APPENDIX I

PBA08 Remedial Investigation Summary

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ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
Army	U.S. Department of the Army
bgs	Below Ground Surface
DoD	U.S. Department of Defense
DQO	Data Quality Objective
FS	Feasibility Study
FWCUG	Facility-wide Cleanup Goal
FWSAP	*Facility-Wide Sampling And Analysis Plan*
GPS	Global Positioning System
IDW	Investigation-Derived Waste
ISM	Incremental Sampling Methodology
MS	Matrix Spike
MSD	Matrix Spike Duplicate
Ohio EPA	Ohio Environmental Protection Agency
PBA08 RI	Performance-Based Acquisition 2008 Remedial Investigation
PBA08 SAP	Performance Based Acquisition 2008 Supplemental Investigation Sampling and Analysis Plan Addendum No. 1
QA	Quality Assurance
QC	Quality Control
RI	Remedial Investigation
RVAAP	Ravenna Army Ammunition Plant
TestAmerica	TestAmerica Laboratories, Inc.
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound

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I.0 REMEDIAL INVESTIGATION

This section presents the methods used for developing data quality objectives (DQOs), collecting field data, and managing analytical data and laboratory programs for the Performance-based Acquisition 2008 Remedial Investigation (PBA08 RI) at C Block Quarry. The PBA08 RI was implemented in accordance with the Performance-based Acquisition 2008 Supplemental Investigation Sampling and Analysis Plan Addendum No. 1 (PBA08 SAP) to supplement historical data and complete the remedial investigation (RI) phase of the Comprehensive Environmental Response, Compensation, and Liability Act process. The results of the PBA08 RI sampling completed in 2010, with additional sampling completed in August of 2012, are combined with the 2004 results of the Characterization of 14 areas of concern (AOCs) to evaluate the nature and extent of contamination, assess potential future impacts to groundwater, conduct human health risk assessments and ecological risk assessments, and evaluate the need for remedial alternatives.

As part of the PBA08 RI DQOs, an initial screening approach was used to help focus the investigation on specific chemicals and areas to be further evaluated by assessing the nature and extent of contamination observed in historical samples (Section 3.2.2 of the PBA08 SAP). The screening approach presented in the PBA08 SAP compared sample results from previous investigations at C Block Quarry to the most protective chemical-specific facility-wide cleanup goals (FWCUGs) at the 1E-06 cancer risk level and non-carcinogenic risk hazard quotient of 0.1, as presented in the Ravenna Army Ammunition Plant (RVAAP) Facility-wide Human Health Risk Assessors Manual (USACE 2005). The most protective FWCUGs are referred to as "screening criteria." Previous results were also compared to FWCUGs at the higher target risk of 1E-05 and hazard quotient of 1 to facilitate identification of potential source areas that may require additional sampling to refine the extent of contamination. The decision rules for surface and subsurface soil sampling outlined in the PBA08 SAP are shown in Figures I-1 and I-2. Table I-1 lists the chemicals with detected concentrations that exceed screening criteria in historical soil samples.

Table I-1. Chemicals Detected at Concentrations Above Screening Criteria in Previous Investigations

Surface Soil	Subsurface Soil	Sediment	Surface Water
Arsenic Chromium Chromium, hexavalent 2,4,6-Trinitrotoluene	Not previously sampled	Not previously sampled	Not previously sampled

Note: This table was generated using soil data from the Characterization of 14 Areas of Concern.

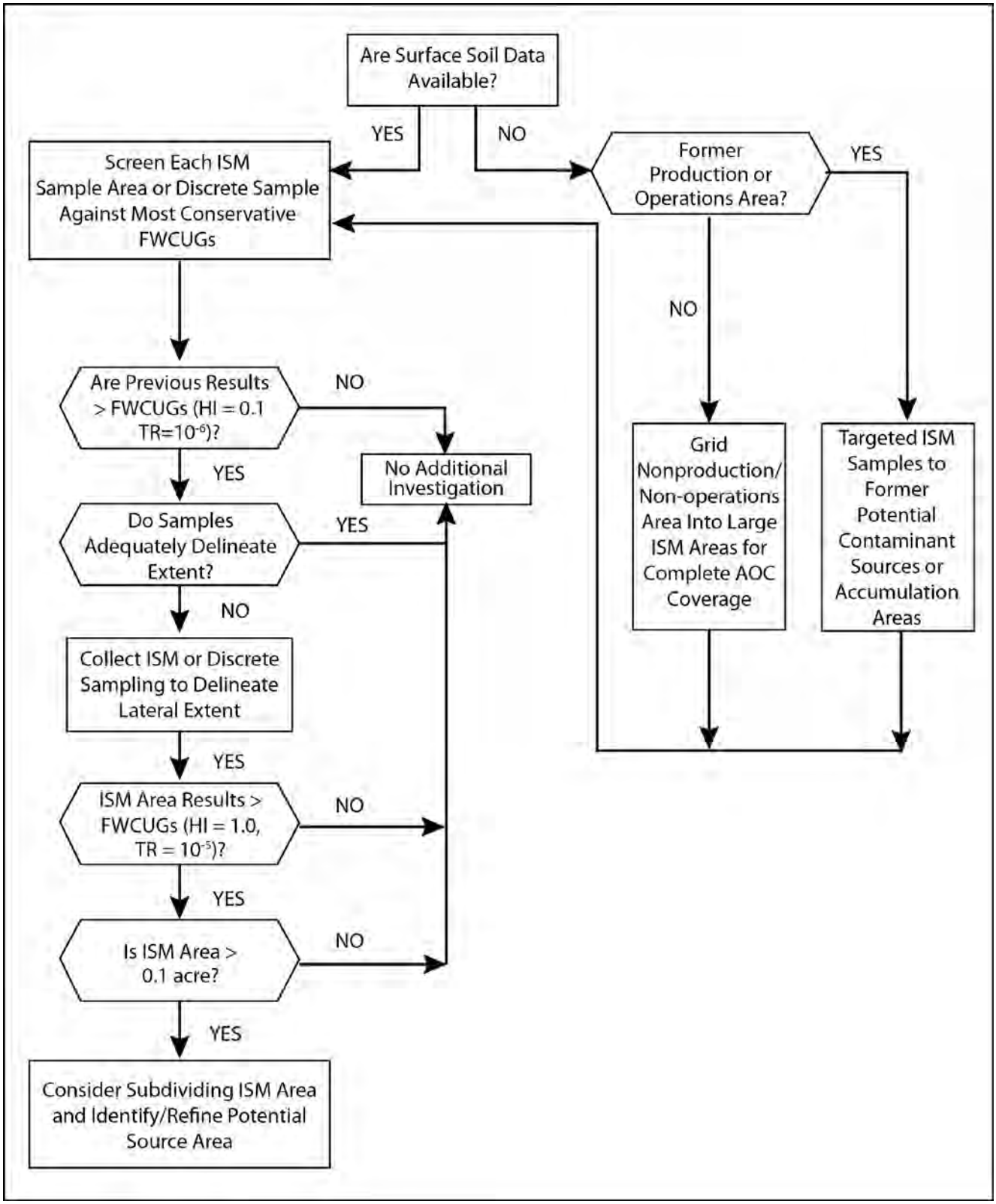

Figure I-1. PBA08 RI Surface Soil Sampling Decision Flowchart

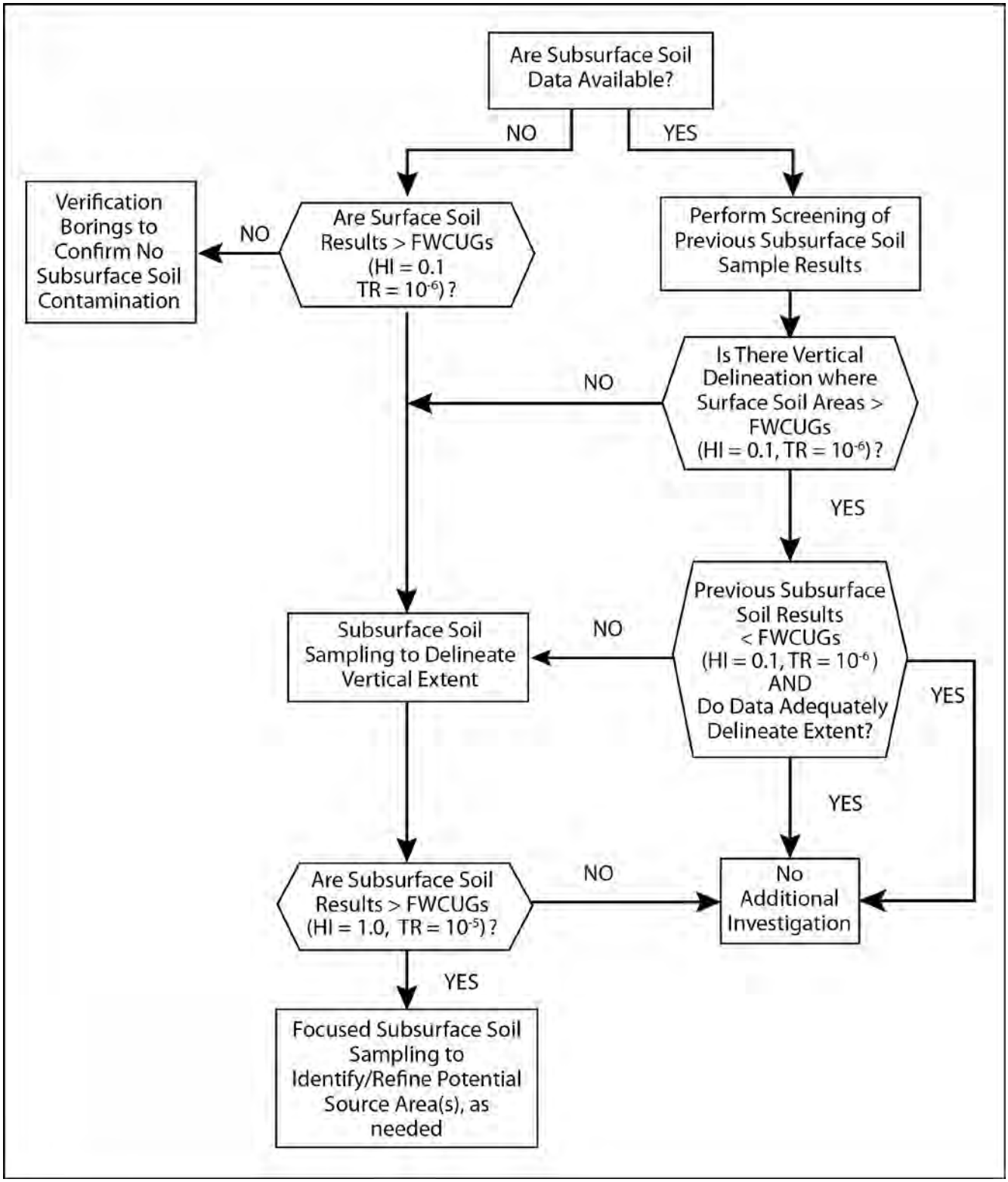

Figure I-2. PBA08 RI Subsurface Soil Sampling Decision Flowchart

Representatives of the U.S. Department of the Army (Army) and Ohio Environmental Protection Agency (Ohio EPA) reviewed and approved the PBA08 RI sample locations and rationale as part of the approval process for the PBA08 SAP in January 2010. The PBA08 RI was conducted from February through April 2010, with additional sampling in August 2012 that included collecting surface soil and subsurface soil using discrete and incremental sampling methodology (ISM) sampling techniques.

No groundwater samples were collected during the PBA08 RI, as the current condition of groundwater will be evaluated as an individual AOC for the entire facility (designated as RVAAP-66) and addressed in a separate RI Report. Also, No surface water or sediment samples were collected because these media are not present at the AOC. The following sections describe the rationale and sample collection methods for each component of the PBA08 RI field investigation.

I.1 SOIL CHARACTERIZATION

Soil samples were collected during two field mobilizations for the PBA08 RI to assess contaminant occurrence and distribution in surface and subsurface soil. The decision-making matrices for the surface soil and subsurface soil sampling plans are presented in Figures I-1 and I-2, respectively.

I.1.1 Soil Sampling Rationale and Methods - March 2010

Previous investigations of C Block Quarry have shown surface soil contamination to be laterally confined by the topography of the AOC caused by the steep slopes of the quarry wall. Because the contamination is laterally confined, there was no need for further surface soil delineation. Therefore, discrete soil borings were used during the 2010 PBA08 field activities to further define the vertical extent of contamination in subsurface soil at C Block Quarry.

The PBA08 RI used discrete samples from five soil borings collected during the 2010 field efforts to characterize subsurface soil. The subsurface soil decision rules are presented in Figure I-2 and were based upon prior surface soil sampling results to define the extent of contamination. Subsurface soil sampling was conducted according to the decision rules approved in the PBA08 SAP. The subsurface soil borings were located based on the following objectives:

- Borings at locations where previous surface soil sampling results exceeded screening criteria and vertical delineation was warranted.
- Borings at locations where previous surface soil sampling results only slightly exceeded screening criteria to confirm that contaminant concentrations did not increase with depth.

Table I-2. PBA08 RI Surface and Subsurface Soil Samples and Rationales

PBA08 RI Location	Comments/Rationale	Sample Type	Depth (ft bgs)	Analyses Performed					
				Metals	Explosives	VOCs	Pesticides/ PCBs	SVOC	Asbestos
CBLsb-007	Delineate vertical extent of previously identified contamination; bedrock encountered at 7 ft	Discrete	0-1	Y	Y	N	N	N	Y
		Discrete	1-4	Y	Y	N	N	N	Y
		Discrete	4-7	Y	Y	N	N	N	Y
		NS	7-13	N	N	N	N	N	N
CBLsb-008	Delineate vertical extent of previously identified contamination; bedrock encountered at 2 ft	Discrete	0-1	Y	Y	N	N	N	Y
		Discrete	1-2	Y	Y	N	N	N	Y
		NS	4-7	N	N	N	N	N	N
		NS	7-13	N	N	N	N	N	N
	QA/QC	Discrete	0-1	Y	Y	N	N	N	Y
		Discrete	0-1	Y	Y	N	N	N	Y
CBLsb-010	Delineate vertical extent of previously identified contamination; bedrock encountered at 4 ft	Discrete	0-1	Y	Y	N	N	N	Y
		Discrete	1-4	Y	Y	N	N	N	Y
		NS	4-7	N	N	N	N	N	N
		NS	7-13	N	N	N	N	N	N
	Geotechnical	Discrete	1.5-3.5	N	N	N	N	N	N
CBLsb-011	Delineate vertical extent of previously identified contamination; bedrock encountered at 4.5 ft. Analyzed for RVAAP full-suite analytes	Discrete	0-1	Y	Y	Y	Y	Y	N
		Discrete	1-4	Y	Y	Y	Y	Y	N
		Discrete	4-4.5	Y	Y	Y	Y	Y	N
		NS	7-13	N	N	N	N	N	N
	QA/QC, Analyzed for RVAAP full-suite analytes	Discrete	1-4	Y	Y	Y	Y	Y	N
		Discrete	1-4	Y	Y	Y	Y	Y	N
CBLsb-012	Delineate vertical extent of previously identified contamination; bedrock encountered at 3 ft	Discrete	0-1	Y	Y	N	N	N	Y
		Discrete	1-4	Y	Y	N	N	N	Y
		NS	4-7	Y	Y	N	N	N	N
		NS	7-13	N	N	N	N	N	N
CBLsb-025	Discrete sample recollected to assess chromium speciation (August 2012). Previous chromium result represents elevated chromium concentration (CBLsb-010 at 2,100 mg/kg)	Discrete	0-1	Y	N	N	N	N	N
		Discrete	1-2	Y	N	N	N	N	N

Table I–2. PBA08 RI Subsurface Soil Rationale and Analyses (continued)

PBA08 RI Location	Comments/Rationale	Sample Type	Depth (ft bgs)	Analyses Performed					
				Metals	Explosives	VOCs	Pesticides/ PCBs	SVOC	Asbestos
CBLsb-026	Discrete sample recollected to assess chromium speciation (August 2012). Previous chromium result represents elevated chromium concentration (CBLss-003M at 240 mg/kg). Bedrock encountered at 1.8 ft	Discrete	0-1	Y	N	N	N	N	N
		Discrete	1-1.8	Y	N	N	N	N	N
	QC sample collected	Discrete	0-1	Y	N	N	N	N	N

bgs = Below ground surface.
ft = Feet.
mg/kg = Milligrams per kilogram.
NS = Not sampled due to refusal.
PBA08 RI = Performance-based Acquisition 2008 Remedial Investigation.
PCB = Polychlorinated biphenyl.
QA = Quality assurance.
QC = Quality control.
RVAAP = Ravenna Army and Ammunition Plant.
SVOC = Semi-volatile organic compound.
VOC = Volatile organic compound.

The subsurface soil was characterized by placing borings in various areas, including areas with previous surface soil results greater than the screening criteria, and areas with previous results only slightly greater than the screening criteria. In all cases, subsurface borings were biased toward areas where contamination was identified in surface soil ISM samples. Soil samples from five soil borings were installed to further delineate the vertical extent of contamination in subsurface soil at the AOC (Figure I-3). Table I-2 presents the specific rationale for each subsurface soil sample collected for the PBA08 RI.

Subsurface soil borings were completed by direct push technology using a Geoprobe® and/or hand auger. Direct push technology soil samples were collected in a single-use acetate liner at discrete sample locations and hand auger samples were collected in a chemically decontaminated 3-inch-diameter stainless steel auger bucket.

To assess the depths of exposure of the Resident Receptor, each soil boring was to be sampled at 0–1, 1–4, 4–7, and 7–13 ft below ground surface (bgs). These sample intervals were selected to evaluate surface and subsurface exposure depths for the Resident Receptor (0–1 and 1–13 ft bgs) and National Guard Trainee (0–4 and 4–7 ft bgs). Bedrock at this AOC occurs at shallow depths which did not allow for sample collection of the desired intervals. Bedrock was encountered as shallow as 2 ft bgs, and as deep as 7 ft bgs. Due to the shallow nature of bedrock at this particular AOC, deep sample intervals (7–13 ft bgs) could not be collected. Furthermore, CBLsb-007 was the only boring in which a 4–7 ft bgs interval was collected. Each interval was composited and homogenized in a stainless steel bowl, with the exception of volatile organic compound (VOC) samples.

No samples were collected from 7–13 ft bgs at C Block Quarry due to the presence of shallow bedrock. Soil boing CBLsb-007 was terminated at 7 ft bgs, CBLsb-008 was terminated at 2 ft bgs, CBLsb-010 was terminated at 4 ft bgs, CBLsb-011 was terminated at 4.5 ft bgs, and CBLsb-012 was terminated at 3 ft bgs.

All subsurface soil samples were analyzed for target analyte list metals, explosives, and asbestos. A minimum of 10% of samples (three) were analyzed for RVAAP full-suite analytes which included TAL metals, explosives, propellants (nitrocellulose and nitroguanidine), semi-volatile organic compounds, VOCs, polychlorinated biphenyls, and pesticides. Two quality control (QC) field duplicate and two quality assurance (QA) split samples were collected to satisfy the QA/QC sample requirements of 10% frequency for subsurface soil samples. A lithologic soil description was completed for each soil boring and is included in Appendix A.

One geotechnical sample was collected from one boring location to provide soil data for fate and transport modeling. A pilot boring was installed with a Geoprobe® to a depth of 4 ft bgs to lithologically characterize the soil and determine the appropriate geotechnical sample intervals (Appendix A). The geotechnical sample location was offset from the pilot boring and drilled with hollow stem auger attachments. Geotechnical samples were collected through the hollow stem augers directly into Shelby tubes. Shelby tubes were collected from 1.5–3.5 ft bgs, directly above the saturated zone observed in the pilot boring. Shelby tubes were sealed with wax, capped, and

submitted for laboratory geotechnical analysis for porosity, bulk density, moisture content, total organic carbon, grain size fraction analysis, and permeability. Laboratory analytical results for geotechnical samples are presented in Appendix D. QA/QC samples were not collected for geotechnical samples.

After the discrete samples were collected, excess soil was designated as investigative-derived waster (IDW) and placed in lined, labeled 55-gal drums that were sealed after use and staged at Building 1036. IDW management practices for all media are discussed in Appendix F. Hand auger borings were backfilled to ground surface with dry bentonite chips while hydrating with the project-approved potable water.

I.1.2 August 2012 Chromium Speciation Samples

In August 2012, two ISM chromium speciation samples (and one QC field duplicate) were recollected from historically sampled ISM areas (CBLss-003M and CBLss-005M) to evaluate the potential contribution of hexavalent chromium to the total chromium concentration in soil. In addition, four discrete subsurface soil samples and one QC field duplicate were collected from two soil borings located within ISM area with elevated chromium concentration (CBLss-003M) or near CBLsb-010 (Table I-2 and Figure I-3). All samples were analyzed for total and hexavalent chromium.

For the ISM samples, the corners of each of the designated ISM sampling areas were located using a digital global positioning system (GPS) and were marked using wooden stakes. Sampling crews selected aliquot locations by walking over the entire ISM sampling area and marking the requisite number of points using flagging. At least 30 aliquots were collected for each ISM sample. Aliquot locations were randomly selected in the field and were not predetermined using a grid. Approximately equal sample volume aliquots were collected from a depth of 0–1 ft bgs using a decontaminated ⅝-inch-diameter push probe. A soil description was completed for each ISM sample and is included in Appendix A. All aliquots collected from a given ISM sample area were combined in a labeled container for transport to the laboratory in accordance with the PBA08 SAP. At the laboratory, each sample was air-dried, sieved, and ground for specified non-volatile chemical analyses.

QC field duplicate samples were collected from ISM sample areas at a 50% frequency (one sample). The QC field duplicate samples were submitted to the laboratory as "blind" and were used to determine whether the field sampling technique was reproducible, and as an indicator of sample heterogeneity. QA/QC samples were collected as replicate ISM samples requiring three separate ISM samples from the same sample area. The QA/QC samples were collected from a set of 30 aliquot locations that were positioned adjacent to the location used for the initial ISM sample. Aliquots for QA/QC samples were collected in separate stainless steel bowls and placed into separate labeled containers.

Samples from 0–1 and 1–2 ft bgs were collected in accordance with the bucket hand auger method described in Section 4.5.2.1.1 of the Facility-wide Sampling and Analysis Plan (USACE 2001) (herein referred to as the FWSAP) (USACE 2001c).

The four discrete chromium speciation samples were collected from 0–1 and 1–2 ft bgs to evaluate the potential contribution of hexavalent chromium to the total chromium concentration in soil. Samples from were collected in accordance with the bucket hand auger method described in Section 4.5.2.1.1 of the FWSAP (USACE 2001). An updated version of the FWSAP was developed in February 2011 and approved by the Ohio EPA; however, the PBA08 RI was implemented prior to approval of this updated version. Four samples were collected from areas previously identified as having elevated total chromium concentrations. Field duplicate samples were collected for the chromium speciation at a 25% frequency (one sample). Matrix spike (MS) and matrix spike duplicate (MSD) samples were also collected for chromium speciation at a 25% frequency (one MS and one MSD). A sample log, including soil description was completed for each sample, and all logs are included in Appendix A.

After the discrete samples were collected, excess soil was designated as IDW and placed in lined, labeled 55-gal drums that were sealed after use and staged at Building 1036. IDW management practices for all media are discussed in Appendix F. Hand auger borings were backfilled to ground surface with dry bentonite chips and hydrated with the project-approved potable water.

I.1.3 Asbestos Characterization and Sampling

An Asbestos Hazard Evaluation Specialist, certified by the State of Ohio Department of Health, conducted the asbestos survey and sampling at C Block Quarry. The results report is presented in Appendix K. A visual survey was conducted for the entire AOC. Six building material samples and one soil sample were collected at the locations presented on Figure I-3. The asbestos sampling included identifying suspect material, estimating approximate quantity of suspected asbestos-containing material, and collecting and analyzing samples from each material identified. Bulk samples were placed into clean, sealable bags and were analyzed by polarized light microscopy using U.S. Environmental Protection Agency (USEPA) Method 600/R-93/116.

Table I-3. Summary of Asbestos-Containing Material Survey Samples

Sample ID	Material Description	Approximate % of Asbestos	Friability[1]
CBLSS-013-5793-BD	Grey Transite (cement shingle)	16% chrysotile	F
CBLSS-014-5794-BD	Beige Transite (cement shingle)	20% chrysotile	F
CBLSS-014-5795-BD	Black Tar (from black building insulation)	10% chrysotile	F
CBLSS-015-5796-BD	Black Tar Paper (from black building insulation)	35% chrysotile	F
CBLSS-016-5797-BD	Beige Firebrick (orange cement block)	ND	NF-II
CBLSS-017-5798-BD	Surface soil, 0–1 ft bgs (brown soil)	<1% chrysotile	NA
CBLSS-018-5799-BD	Black Cinder (black rock-like material)	ND	NF-II

[1]Although the Asbestos Results Report in Appendix J indicates the soil sample in CBLss-017-5798-BD is friable, the friability determination of the soil sample is not applicable.
bgs = Below ground surface.
F = Friable.
ft = Feet.
ID = Identification.
NA = Not applicable.
ND = Not detected.
NF-II = Non-friable category II.
< = Less than.

I.2 CHANGES FROM THE WORK PLAN

Changes to the PBA08 SAP are documented in the field change requests provided in Appendix B. Changes made in the field based on AOC-specific conditions are not documented on field change requests but on the field sampling logs (Appendix A). No changes were made at C Block Quarry during the PBA08 RI.

I.3 ANALYTICAL PROGRAM OVERVIEW

The following sections describe the analytical program followed during the PBA08 RI.

I.3.1 Data Quality Objectives

Samples were collected and analyzed according to the FWSAP and the PBA08 SAP and were prepared in accordance with U.S. Army Corps of Engineers (USACE) and USEPA guidance. The FWSAP and PBA08 SAP outline the organization, objectives, intended data uses, and QA/QC activities to perform in order to achieve the desired DQOs for maintaining the defensibility of the data. Project DQOs were established in accordance with USEPA Region 5 guidance. Requirements for sample collection, handling, analysis criteria, target analytes, laboratory criteria, and data verification criteria for the RI are consistent with USEPA and U.S. Department of Defense (DoD) requirements. DQOs for this project include analytical precision, accuracy, representativeness, completeness, comparability, and sensitivity for the measurement data. Appendix C presents an assessment of the analytical program objectives.

I.3.2 Quality Assurance and Quality Control

Samples were properly packaged for shipment and transferred by courier to the laboratory for analysis. A signed chain-of-custody record (included in Appendix D) with sample numbers and locations was enclosed with each shipment. When transferring possession of samples, the individuals relinquishing and receiving the samples signed, dated, and noted the time on the record. All shipments were in compliance with applicable U.S. Department of Transportation regulations for environmental samples.

QA/QC samples for this project included field blanks, trip blanks, QC field duplicates, QA split samples, laboratory method blanks, laboratory control samples, laboratory duplicates, and MS/MSD samples. Table I-4 summarizes QA/QC samples utilized during the PBA08 RI and how each sample type was used to support the quality of the analytical data. An evaluation of QA/QC samples and their contribution to documenting project data quality is provided in Appendix C.

Table I-4. Summary of PBA08 RI QA/QC Samples

Sample Type	Rationale
Field Blank	Analyzed to determine contamination in source material that may contribute to sample contamination.
Trip Blank	Analyzed to assess the potential for cross contamination of samples due to contaminant interference during sample shipment and storage.
Field Duplicate	Analyzed to determine sample heterogeneity and sampling methodology reproducibility.
Equipment Rinsate	Analyzed to assess the adequacy of the equipment decontamination processes for non-dedicated sampling equipment.
Laboratory Method Blanks	Analyzed to assess the contamination level in the laboratory preparation and analysis process.
Laboratory Duplicate Samples	Analyzed to assist in determining the analytical reproducibility and precision of the analysis for the samples of interest and provide information about the effect of the sample matrix on the measurement methodology.
Matrix Spike/Matrix Spike Duplicate	
Laboratory Control Sample	Analyzed to determine the accuracy and precision of the analytical method implemented by the laboratory and to monitor the laboratory's analytical process control.
QA Split	Analyzed to provide independent verification of the accuracy and precision of the principal analytical laboratory.

FS = Feasibility study.
QA = Quality assurance.
QC = Quality control.
PBA08 RI = Performance-based Acquisition 2008 Remedial Investigation.

I.3.3 Field Analyses

No field laboratory analyses (i.e., field explosives testing) were conducted for the PBA08 RI. Additionally, field screening for organic vapors was not used to guide sampling or analytical efforts.

I.3.4 Laboratory Analyses

Samples collected during the PBA08 RI were analyzed by TestAmerica Laboratories, Inc. (TestAmerica) of North Canton, Ohio, and West Sacramento, California, as a subcontractor to White Water Associates, Inc., of Amasa, Michigan. Collected QA split samples were analyzed by USACE's contracted QA laboratory, RTI Laboratories, Inc., of Livonia, Michigan. TestAmerica and RTI Laboratories, Inc. are accredited by the DoD Environmental Laboratory Accreditation Program.

All analytical procedures were completed in accordance with applicable professional standards, USEPA requirements, government regulations and guidelines, DoD Quality Systems Manual Version 3, USACE Louisville District analytical QA guidelines, and specific project goals and requirements. In addition to these standards, the analytical laboratories were required to strictly adhere to the requirements set forth in the FWSAP and PBA08 SAP so that conditions adverse to data quality would not arise. Project quantitation level goals for analytical methods were listed in the Quality Assurance Project Plan. These goals and exceptions are further discussed in Appendix C Data Quality Control Summary Report. While some quantitation levels were elevated above FWCUGs, all method detection limits for undetected analytes remained below these levels. Preparation and analyses for chemical parameters were performed according to the methods listed in Table I-5. Additionally, soil

geotechnical analysis for porosity, bulk density, moisture content, grain size fraction, and permeability were performed in compliance with American Society for Testing and Materials test methods.

Table I-5. Summary of PBA08 RI Sample Preparation and Analytical Procedures

Parameter	Soil and Sediment		Surface Water	
	Preparation	Analysis	Preparation	Analysis
Inorganic chemicals	SW-846 3050B	SW-846 6020	SW-846 3005A	SW-846 6020
Mercury	--	SW-846 7471A	--	SW-846 7470A
Explosives	--	SW-846 8330B	--	SW-846 8330B
SVOCs and PAHs	SW-846 3540C	SW-846 8270C	SW-846 3520C	SW-846 8270C
Propellants: Nitrocellulose Nitroguanidine	 -- SW-846 3550A	 353.2 Modified SW-846 8330M	 -- SW-846 3535	 353.2 Modified SW-846 8330M
VOCs	SW-846 5030B	SW-846 8260B	SW-846 5030B	SW-846 8260B
Pesticides	SW-846 3540C	SW-846 8081A	SW-846 3520C	SW-846 8081A
PCBs	SW-846 3540C	SW-846 8082	SW-846 3520C	SW-846 8082
Hexavalent Chromium	SW-846 3060A	SW-846 7196A	--	SW-846 7196A

FS = Feasibility study.
PAH = Polycyclic aromatic hydrocarbon.
PCB = Polychlorinated biphenyl.
PBA08 = Performance-based Acquisition 2008 Remedial Investigation.
SVOC = Semi-volatile organic compound.
VOC = Volatile organic compound.
-- = Preparation steps included in analytical method.

Leidos is the custodian of project files and will maintain the contents of the files for this investigation, including all relevant records, reports, logs, field notebooks, photographs, subcontractor reports, correspondence, and sample custody forms. These files will remain in a secure area under the custody of the Leidos project manager until they are transferred to USACE Louisville District and the Army at the end of the 2008 performance-based acquisition project.

Analytical data reports from the project laboratory were forwarded to the USACE Louisville District laboratory data validation contractor for validation, review, and QA comparison. White Water Associates, Inc. and TestAmerica will retain all original raw data (hard copy and electronic copy) in a secure area under the custody of the laboratory project manager for a minimum of seven years.

I.3.5 Data Review, Verification, and Quality Assessment

Data were produced, reviewed, and reported by the laboratory in accordance with specifications in the PBA08 SAP, USACE Louisville District analytical QA guidelines, and the laboratory's QA manual.

TestAmerica performed in-house analytical data reduction under the direction of the laboratory project manager and QA officer. These individuals were responsible for assessing data quality and informing Leidos and USACE of any data considered "unacceptable" or requiring caution by the data user in terms of its reliability.

Final reports were generated by the laboratory project manager. Data were then delivered to Leidos for verification. TestAmerica prepared and retained full analytical and QC documentation for the project in paper copy and electronic storage media (e.g., compact disk), as directed by the analytical methodologies employed. Laboratory reports included documentation verifying analytical holding time compliance.

Leidos performed a systematic process utilizing automated data review software for data verification to ensure the precision and accuracy of the analytical data were adequate for their intended use. The automated data review outlier reports are included as Attachment 2 to Appendix C. This verification also attempted to minimize the potential of using false-positive or false-negative results in the decision-making process (i.e., to ensure that detected versus non-detected chemicals were accurately identified). This approach was consistent with the DQOs for the project and with the analytical methods used for determining chemicals of concern and calculating risk. "Definitive data" were reported consistent with the deliverables identified in the project sampling and analysis plan. These definitive data were then verified through the review process outlined in the project sampling and analysis plan and presented in Appendix C. During the review process, results were qualified as estimated, indicating accuracy, precision, or sensitivity was less than desired but adequate for their intended use; no data were rejected. The completeness goal for analytical data is 90% as defined in Tables 3-1 and 3-2 of the FWQAPP. The project achieved this goal by collecting all samples presented in the PBA08 SAP and producing usable results for 100% of all sample analyses performed. In addition to the Leidos data review, a 10% validation of all data was performed by USACE to evaluate data usability.

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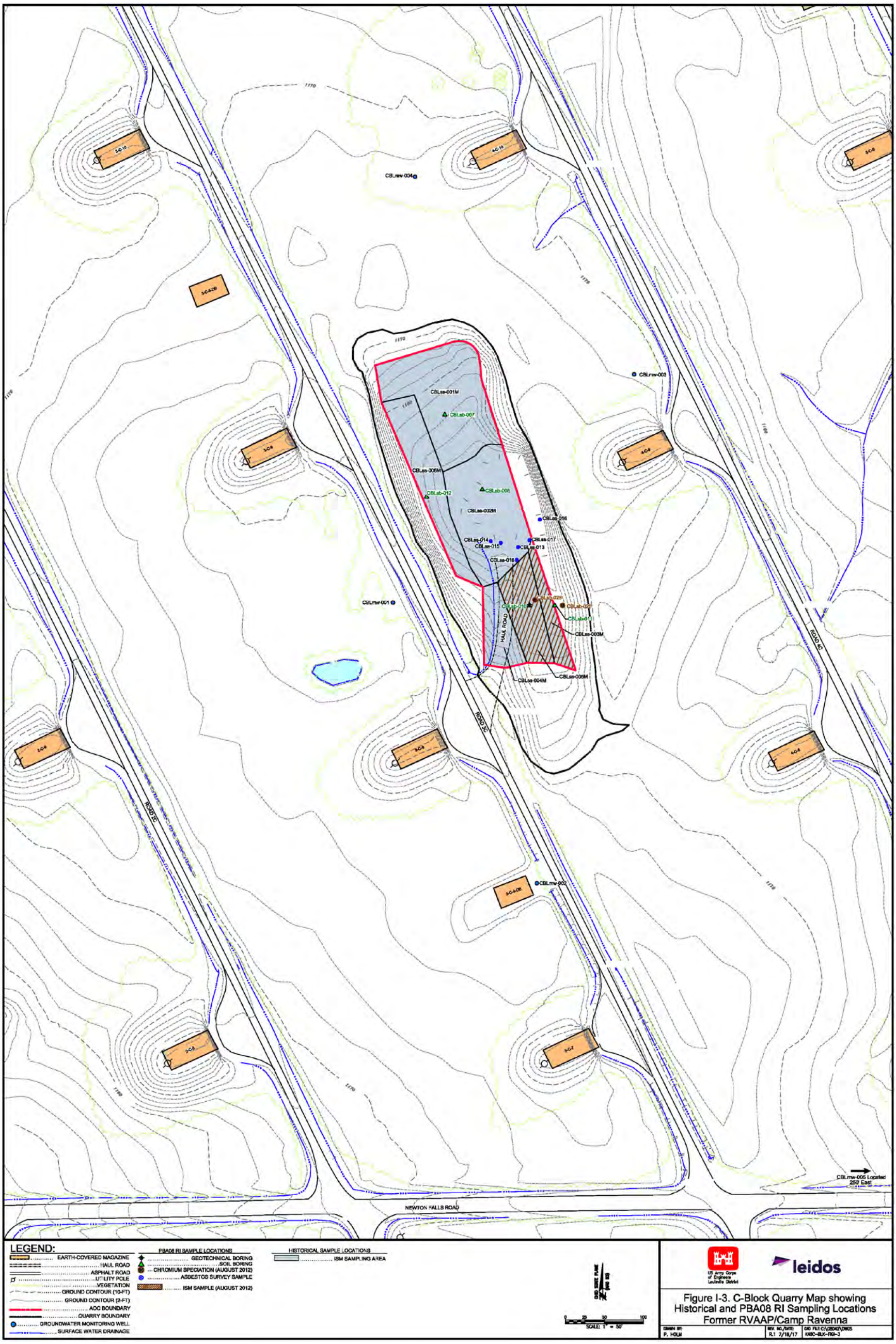

Figure I-3. C Block Quarry Sampling Locations – Former RVAAP/Camp Ravenna

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REFERENCES

USACE 2001. *Facility-wide Sampling and Analysis Plan for Environmental Investigations at the Ravenna Army Ammunition Plant, Ravenna, Ohio*. March 2001.

USACE 2005. *RVAAP Facility-Wide Human Health Risk Assessors Manual – Amendment 1*. December 2005.

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