Sample Depth:	7.83 ft.	20 ft.	20 ft.	10.3 ft.	13.2 ft.	11.7 ft.	17.5 ft.
					Description	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)	Unconsolidated Filtered Groundwater Background	Units							
	8260B	Toluene	723 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Total Xylenes	206 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	trans-1,2-Dichloroethene	122 nc	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	trans-1,3-Dichloropropene	0.40 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Trichloroethene	0.028 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
	8260B	Vinyl chloride	0.020 ca	--	ug/l	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
SVOCs	8270C	1,2,4-Trichlorobenzene	7.2 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	1,2-Dichlorobenzene	370 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	1,3-Dichlorobenzene	182 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	1,4-Dichlorobenzene	0.50 ca	--	ug/l	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	2,2-oxybis (1-chloropropane)	0.27 ca	--	ug/l	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	2,4,5-Trichlorophenol	3650 nc	--	ug/l	4.85 U	5 U	5 U	4.95 U	4.9 U	4.95 U	4.9 U
	8270C	2,4,6-Trichlorophenol	3.6 nc	--	ug/l	2.45 U	2.55 U	2.55 U	2.5 U	2.45 U	2.5 U	2.45 U
	8270C	2,4-Dichlorophenol	109 nc	--	ug/l	4.85 U	5 U	5 U	4.95 U	4.9 U	4.95 U	4.9 U
	8270C	2,4-Dimethylphenol	730 nc	--	ug/l	4.85 U	5 U	5 U	4.95 U	4.9 U	4.95 U	4.9 U
	8270C	2,4-Dinitrophenol	73 nc	--	ug/l	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U
	8270C	2,4-Dinitrotoluene	73 nc	--	ug/l	0.485 U	0.5 U	0.5 U	0.495 U	0.49 U	0.495 U	0.49 U
	8270C	2,6-Dinitrotoluene	36 nc	--	ug/l	0.245 U	0.255 U	0.255 U	0.25 U	0.245 U	0.25 U	0.245 U
	8270C	2-Chloronaphthalene	487 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	2-Chlorophenol	30 nc	--	ug/l	2.45 U	2.55 U	2.55 U	2.5 U	2.45 U	2.5 U	2.45 U
	8270C	2-Methylnaphthalene	--	--	ug/l	0.245 U	0.255 U	0.255 U	0.25 U	0.245 U	0.25 U	0.245 U
	8270C	2-Methylphenol	1825 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	2-Nitroaniline	109 nc	--	ug/l	2.45 U	2.55 U	2.55 UJ	2.5 U	2.45 U	2.5 U	2.45 U
	8270C	2-Nitrophenol	--	--	ug/l	4.85 U	5 U	5 U	4.95 U	4.9 U	4.95 U	4.9 U
	8270C	3,3'-Dichlorobenzidine	0.15 ca	--	ug/l	2.45 U	2.55 U	2.55 U	2.5 U	2.45 U	2.5 U	2.45 U
	8270C	3-Nitroaniline	3.2 ca	--	ug/l	4.85 U	5 U	5 U	4.95 U	4.9 U	4.95 U	4.9 U
	8270C	4,6-Dinitro-2-methylphenol	3.6 nc	--	ug/l	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U
	8270C	4-Bromophenyl phenyl ether	--	--	ug/l	2.45 U	2.55 U	2.55 U	2.5 U	2.45 U	2.5 U	2.45 U
	8270C	4-Chloro-3-methylphenol	--	--	ug/l	4.85 U	5 U	5 U	4.95 U	4.9 U	4.95 U	4.9 U
	8270C	4-Chloroaniline	146 nc	--	ug/l	4.85 U	5 U	5 U	4.95 U	4.9 UJ	4.95 UJ	4.9 UJ
	8270C	4-Chlorophenyl phenyl ether	--	--	ug/l	2.45 U	2.55 U	2.55 U	2.5 U	2.45 U	2.5 U	2.45 U
	8270C	4-Methylphenol	182 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	4-Nitroaniline	3.2 ca	--	ug/l	4.85 U	5 U	5 U	4.95 U	4.9 U	4.95 U	4.9 U
	8270C	4-Nitrophenol	--	--	ug/l	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U
	8270C	Acenaphthene	365 nc	--	ug/l	0.485 U	0.5 U	0.5 U	0.495 U	0.49 U	0.495 U	0.49 U
	8270C	Acenaphthylene	--	--	ug/l	0.485 U	0.5 U	0.5 U	0.495 U	0.49 U	0.495 U	0.49 U
	8270C	Anthracene	1825 nc	--	ug/l	0.485 U	0.5 U	0.5 U	0.495 U	0.49 U	0.495 U	0.49 U
	8270C	Benzo(a)anthracene	0.092 ca	--	ug/l	0.095 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	8270C	Benzo(a)pyrene	0.0092 ca	--	ug/l	0.195 U	0.2 U	0.2 U	0.2 U	0.195 U	0.2 U	0.195 U
	8270C	Benzo(b)fluoranthene	0.092 ca	--	ug/l	0.195 U	0.2 U	0.2 U	0.2 U	0.195 U	0.2 U	0.195 U
	8270C	Benzo(g,h,i)perylene	--	--	ug/l	0.485 U	0.5 U	0.5 U	0.495 U	0.49 U	0.495 U	0.49 U
	8270C	Benzo(k)fluoranthene	0.92 ca	--	ug/l	0.195 U	0.2 U	0.2 U	0.2 U	0.195 U	0.2 U	0.195 U

Table L12-3
Load Line 12 Summary of All Groundwater Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						L12mw-189-GW	L12mw-242-DUP	L12mw-242-GW	L12mw-243-GW	L12mw-244-GW	L12mw-245-GW	L12mw-246-GW
					Sample Date:	10/26/2004	11/30/2004	11/30/2004	11/29/2004	11/29/2004	11/29/2004	11/29/2004
					Sample Depth:	7.83 ft.	20 ft.	20 ft.	10.3 ft.	13.2 ft.	11.7 ft.	17.5 ft.
					Description	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)	Unconsolidated Filtered Groundwater Background	Units							
	8270C	Benzoic acid	145979 nc	--	ug/l	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U
	8270C	Benzyl alcohol	10950 nc	--	ug/l	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U
	8270C	Bis(2-chloroethoxy)methane	--	--	ug/l	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	Bis(2-chloroethyl) ether	0.010 ca	--	ug/l	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	Bis(2-ethylhexyl) phthalate	4.8 ca	--	ug/l	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U	7.5 U
	8270C	Butylbenzyl phthalate	7300 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	Carbazole	3.4 ca	--	ug/l	2.45 U	2.55 U	2.55 U	2.5 U	2.45 U	2.5 U	2.45 U
	8270C	Chrysene	9.2 ca	--	ug/l	0.245 U	0.255 U	0.255 U	0.25 U	0.245 U	0.25 U	0.245 U
	8270C	Dibenzo(a,h)anthracene	0.0092 ca	--	ug/l	0.195 U	0.2 U	0.2 U	0.2 U	0.195 U	0.2 U	0.195 U
	8270C	Dibenzofuran	12 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	Diethyl phthalate	29199 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	Dimethyl phthalate	364867 nc	--	ug/l	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	Di-n-butyl phthalate	3650 nc	--	ug/l	2.45 U	2.55 U	2.55 U	2.5 U	2.45 U	2.5 U	2.45 U
	8270C	Di-n-octyl phthalate	1460 nc	--	ug/l	4.85 U	5 U	5 U	4.95 U	4.9 U	4.95 U	4.9 U
	8270C	Fluoranthene	1460 nc	--	ug/l	0.485 U	0.5 U	0.5 U	0.495 U	0.49 U	0.495 U	0.49 U
	8270C	Fluorene	243 nc	--	ug/l	0.485 U	0.5 U	0.5 U	0.495 U	0.49 U	0.495 U	0.49 U
	8270C	Hexachlorobenzene	0.042 ca	--	ug/l	0.245 U	0.255 U	0.255 U	0.25 U	0.245 U	0.25 U	0.245 U
	8270C	Hexachlorobutadiene	0.86 ca	--	ug/l	2.45 U	2.55 U	2.55 U	2.5 U	2.45 U	2.5 U	2.45 U
	8270C	Hexachlorocyclopentadiene	219 nc	--	ug/l	- R	- R	- R	- R	- R	- R	- R
	8270C	Hexachloroethane	4.8 ca	--	ug/l	2.45 U	2.55 U	2.55 UJ	2.5 U	2.45 U	2.5 U	2.45 U
	8270C	Indeno(1,2,3-cd)pyrene	0.092 ca	--	ug/l	0.195 U	0.2 U	0.2 U	0.2 U	0.195 U	0.2 U	0.195 U
	8270C	Isophorone	71 ca	--	ug/l	0.95 U	1 U	1 U	1 U	1 U	1 U	1 U
	8270C	Naphthalene	6.2 nc	--	ug/l	0.485 U	0.5 U	0.5 U	0.495 U	0.49 U	0.495 U	0.49 U
	8270C	Nitrobenzene	3.4 nc	--	ug/l	0.485 U	0.5 U	0.5 U	0.495 U	0.49 U	0.495 U	0.49 U
	8270C	n-Nitroso-di-n-propylamine	0.0096 ca	--	ug/l	0.245 U	0.255 U	0.255 U	0.25 U	0.245 U	0.25 U	0.245 U
	8270C	n-Nitrosodiphenylamine	14 ca	--	ug/l	0.485 U	0.5 U	0.5 U	0.495 U	0.49 U	0.495 U	0.49 U
	8270C	Pentachlorophenol	0.56 ca	--	ug/l	4.85 U	5 U	5 U	4.95 U	4.9 U	4.95 U	4.9 U
	8270C	Phenanthrene	--	--	ug/l	0.485 U	0.5 U	0.5 U	0.495 U	0.49 U	0.495 U	0.49 U
	8270C	Phenol	10950 nc	--	ug/l	2.45 U	2.55 U	2.55 U	2.5 U	2.45 U	2.5 U	2.45 U
	8270C	Pyrene	182 nc	--	ug/l	0.485 U	0.5 U	0.5 U	0.495 U	0.49 U	0.495 U	0.49 U
Explosives	8330	1,3,5-Trinitrobenzene	1095 nc	--	ug/l	0.1 U	0.1 U	0.11 U	0.11 U	0.145 U	0.1 U	0.14 U
	8330	1,3-Dinitrobenzene	3.6 nc	--	ug/l	0.1 U	0.1 U	0.11 U	0.11 U	0.145 U	0.1 U	0.14 U
	8330	2,4,6-TNT	2.2 ca	--	ug/l	0.125 U	0.125 U	0.14 U	**3**	0.18 U	0.125 U	0.175 U
	8330	2,4-Dinitrotoluene	73 nc	--	ug/l	0.18 U	0.18 U	0.2 U	0.195 U	0.26 U	0.18 U	0.25 U
	8330	2,6-Dinitrotoluene	36 nc	--	ug/l	0.215 U	0.215 U	0.235 U	0.235 U	0.31 U	0.215 U	0.3 U
	8330	2-Amino-4,6-Dinitrotoluene	--	--	ug/l	0.18 U	0.18 U	0.2 U	2.5	0.26 U	0.18 U	0.25 U
	8330	2-Nitrotoluene	0.049 ca	--	ug/l	0.155 U	0.155 U	0.17 U	0.17 U	0.22 U	0.155 U	0.215 U
	8330	3-Nitrotoluene	122 nc	--	ug/l	0.155 U	0.155 U	0.17 U	0.17 U	0.22 U	0.155 U	0.215 U
	8330	4-Amino-2,6-Dinitrotoluene	--	--	ug/l	0.165 U	0.165 U	0.18 U	3.2	0.235 U	0.165 U	0.23 U
	8330	4-Nitrotoluene	0.66 ca	--	ug/l	0.155 U	0.155 U	0.17 U	0.17 U	0.22 U	0.155 U	0.215 U
	8330	HMX	1825 nc	--	ug/l	0.155 U	0.155 U	0.17 U	0.78	0.22 U	0.155 U	0.215 U
	8330	Nitrobenzene	3.4 nc	--	ug/l	0.08 U	0.08 U	0.09 U	0.085 U	0.115 U	0.08 U	0.11 U

Table L12-3
Load Line 12 Summary of All Groundwater Results
RVAAP 14 AOC Characterization
Ravenna Army Ammunition Plant, Ravenna, Ohio

						L12mw-189-GW	L12mw-242-DUP	L12mw-242-GW	L12mw-243-GW	L12mw-244-GW	L12mw-245-GW	L12mw-246-GW
					Sample Date:	10/26/2004	11/30/2004	11/30/2004	11/29/2004	11/29/2004	11/29/2004	11/29/2004
					Sample Depth:	7.83 ft.	20 ft.	20 ft.	10.3 ft.	13.2 ft.	11.7 ft.	17.5 ft.
					Description	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered	UC/Filtered
Group	Method	Parameter	Region 9 PRG (Tap Water)	Unconsolidated Filtered Groundwater Background	Units							
	8330	RDX	0.61 ca	--	ug/l	0.1 U	0.1 U	0.11 U	**1.5**	0.145 U	0.1 U	0.14 U
	8330	Tetryl	365 nc	--	ug/l	0.39 U	0.39 U	0.43 U	0.425 U	0.55 U	0.39 U	0.55 U
Propellants	353.2 Modified	Nitrocellulose	--	--	ug/l	250 U	250 U	250 U	250 U	250 U	250 U	250 U
	8332	Nitroglycerine	4.8 ca	--	ug/l	0.5 UJ	0.18 J	0.55 U	0.55 U	0.7 U	0.5 U	0.7 U
	SW8330 Modified	Nitroguanidine	3650 nc	--	ug/l	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Other Analytes	353.2	Nitrate as N (NO3-N)	10000 nc	--	ug/l	100 U	100 U	100 U	100 U	100 U	100 U	100 U

Notes:
-- - no background/PRG value is available for this analyte
blank cell indicates that the analysis was not performed
ug/l - means micrograms per Liter (parts per billion - ppb)
PRG - preliminary remediation goals (The screeing value for lead is the Maximum Contaminant level (MCL) from the safe Drinking
nc - non-cancer basis
ca - cancer basis
pbk - based on PBK modeling
mcl - based on CWA maximum contaminant level
max - ceiling limit
sat - soil saturation
UC/Filtered – GW sample was filtered for metals and taken from an unconsolidated MW
C/Filtered – GW sample was filtered for metals and taken from a consolidated (bedrock) MW
[n] - nutrient
U - analyte not detected
J - estimated value
R - result rejected during ADR validation
If Result = or > Background, then the value is presented with a shaded/highlighted style
If Result = or > Background & PRG, then result is presented with a bold + shaded/highlighted style
If Result = or > PRG, then the value is presented with a bold style
If Result < PRG & Background, then the value is presented with a normal style.