Final

Historical Records Review Report for the 2010 Phase I Remedial Investigation Services at Compliance Restoration Sites (9 Areas of Concern) Revision 0

Ravenna Army Ammunition Plant
Ravenna, Ohio

Contract No. W912QR-08-D-0008
Delivery Order No. 0019

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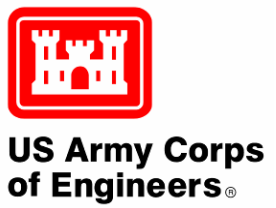

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Louisville District

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None.

14. ABSTRACT

This Historical Records Review Report provides results of historical information research and property visits for nine (9) Areas of Concern (AOCs) at the former Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio. The project scope was to conduct Phase I Remedial Investigation (RI) services at the 9 AOCs, including review of available historical information, property visits and visual inspections, interviews of knowledgable persons, and preparation of a Historical Records Review Report documenting results of the work. The scope of the project is equivalent to a Preliminary Assessment (PA) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The 9 AOCs are referred to as Compliance Restoration (CR) sites under the RVAAP Installation Restoration Program (IRP) and include:

- CC-RVAAP-68: Electric Substations (East, West, No. 3)
- CC-RVAAP-69: Building 1048 Fire Station
- CC-RVAAP-70: East Classification Yard
- CC-RVAAP-72: Facility-Wide Underground Storage Tanks (USTs)
- CC-RVAAP-73: Facility-Wide Coal Storage
- CC-RVAAP-74: Building 1034 Motor Pool Hydraulic Lift
- CC-RVAAP-75: George Road Sewage Treatment Plan
- CC-RVAAP-76: Depot Area
- CC-RVAAP-77: Building 1037 Laundry Waste Water Sump

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Final

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600 Martin Luther King, Jr. Place
Louisville, Kentucky 40202

Prepared by:
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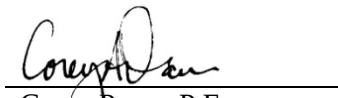
8866 Commons Boulevard
Twinsburg, Ohio 44087

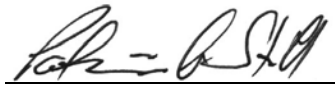
December 22, 2011

CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

Science Applications International Corporation (SAIC) has completed the Historical Records Review Report for the 2010 Phase I Remedial Investigation Services at Compliance Restoration Sites (9 Areas of Concern) at the Ravenna Army Ammunition Plant, Ravenna, Ohio. Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of data quality objectives; technical assumptions; methods, procedures, and materials to be used; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing United States Army Corps of Engineers (USACE) policy.



Corey Pacer, P.E. — Date: 04/19/11
Study/Design Team Leader



Patricia A. Stoll, P.E. — Date: 04/19/11
Independent Technical Review Team Leader

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

Internal SAIC Independent Technical Review was conducted on the Preliminary Draft version of this document. Subsequent versions of this document (e.g., Draft and Final) incorporated changes based on the technical reviews of USACE, the Ohio Army National Guard, and the Ohio Environmental Protection Agency. Internal SAIC Independent Technical Review comments are recorded on a Document Review Record per SAIC quality assurance procedure QAAP 3.1. This Document Review Record is maintained in the project file. Changes to the report addressing the comments have been verified by the Study/Design Team Leader. As noted above, all concerns resulting from independent technical review of the project have been considered.

Kevin Jago, P.G. — Date: 04/19/11
Principal w/ A-E firm

DOCUMENT DISTRIBUTION
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Ravenna, Ohio

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NGB = National Guard Bureau
OHARNG = Ohio Army National Guard
Ohio EPA-NEDO = Ohio Environmental Protection Agency-Northeast District Office
RVAAP = Ravenna Army Ammunition Plant
USACE = United States Army Corps of Engineers
USAEC = United States Army Environmental Command
REIMS = Ravenna Environmental Information Management System
SAIC = Science Applications International Corporation

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ABBREVIATIONS, ACRONYMS, AND BREVITY CODES

amsl	Above Mean Sea Level
AOC	Area of Concern
AST	Aboveground Storage Tank
bgs	Below Ground Surface
BRAC	Base Realignment and Closure
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
BUSTR	Bureau of Underground Storage Tank Regulations
Camp Ravenna	Camp Ravenna Joint Military Training Center
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CON/HTRW	Containerized Hazardous, Toxic, and Radioactive Waste
CR	Compliance Restoration
DFFO	Directors Final Findings and Orders
DLA	Defense Logistics Agency
gpm	Gallons Per Minute
HE	High Explosive
HTRW	Hazardous, Toxic, and Radioactive Waste
ID	Identification
IED	Improvised Explosive Device
IRP	Installation Restoration Program
KVA	Kilovolt-ampere
MEC	Munitions and Explosives of Concern
MHE	Material Handling Equipment
MMRP	Military Munitions Response Program
MRS	Munitions Response Site
NCP	National Contingency Plan
NFA	No Further Action
NGB	National Guard Bureau
NPDES	National Pollutant Discharge Elimination System
OAC	Ohio Administrative Code
ODNR	Ohio Department of Natural Resources
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
PAH	Polycyclic Aromatic Hydrocarbon
PBA08	Performance-Based Acquisition 2008
PBA08 RI	Performance-Based Acquisition 2008 Remedial Investigation
PCB	Polychlorinated Biphenyl
PID	Photoionization Detector
POL	Petroleum, Oil, and Lubricant
ppb	Parts Per Billion
ppm	Parts Per Million
REIMS	Ravenna Environmental Information Management System

ABBREVIATIONS, ACRONYMS, AND BREVITY CODES (CONTINUED)

RI	Remedial Investigation
RVAAP	Ravenna Army Ammunition Plant
SAIC	Science Applications International Corporation
SI	Site Investigation
SOW	Statement of Work
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCLP	Toxicity Characteristic Leaching Procedure
TNT	2,4,6-Trinitrotoluene
TPH	Total Petroleum Hydrocarbon
USACE	United States Army Corps of Engineers
USCA	United States Code Annotated
UST	Underground Storage Tank
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

ES.1 INTRODUCTION AND SCOPE

This Historical Records Review Report provides results of historical information research and property visits for nine (9) areas of concern (AOCs) at the Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio. Science Applications International Corporation (SAIC) performed this work under Contract W912QR-08-D-0008, Delivery Order No. 0019 with the United States Army Corps of Engineers (USACE) Louisville District. The project scope is to conduct Phase I Remedial Investigation (RI) services at the 9 AOCs (including review of available historical information), conduct property visits and visual inspections, and prepare this Historical Records Review Report.

The 9 AOCs are referred to as Compliance Restoration (CR) sites under the RVAAP Installation Restoration Program (IRP) and include:

- CC-RVAAP-68: Electric Substations (East, West, and No. 3);
- CC-RVAAP-69: Building 1048 Fire Station;
- CC-RVAAP-70: East Classification Yard;
- CC-RVAAP-72: Facility-Wide Underground Storage Tanks (USTs);
- CC-RVAAP-73: Facility-Wide Coal Storage;
- CC-RVAAP-74: Building 1034 Motor Pool Hydraulic Lift;
- CC-RVAAP-75: George Road Sewage Treatment Plant;
- CC-RVAAP-76: Depot Area; and
- CC-RVAAP-77: Building 1037 Laundry Waste Water Sump.

These 9 CR sites qualified for environmental investigation and remediation under the U.S. Army's IRP expanded guidelines. The guidelines were expanded in December 2008 to extend the time period for eligible AOCs from October 17, 1986, to present day activities. These CR sites were part of the facility support and infrastructure operations that involved material and solid waste, such as petroleum products or polychlorinated biphenyls (PCBs), not specifically regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) that could potentially present a risk to human health and the environment.

Planning and performance of all elements of the project scope are in accordance with the requirements of the Ohio Environmental Protection Agency (Ohio EPA) *Director's Final Findings and Orders* (DFFO) for RVAAP, dated June 10, 2004 (Ohio EPA 2004). The DFFO requires conformance with CERCLA and the National Contingency Plan (NCP). This Historical Records Review Report was prepared consistent with guidance outlined in *Guidance for Performing Preliminary Assessments Under CERCLA* (USEPA 1991). No sampling was conducted as part of the scope for this project. Recommendations for further investigation of soil, sediment, and surface water are provided based on the historical records review. Recommendations for further investigation of these media will be evaluated by the RVAAP stakeholder team and implemented, as applicable, under

a separate project. Recommendations related to investigation of groundwater in this report are limited to identifying potential contaminant releases to soil that could migrate to groundwater. Installation of monitoring wells and completion of a RI for groundwater will be addressed separately as part of future RI activities for the RVAAP-66 Facility-Wide Groundwater AOC.

ES.2 METHODS AND INFORMATION SOURCES FOR THE HISTORICAL RECORDS REVIEW

SAIC performed a comprehensive search and review of available historical information pertaining to the 9 CR sites. These historical records included, but were not limited to, technical and administrative reports, letters, memoranda, field notes, environmental sampling and analysis data, historical ground-level photographs, maps and engineering drawings, and aerial photographs. SAIC accessed the following historical information and data sources:

- RVAAP Administrative Record;
- RVAAP Environmental Information Management System (REIMS);
- RVAAP public information website (*RVAAP Access* at www.rvaap.org);
- RVAAP historical records storage (e.g., "RVAAP cold storage files");
- Ohio Army National Guard (OHARNG) Camp Ravenna Joint Military Training Center (herein referred to as Camp Ravenna) historical hard copy drawings and map files;
- Online information sources through data centers directed by the project scope of work, as well as other linked data sources;
- Leading internet search engines (e.g., Google, AOL, MSN, and Yahoo!); and
- Ohio State Fire Marshal's Office, Ohio EPA Central District Office and Northeast District Office, and the Ravenna City Fire Department for historical closure records for USTs at RVAAP.

SAIC conducted interviews with former RVAAP employees and other persons currently affiliated with RVAAP with knowledge of past CR site operations, including current employees of RVAAP, Camp Ravenna, and USACE Louisville District.

In November 2010, SAIC conducted property visits and perimeter surveys of the 9 CR sites. In accordance with RVAAP policy, unexploded ordnance (UXO)-qualified personnel accompanied the property visit team when conducting inspections within designated munitions response sites (MRSs). The following inspection items were evaluated during the property visits and photographs were taken to document current AOC conditions:

- Any conditions warranting immediate or emergency action;

- Overall current AOC conditions, including presence of buildings, their condition, and current use;
- Physical evidence of munitions and explosives of concern (MEC);
- Evidence of past uses of the property and any hazardous, toxic, or radioactive waste (HTRW) releases (i.e., staining, residue, odor, free product, stressed vegetation, seeps);
- Evidence of or releases from any containerized HTRW (CON/HTRW);
- Locations of any maintenance and refueling operations conducted on the property;
- Areas where petroleum or chemical storage took place [e.g., USTs, aboveground storage tanks (ASTs), storage buildings];
- Presence of disposal areas, landfills, or burn pits;
- Presence of transformers and condition or location where transformers were formerly located;
- Location of any on-site groundwater production wells;
- Presence of suspected or known sensitive habitats, natural resources, or cultural resources; and
- Potential preferential pathways for surface water runoff and the nearest receiving surface water body.

ES.3 FINDINGS AND RECOMMENDATIONS OF THE HISTORICAL RECORDS REVIEW

Section 11.0 of this report summarizes the findings and recommendations of the historical records review. A summary of key findings and recommendations are provided in the following sections.

ES.3.1 Key Findings

Key findings from the historical records review include:

- Discovery of eight USTs not listed in the RVAAP inventory (undocumented USTs);
- Discovery of apparent former coal storage locations at the East Classification Yard and Building U-16 not listed in the RVAAP facility inventory (undocumented former coal storage location); and

- Discovery of records documenting 12 buried "paint cans" (estimated 5-gallon cans) during an attempt to locate the UST near the Bolton Mansion (EE-102).

ES.3.2 Recommendations

The basis and rationale for a further action recommendation for a CR site includes whether or not historical information indicates operations involving HTRW or MEC, documentation of spills or releases that were not fully characterized, and evidence of potential releases observed during the property visits.

In the case of USTs, no further action (NFA) is recommended based on the following:

- The UST was regulated under the Ohio State Fire Marshal's Office, Bureau of Underground Storage Tank Regulations (BUSTR), and documentation was located confirming removal and closure in accordance with regulatory requirements; or

- The UST was not regulated under BUSTR, but documentation was located confirming its removal and closure consistent with regulatory requirements.

A further action recommendation is made for a UST if documentation could not be found confirming tank removal and closure consistent with regulatory requirements.

NFA is recommended for former coal storage locations if visual inspection of the coal storage locations indicates no coal residues are present. Additional considerations included whether the facilities associated with former coal storage locations have been demolished and the areas have been re-graded and/or backfilled, thereby removing or dispersing any surficial coal residues. A further action recommendation is made if property visits and visual inspections indicate the presence of coal residues.

Compliance Restoration Sites That Warrant No Further Action

As summarized in Section 11.0, no additional investigation or action is warranted for 43 of the 58 USTs in CC-RVAAP-72 and 15 former coal storage locations in CC-RVAAP-73.

Compliance Restoration Sites That Warrant Further Action

Based on the historical records review, further investigation or action is warranted at the following CR Sites:

- CC-RVAAP-68: Electric Substations (East, West, and No. 3)

- CC-RVAAP-69: Building 1048 Fire Station

- CC-RVAAP-70: East Classification Yard

- CC-RVAAP-72: Facility-Wide USTs (specifically RV-4, RV-5, RV-41, RV-46, RV-86, RV-87, RV-88 RV-89, CC-RVAAP-72-01, CC-RVAAP-72-02, CC-RVAAP-72-03, CC-RVAAP-72-04, CC-RVAAP-72-05, CC-RVAAP-72-06, and CC-RVAAP-72-08)

- CC-RVAAP-73: Facility-Wide Coal Storage Locations:
  - North Line Coal Tipple
  - Sand Creek Coal Tipple
  - Building U-16
  - Previously undocumented coal storage location south of the East Classification Yard

- CC-RVAAP-74: Building 1034 Motor Pool Hydraulic Lift

- CC-RVAAP-75: George Road Sewage Treatment Plant

- CC-RVAAP-76: Depot Area

- CC-RVAAP-77: Building 1037 Laundry Waste Water Sump

The basis and rationale for further action recommendations are detailed in Tables 11-1 through 11-3. Environmental media and/or receptors that may have been impacted by historical operations at the CR sites are also noted, along with recommended analytical parameters.

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1.0 INTRODUCTION

Science Applications International Corporation (SAIC) has been contracted by the United States Army Corps of Engineers (USACE) Louisville District to conduct Phase I Remedial Investigation (RI) services at nine (9) areas of concern (AOCs) at the Ravenna Army Ammunition Plant (RVAAP) (Figures 1-1 and 1-2). This work is being performed in accordance with USACE, Louisville District, Contract W912QR-08-D-0008, Delivery Order No. 0019. The Phase I RI services consist of a historical data review and property visit with visual inspections for the 9 AOCs, and preparation of this Historical Records Review Report. Subsequent sampling activities to complete the Phase I RI will be performed under a future scope of work.

The 9 Compliance Restoration (CR) sites addressed in this report are shown in Figure 1-2 and are listed below:

- CC-RVAAP-68: Electric Substations (East, West, and No. 3);
- CC-RVAAP-69: Building 1048 Fire Station;
- CC-RVAAP-70: East Classification Yard;
- CC-RVAAP-72: Facility-Wide Underground Storage Tanks (USTs);
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These 9 CR sites qualified for environmental investigation and remediation under the U.S. Army's Installation Restoration Program (IRP) expanded guidelines. The guidelines were expanded in December 2008 to extend the time period for eligible AOCs from October 17, 1986, to present day activities. These CR sites were part of the facility support and infrastructure operations that involved material and solid waste, such as petroleum products or polychlorinated biphenyls (PCBs), not specifically regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) that could potentially present a risk to human health and the environment.

Planning and performance of all elements of the project scope are in accordance with the requirements of the Ohio Environmental Protection Agency (Ohio EPA) *Director's Final Findings and Orders* (DFFO) for RVAAP, dated June 10, 2004 (Ohio EPA 2004). The DFFO requires conformance with CERCLA and the National Contingency Plan (NCP). Accordingly, this Historical Records Review Report was prepared consistent with guidance outlined in *Guidance for Performing Preliminary Assessments Under CERCLA*, EPA/540/G-91/013 (USEPA 1991).

1.1 PURPOSE AND SCOPE

The purpose of this Historical Records Review Report is to present the findings from comprehensive review of available historical data pertaining to the 9 CR sites, including historical data search, interviews with former employees, and property visits and perimeter surveys of the AOCs. The information collected was assessed to determine if a potential threat to human health and the environment was present and recommend additional characterization of the area(s) as necessary. The scope of this document includes the 9 CR sites identified in the statement of work (SOW). Descriptions of each CR site are presented in the following sections. USTs and coal storage areas may be associated with other AOCs at RVAAP that are at various stages in the CERCLA process. Where applicable, information from the other investigations were evaluated as part of the historical records review to determine if further action was warranted at the CR sites. No sampling was conducted as part of the scope for this project.

SAIC performed a comprehensive search and review of available historical information pertaining to the 9 CR sites. These historical records included, but were not limited to, technical and administrative reports, letters, memoranda, field notes, environmental sampling and analysis data, historical ground-level photographs, maps and engineering drawings, and aerial photographs. SAIC accessed the following historical information and data sources:

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- Online information sources through data centers directed by the project scope of work, as well as other linked data sources;
- Leading internet search engines (e.g., Google, AOL, MSN, and Yahoo!); and
- Ohio State Fire Marshal's Office, Ohio EPA Central District Office and Northeast District Office, and the Ravenna City Fire Department for historical closure records for USTs at RVAAP.

SAIC conducted interviews with former RVAAP employees and other persons currently affiliated with RVAAP with knowledge of past CR site operations, including current employees of RVAAP, Camp Ravenna, and USACE Louisville District.

In November 2010, SAIC conducted property visits and perimeter surveys of the 9 CR sites. In accordance with RVAAP policy, unexploded ordnance (UXO)-qualified personnel accompanied the property visit team when conducting inspections within designated munitions response sites (MRSs). The following inspection items were evaluated during the property visits and photographs were taken to document current AOC conditions:

- Any conditions warranting immediate or emergency action;
- Overall current AOC conditions, including presence of buildings, their condition, and current use;
- Physical evidence of munitions and explosives of concern (MEC);
- Evidence of past uses of the property and any hazardous, toxic, or radioactive waste (HTRW) releases (i.e., staining, residue, odor, free product, stressed vegetation, seeps);
- Evidence of or releases from any containerized HTRW (CON/HTRW);
- Locations of any maintenance and refueling operations conducted on the property;
- Areas where petroleum or chemical storage took place [e.g., USTs, aboveground storage tanks (ASTs), storage buildings];
- Presence of disposal areas, landfills, or burn pits;
- Presence of transformers and condition or location where transformers were formerly located;
- Location of any on-site groundwater production wells;
- Presence of suspected or known sensitive habitats, natural resources, or cultural resources; and
- Potential preferential pathways for surface water runoff and the nearest receiving surface water body.

Recommendations for further investigation of soil, sediment, and surface water are provided based on the historical records review. Recommendations for further investigation of these media will be evaluated by the RVAAP stakeholder team and implemented, as applicable, under a separate project. Recommendations related to investigation of groundwater in this report are limited to identifying potential contaminant releases to soil that could migrate to groundwater. Installation of monitoring wells and completion of a RI for groundwater will be addressed separately as part of future RI activities for the RVAAP-66 Facility-Wide Groundwater AOC.

1.2 FACILITY DESCRIPTION

When the RVAAP IRP began in 1989, RVAAP was identified as a 21,419-acre facility. The property boundary was resurveyed by OHARNG over a 2-year period (2002 and 2003) and the total acreage of the property was found to be 21,683 acres. As of June 2010, a total of 20,423 acres of the former 21,683-acre RVAAP has been transferred to the National Guard Bureau (NGB) and subsequently licensed to OHARNG for use as a military training site.

The current RVAAP consists of 1,260 acres scattered throughout the OHARNG Camp Ravenna (Figure 1-2). Camp Ravenna is in northeastern Ohio within Portage and Trumbull counties, approximately 3 miles (4.8 km) east-northeast of the City of Ravenna and approximately 1 mile (1.6 km) northwest of the City of Newton Falls. The RVAAP portions of the property are solely located within Portage County. RVAAP and Camp Ravenna occupy a parcel of property approximately 11 miles (17.7 km) long and 3.5 miles (5.6 km) wide bounded by State Route 5, the Michael J. Kirwan Reservoir, and the CSX System Railroad on the south; Garrett, McCormick, and Berry roads on the west; the Norfolk Southern Railroad on the north; and State Route 534 on the east (Figures 1-1 and 1-2). Camp Ravenna is surrounded by several communities: Windham on the north; Garrettsville 6 miles (9.6 km) to the northwest; Newton Falls 1 mile (1.6 km) to the southeast; Charlestown to the southwest; and Wayland 3 miles (4.8 km) to the south.

When RVAAP was operational, Camp Ravenna did not exist and the entire 21,683-acre parcel was a government-owned, contractor-operated, industrial facility. The RVAAP IRP encompasses investigation and cleanup of past activities over the entire 21,683 acres of the former RVAAP. References to RVAAP in this document indicate the historical extent of RVAAP, which is inclusive of the combined acreages of the current Camp Ravenna and RVAAP, unless otherwise specifically stated.

Former industrial operations at RVAAP consisted of 12 munitions-assembly facilities referred to as "load lines." Load Lines 1 through 4 were used to melt and load 2,4,6-trinitrotoluene (TNT) and Composition B into large-caliber shells and bombs. Load Lines 5 through 11 were used to manufacture fuzes, primers, and boosters. From 1946 to 1949, Load Line 12 was used to produce ammonium nitrate for explosives and fertilizers prior to use as a weapons demilitarization facility.

In 1950, the facility was placed on standby status and operations were limited to renovation, demilitarization, and normal maintenance of equipment, along with storage of munitions. Production activities resumed from July 1954 to October 1957 and again from May 1968 to August 1972. In addition to production missions, various demilitarization activities were conducted at facilities constructed at Load Lines 1, 2, 3, and 12. Demilitarization activities included disassembly of munitions and explosives melt-out and recovery operations using hot water and steam processes. Periodic demilitarization of various munitions continued through 1992.

In addition to production and demilitarization activities at the load lines, other facilities at RVAAP include AOCs that were used for the burning, demolition, and testing of munitions. These burning

and demolition grounds consist of large parcels of open space or abandoned quarries. Other types of AOCs present at RVAAP include landfills, an aircraft fuel tank testing facility, and various general industrial support and maintenance facilities.

1.3 DEMOGRAPHY AND LAND USE

RVAAP consists of 21,683 acres and is located in northeastern Ohio, approximately 23 miles (37 km) east–northeast of Akron and 30 miles (48.3 km) west–northwest of Youngstown. RVAAP occupies east–central Portage County and southwestern Trumbull County. Census projections for 2007 indicate the populations of Portage and Trumbull counties are 155,869 and 213,475, respectively. Population centers closest to RVAAP are Ravenna, with a population of 11,422, and Newton Falls, with a population of 4,694.

The RVAAP facility is located in a rural area and is not close to any major industrial or developed areas. Approximately 55% of Portage County, in which the majority of RVAAP is located, consists of either woodland or farmland acreage. The closest major recreational area, the Michael J. Kirwan Reservoir (also known as West Branch Reservoir), is located adjacent to the western half of RVAAP, south of State Route 5.

RVAAP is operated by the Base Realignment and Closure (BRAC) Division of the Army, which manages the restoration activities at RVAAP. Camp Ravenna (which is located on the remainder of the property) is owned by NGB who licenses it to the OHARNG for use as a military training site. Training and related activities at Camp Ravenna include field operations and bivouac training, convoy training, equipment maintenance, C-130 aircraft drop zone operations, helicopter operations, and storage of heavy equipment.

1.4 RVAAP ENVIRONMENTAL SETTING

This section describes the physical features, topography, geology, hydrogeology, and environmental characteristics of RVAAP. The environmental setting specific to each CR site is included in the individual AOC descriptions presented in Sections 2.0 through 10.0. The individual CR site descriptions reference the facility-wide information presented below, as applicable.

1.4.1 Physiographic Setting

RVAAP is located within the Southern New York Section of the Appalachian Plateaus physiographic province (USGS 1968). This province is characterized by elevated uplands underlain primarily by Mississippian and Pennsylvanian age bedrock units that are horizontal or gently dipping. The province is characterized by its rolling topography with incised streams having dendritic drainage patterns. The Southern New York Section has been modified by glaciation, which rounded ridges, filled major valleys, and blanketed many areas with glacially-derived unconsolidated deposits (e.g., sand, gravel, and finer-grained outwash deposits). As a result of glacial activity in this section, old stream drainage patterns were disrupted in many locales, and extensive wetland areas developed.

1.4.2 Surface Features and Topography

The topography of RVAAP is gently undulating with an overall decrease in ground elevation from a topographic high of approximately 1,220 ft above mean sea level (amsl) in the far western portion of the facility to low areas at approximately 930 ft amsl in the far eastern portion of the facility.

USACE mapped the facility topography in February 1998 using a 2-ft (60.1-cm) contour interval with an accuracy of 0.02 ft (0.61 cm). USACE based the topographic information on aerial photographs taken during the spring of 1997. The USACE survey is the basis for the topographical information illustrated in figures included in this report.

1.4.3 Soil and Geology

1.4.3.1 Regional Geology

The regional geology at RVAAP consists of horizontal to gently dipping bedrock strata of Mississippian and Pennsylvanian age overlain by varying thicknesses of unconsolidated glacial deposits. The bedrock and unconsolidated geology at RVAAP are presented in the following subsections.

1.4.3.2 Soil and Glacial Deposits

Bedrock at RVAAP is overlain by deposits of the Wisconsin-age Lavery Till in the western portion of the facility and the younger Hiram Till and associated outwash deposits in the eastern two-thirds of the facility (Figure 1-3). Unconsolidated glacial deposits vary considerably in their character and thickness across RVAAP, from zero in some of the eastern portions of the facility to an estimated 150 ft (46 m) in the south-central portion.

Thin coverings of glacial material have been completely removed as a consequence of human activities at locations such as Ramsdell Quarry. Bedrock is present at or near the ground surface in locations such as at Load Line 1 and the Erie Burning Grounds (USACE 2001). Where this glacial material is still present, their distribution and character indicate their origin as ground moraine. These tills consist of laterally discontinuous assemblages of yellow-brown, brown, and gray silty clays to clayey silts, with sand and rock fragments. Lacustrine sediment from bodies of glacial-age standing water has also been encountered in the form of deposits of uniform light gray silt greater than 50-ft thick in some areas (USACE 2001).

Soil at RVAAP is generally derived from the Wisconsin-age silty clay glacial till. Distributions of soil types are discussed and mapped in the *Soil Survey of Portage County, Ohio*, which describes soil as nearly level to gently sloping and poor to moderately well drained (USDA 1978). Much of the native soil at RVAAP was disturbed during construction activities in former production and operational areas of the facility.

Several soil types are present at RVAAP. The main soil types present at the 9 CR sites include:

- **Mahoning silt loams (0-2% slopes and 2-6% slopes):** Mahoning silt loam is a gently sloping, poorly drained soil formed in silty clay loam or clay loam glacial till, generally where bedrock is greater than 6 ft below ground surface (bgs). The Mahoning silt loam has low permeability, with rapid runoff and seasonal wetness (USDA 2010).

- **Fitchville silt loam (0-2% slopes):** The Fitchville silt loam is a somewhat poorly drained, gently sloping silt loam to silty clay loam formed from glaciolacustrine deposits where bedrock is greater than 80 inches bgs (USDA 2010).

- **Wadsworth silt loams (0-2% slopes and 2-6% slopes):** The Wadsworth silt loam is found in gently sloping, somewhat poorly drained soil formed in silty clay loam or silt loam glacial till plains, generally where bedrock is greater than 6 ft bgs. The Wadsworth silt loam has a low to high permeability locally, with rapid runoff (USDA 2010).

1.4.3.3 Bedrock Geology

The Sharon Sandstone Member, informally referred to as the Sharon Conglomerate, of the Pennsylvanian Pottsville Formation is the primary bedrock beneath RVAAP (Figure 1-4). In the western portion of the facility, the upper members of the Pottsville Formation, including the Sharon Shale, Connoquenessing Sandstone (also known as the Massillon Sandstone), Mercer Shale, and uppermost Homewood Sandstone, have been found. The regional dip of the Pottsville Formation measured in the west portion of RVAAP is between 1.5-3.5 m per 1.6 km (5-11.5 ft per mile) to the south. The Sharon Sandstone Member, the lowest unit of the Pottsville Formation, is a highly porous, loosely cemented, permeable, cross-bedded, frequently fractured and weathered, orthoquartzite sandstone, which is locally conglomeratic. Thin shale lenses occur in the upper portion of the unit (Winslow et al. 1966). The Sharon Shale is a gray to black sandy to micaceous shale containing thin coal, underclay, and sandstone lenses. The Mercer Member of the Pottsville Formation consists of silty to carbonaceous shale with abundant thin, discontinuous sandstone lenses in the upper portion. Regionally, the Mercer also has been noted to contain interbeds of coal. The Homewood Sandstone Member is the uppermost unit of the Pottsville Formation. It typically occurs as a caprock on bedrock highs in the subsurface, and ranges from well-sorted, coarse-grained, white quartzose sandstone to a tan, poorly sorted, clay-bonded, micaceous, medium- to fine-grained sandstone. Thin shale layers are prevalent in the Homewood member as indicated by a darker gray shade of color.

1.4.4 Hydrogeology

1.4.4.1 Regional Hydrogeology

Sand and gravel aquifers are present in the buried-valley and outwash deposits in Portage County, as described in the *Phase I Remedial Investigation Report for High-Priority Areas of Concern* (USACE 1998). Generally, these saturated zones are too thin and localized to provide large quantities of water

for industrial or public water supplies; however, yields are sufficient for residential water supplies. Lateral continuity of these aquifers is unknown. Recharge of these units comes from surface water infiltration of precipitation and surface streams. Specific groundwater recharge and discharge areas at RVAAP have not been delineated. The regional potentiometric surface at RVAAP for unconsolidated deposits and bedrock are presented in Figures 1-5 and 1-6, respectively.

The thickness of the unconsolidated interval at RVAAP ranges from thin to absent in the eastern and northeastern portion of RVAAP to an estimated 150 ft (46 m) in the central portion of the facility. The groundwater table occurs within the unconsolidated zone in many areas of the facility. Because of the heterogeneous nature of the unconsolidated glacial material, groundwater flow patterns are difficult to determine with a high degree of accuracy. Vertical recharge from precipitation likely occurs via infiltration along root zones, desiccation cracks, and partings within the soil column. Laterally, most groundwater flow likely follows topographic contours and stream drainage patterns, with preferential flow along pathways (e.g., sand seams, channel deposits, or other stratigraphic discontinuities) having higher permeabilities than surrounding clay or silt-rich material.

Within bedrock units at RVAAP, the principle water-bearing aquifer is the Sharon Conglomerate. Depending on the existence and depth of overburden, the Sharon Conglomerate ranges from an unconfined to a leaky artesian aquifer. Water yields from on-site water supply wells completed in the Sharon Conglomerate ranged from 30-400 gallons per minute (gpm) (USATHAMA 1978). Well yields of 5-200 gpm were reported for on-site bedrock wells completed in the Sharon Conglomerate (Kammer 1982). Other local bedrock units capable of producing water include the Homewood Sandstone, which is generally thinner and only capable of well yields less than 10 gpm, and the Connoquenessing Sandstone. Wells completed in the Connoquenessing Sandstone in Portage County have yields ranging from 5-100 gpm but are typically less productive than the Sharon Conglomerate due to lower permeabilities (Winslow et al. 1966).

The bedrock potentiometric gradient is a more uniform and regional eastward flow direction than the unconsolidated zone that is not as affected by local surface topography. Due to the lack of well data in the western portion of RVAAP, general flow patterns are difficult to discern. For much of the eastern half of RVAAP, bedrock potentiometric elevations are higher than the overlying unconsolidated potentiometric elevations, indicating an upward hydraulic gradient. This evidence suggests there is a confining layer that separates the two aquifers. In the far eastern area, the two potentiometric surfaces are at approximately the same elevation, suggesting that hydraulic communication between the two aquifers is occurring.

1.4.4.2 Groundwater Usage and Domestic Water Supply

RVAAP historically used groundwater for both domestic and industrial supplies. Groundwater utilized at RVAAP during past operations was obtained from production wells located throughout RVAAP, with the majority of wells screened in the Sharon Conglomerate. The Army discontinued use of groundwater production wells prior to 1993, when RVAAP was placed in modified caretaker status. The status of plugging and abandoning former groundwater production wells is currently under

evaluation by the Army. Currently, one of the four remaining original groundwater production wells remains in use by the Army. This well, located in the Administration Area, is not used as a potable water source, but supplies sanitary water (training activities and toilet flushing) for active-use buildings in that area.

In addition, as of April 2011, OHARNG has installed two bedrock aquifer groundwater wells at RVAAP for use as an institutional groundwater supply. These two OHARNG groundwater supply wells are installed in the Sharon Conglomerate aquifer and are located near Buildings 1067 and 1068 within the Administration Area. There is also one inactive non-potable groundwater supply well just south of Winklepeck Burning Grounds along the east side of George Road, which was formerly used to supply water for environmental restoration activities. These groundwater supply wells are used solely for on-site activities and are not used for public distribution, livestock, or commercial groundwater potable supply.

The closest population center to RVAAP, the city of Newton Falls, obtains municipal water supplies from the east branch of the Mahoning River. Currently, the majority of residential groundwater use in the area surrounding RVAAP is primarily for domestic and livestock supply, with the Sharon Conglomerate acting as the major producing aquifer in the area. The Connoquenessing and Homewood Sandstones also provide limited groundwater resources, primarily surrounding the western half of RVAAP. Unconsolidated deposits can also be an important source of groundwater, as many of the domestic wells and small public water supplies located near RVAAP obtain sustainable quantities of water from wells completed in unconsolidated deposits.

Groundwater in the unconsolidated aquifer predominantly flows in an eastward direction; however, the unconsolidated zone shows numerous local flow variations influenced by topography and drainage patterns. The local variations in flow direction suggest: (1) groundwater in the unconsolidated deposits is generally in direct hydraulic communication with surface water; and (2) surface water drainage ways may also act as groundwater discharge locations. In addition, topographic ridges between surface water drainage features act as groundwater divides in the unconsolidated deposits.

Local groundwater within and surrounding RVAAP contains proportionately high levels of iron, manganese, and carbonate compounds. As such it is classified as “hard” water. Hard water has an associated metallic taste that can be unpalatable if not properly treated for human consumption (OHARNG 2001).

The *Ground Water Pollution Potential of Portage County*, Ohio map (ODNR 1990) provides additional insight into the groundwater characteristics of RVAAP. This map indicates the relative vulnerability of groundwater in a specific area to potential contamination from surface sources. Intended primarily as a groundwater resource management and planning tool, the Groundwater Pollution Potential of Portage County, Ohio map presents index values based on several hydrogeologic criteria including depth to water, hydraulic conductivity, topography, and others.

Resulting index values range from a low pollution potential (zero) to a high pollution potential (200+).

Based on this mapping system, the majority of RVAAP has a moderate pollution potential that ranges between 100 and 159, depending on location. In addition, three general hydrogeologic settings are defined for RVAAP: (1) glacial till overlying bedded sedimentary rock; (2) glacial till overlying sandstone; and (3) alluvium overlying bedded sedimentary rock. Generally, the highest pollution potential values at RVAAP occur in the areas where alluvium overlies bedded sedimentary rock (index range of from 140 to 159); these areas occur primarily in the northeast portion of the facility. The majority of RVAAP has pollution potential indices that range between 100 and 139.

1.4.4.3 Regional Surface Water

RVAAP resides within the Mahoning River watershed, which is part of the Ohio River basin. The west branch of the Mahoning River is the main surface stream in the area. The west branch flows adjacent to the west end of the facility, generally in a north to south direction, before flowing into the Michael J. Kirwan Reservoir, which is located to the south of State Route 5 (Figure 1-1). The west branch flows out of the reservoir and parallels the southern RVAAP boundary before joining the Mahoning River east of RVAAP. The western and northern portions of RVAAP display low hills and a dendritic surface drainage pattern. The eastern and southern portions are characterized by an undulating to moderately level surface, with less dissection of the surface drainage. The facility is marked with marshy areas and flowing and intermittent streams whose headwaters are located in the upland areas of the facility.

The three primary watercourses that drain RVAAP are (Figure 1-2):

- South fork of Eagle Creek;
- Sand Creek; and
- Hinkley Creek.

All of these watercourses have many associated tributaries. Sand Creek, with a drainage area of 13.9 square miles (36 km^2), flows generally in a northeast direction to its confluence with the south fork of Eagle Creek. In turn, the south fork of Eagle Creek continues in a northerly direction for 2.7 miles (4.3 km) to its confluence with Eagle Creek. The drainage area of the south fork of Eagle Creek is 26.2 square miles (67.8 km^2), including the area drained by Sand Creek. Hinkley Creek originates just southeast of the intersection between State Route 88 and State Route 303 to the north of the facility. Hinkley Creek, with a drainage area of 11.0 square miles (28.5 km^2), flows in a southerly direction through the facility, and converges with the west branch of the Mahoning River south of the facility (USACE 2001).

Approximately one-third of RVAAP meets the regulatory definition of a wetland, with the majority of the wetland areas located in the eastern portion of the facility. Wetland areas at RVAAP include seasonal wetlands, wet fields, and forested wetlands. Many of the wetland areas are the result of

natural drainage or beaver activity; however, some wetland areas are associated with anthropogenic settling ponds and drainage areas.

Approximately 50 ponds are scattered throughout the facility. Many were constructed within natural drainage ways to function as settling ponds or basins for process effluent and runoff. Others are natural in origin, resulting from glacial action or beaver activity. Water bodies at RVAAP could support aquatic vegetation and biota. Storm water runoff is controlled primarily by natural drainage, except in former operations areas where an extensive storm sewer network helps to direct runoff to drainage ditches and settling ponds. Additionally, the storm sewer system was one of the primary drainage mechanisms for process effluent during the period that production facilities were in operation.

1.4.5 Climate

The general climate of the RVAAP area is continental and is characterized by moderately warm and humid summers, reasonably cold and cloudy winters, and wide variations in precipitation from year to year. Climate data for the RVAAP area presented below were obtained from available National Weather Service records for the 30-year period of record from 1971 to 2000 at the Youngstown Regional Airport, Ohio (http://www.weather.gov/climate/xmacis.php?wfo=cle). Wind speed data for Youngstown, Ohio, are from the National Climatic Data Center (http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/avgwind.html) for the available 53-year period of record from 1950 through 2002.

Average annual rainfall in the RVAAP area is 38.15 inches (96.9 cm), with the highest monthly average occurring in July [4.14 inches (10.5 cm)] and the lowest monthly average occurring in February [2.03 inches (5.15 cm)]. Average annual snowfall totals approximately 52.8 inches (134.1 cm) with the highest monthly average occurring in January [13.8 inches (35.05 cm)]. Due to the influence of lake-effect snowfall events associated with Lake Erie [located approximately 35 miles (56.3 km) northwest of RVAAP], snowfall totals vary widely throughout northeastern Ohio.

The average annual daily temperature in the RVAAP area is 48.8ºF, with an average daily high temperature of 58.3ºF and an average daily low temperature of 39.3ºF. The record high temperature of 100ºF occurred in July 1988, and the record low temperature of -22ºF occurred in January 1994. The prevailing wind direction at RVAAP is from the southwest, with the highest average wind speed occurring in January [11.4 miles (18.3 km) per hour] and the lowest average wind speed occurring in August [7.4 miles (11.9 km) per hour]. Thunderstorms occur on approximately 35 days per year and are most abundant from April through August. The RVAAP area is susceptible to tornadoes; minor structural damage to several buildings on facility property occurred as the result of a tornado in 1985.

1.5 PLAN ORGANIZATION

The remaining sections of this Historical Records Review Report are organized as follows:

- Sections 2.0-10.0: *Summary of Historical Records Review for Each CR Site* – Presents the results of the historical records review for each CR site, including a description or discussion of the following:
  - Property descriptions
  - Historical property summary
  - Summary of previous investigations
  - Evaluation of the presence of military munitions and technical data (if present)
  - Evaluation of HTRW presence and areas (if present)
  - Evaluation of CON/HTRW presence and areas (if present)
  - Summary of the pathway and environmental hazard assessment

- Section 11.0: *Summary and Conclusions* – Presents the summary and conclusions, including recommendation for AOCs that warrant no further action (NFA) and AOCs that warrant further investigation.

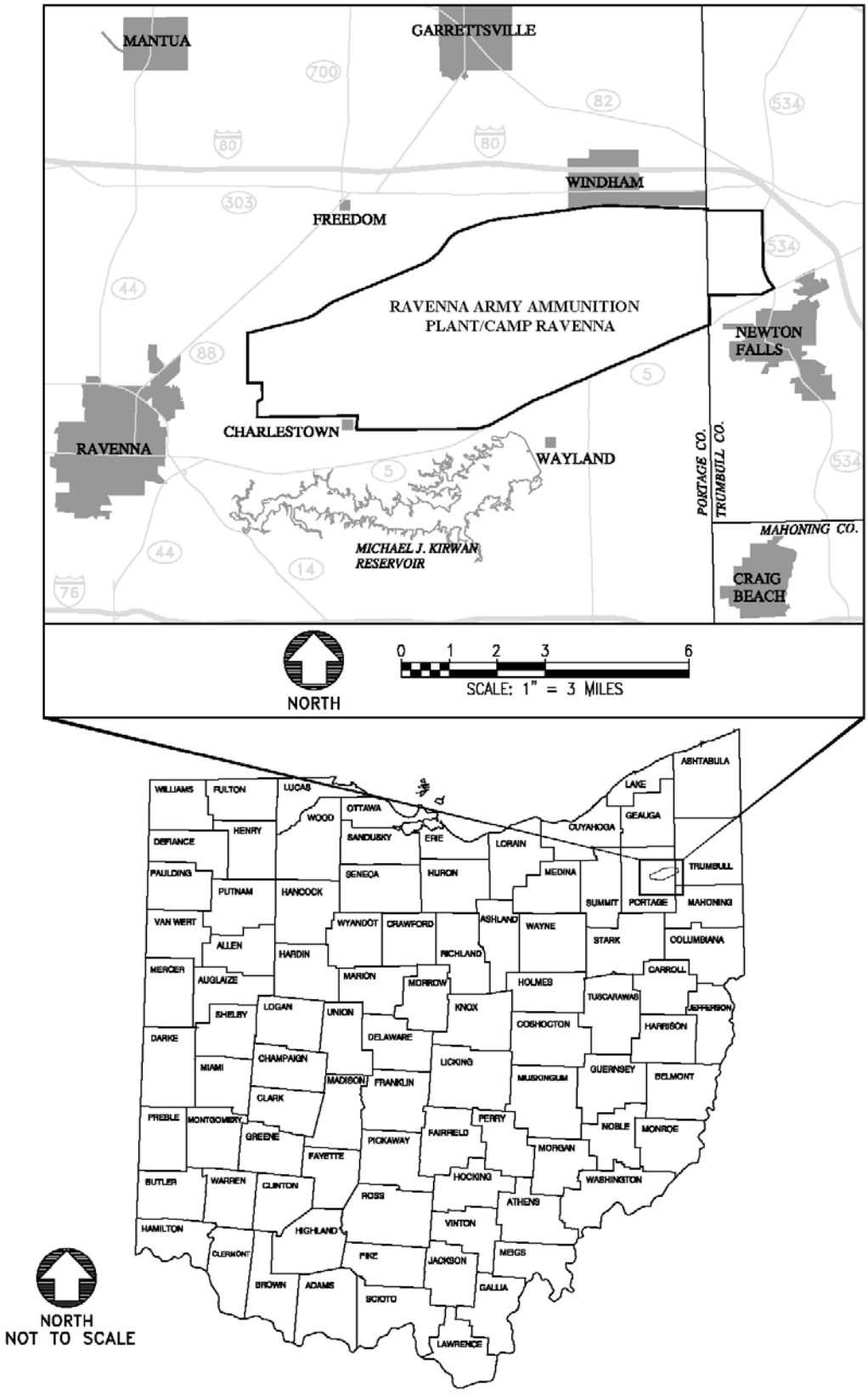

Figure 1-1. General Location and Orientation of RVAAP/Camp Ravenna

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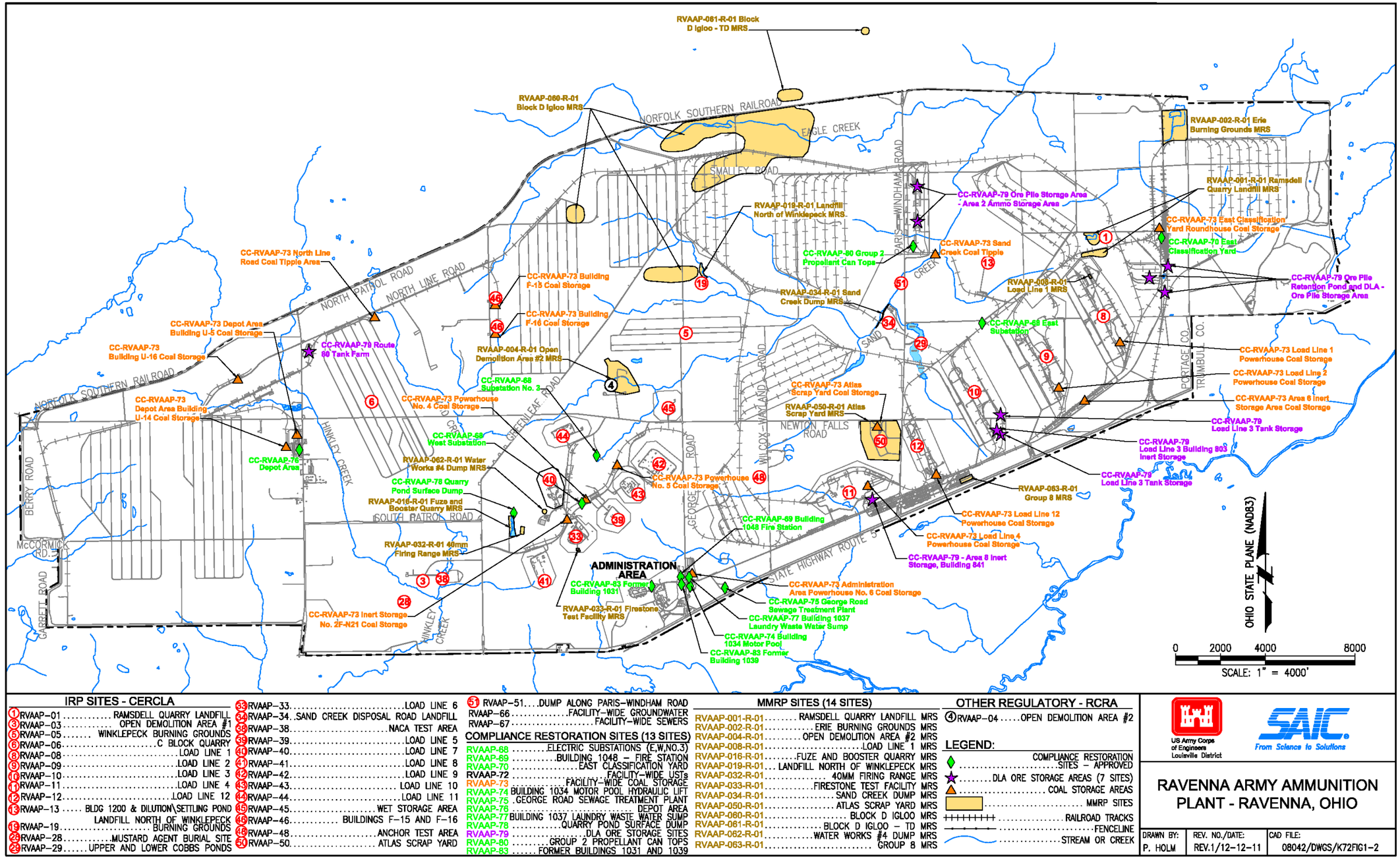

IRP SITES - CERCLA

1 RVAAP-01 ..... RAMSDELL QUARRY LANDFILL
3 RVAAP-03 ..... OPEN DEMOLITION AREA #1
5 RVAAP-05 ..... WINKLEPECK BURNING GROUNDS
6 RVAAP-06 ..... C BLOCK QUARRY
8 RVAAP-08 ..... LOAD LINE 1
9 RVAAP-09 ..... LOAD LINE 2
10 RVAAP-10 ..... LOAD LINE 3
11 RVAAP-11 ..... LOAD LINE 4
12 RVAAP-12 ..... LOAD LINE 12
13 RVAAP-13 ..... BLDG 1200 & DILUTION\SETTLING POND
LANDFILL NORTH OF WINKLEPECK
19 RVAAP-19 ..... BURNING GROUNDS
28 RVAAP-28 ..... MUSTARD AGENT BURIAL SITE
29 RVAAP-29 ..... UPPER AND LOWER COBBS PONDS
33 RVAAP-33 ..... LOAD LINE 6
34 RVAAP-34 ..SAND CREEK DISPOSAL ROAD LANDFILL
38 RVAAP-38 ..... NACA TEST AREA
39 RVAAP-39 ..... LOAD LINE 5
40 RVAAP-40 ..... LOAD LINE 7
41 RVAAP-41 ..... LOAD LINE 8
42 RVAAP-42 ..... LOAD LINE 9
43 RVAAP-43 ..... LOAD LINE 10
44 RVAAP-44 ..... LOAD LINE 11
45 RVAAP-45 ..... WET STORAGE AREA
46 RVAAP-46 ..... BUILDINGS F-15 AND F-16
48 RVAAP-48 ..... ANCHOR TEST AREA
50 RVAAP-50 ..... ATLAS SCRAP YARD
51 RVAAP-51 ....DUMP ALONG PARIS-WINDHAM ROAD
RVAAP-66 ..... FACILITY-WIDE GROUNDWATER
RVAAP-67 ..... FACILITY-WIDE SEWERS

COMPLIANCE RESTORATION SITES (13 SITES)

RVAAP-68 ..... ELECTRIC SUBSTATIONS (E,W,NO.3)
RVAAP-69 ..... BUILDING 1048 – FIRE STATION
RVAAP-70 ..... EAST CLASSIFICATION YARD
RVAAP-72 ..... FACILITY-WIDE USTs
RVAAP-73 ..... FACILITY-WIDE COAL STORAGE
RVAAP-74 BUILDING 1034 MOTOR POOL HYDRAULIC LIFT
RVAAP-75 .GEORGE ROAD SEWAGE TREATMENT PLANT
RVAAP-76 ..... DEPOT AREA
RVAAP-77 BUILDING 1037 LAUNDRY WASTE WATER SUMP
RVAAP-78 ..... QUARRY POND SURFACE DUMP
RVAAP-79 ..... DLA ORE STORAGE SITES
RVAAP-80 ..... GROUP 2 PROPELLANT CAN TOPS
RVAAP-83 ..... FORMER BUILDINGS 1031 AND 1039

MMRP SITES (14 SITES)

RVAAP-001-R-01 ..... RAMSDELL QUARRY LANDFILL MRS
RVAAP-002-R-01 ..... ERIE BURNING GROUNDS MRS
RVAAP-004-R-01 ..... OPEN DEMOLITION AREA #2 MRS
RVAAP-008-R-01 ..... LOAD LINE 1 MRS
RVAAP-016-R-01 ..... FUZE AND BOOSTER QUARRY MRS
RVAAP-019-R-01 ... LANDFILL NORTH OF WINKLEPECK MRS
RVAAP-032-R-01 ..... 40MM FIRING RANGE MRS
RVAAP-033-R-01 ..... FIRESTONE TEST FACILITY MRS
RVAAP-034-R-01 ..... SAND CREEK DUMP MRS
RVAAP-050-R-01 ..... ATLAS SCRAP YARD MRS
RVAAP-060-R-01 ..... BLOCK D IGLOO MRS
RVAAP-061-R-01 ..... BLOCK D IGLOO – TD MRS
RVAAP-062-R-01 ..... WATER WORKS #4 DUMP MRS
RVAAP-063-R-01 ..... GROUP 8 MRS

OTHER REGULATORY - RCRA

4 RVAAP-04 ..... OPEN DEMOLITION AREA #2

LEGEND:

COMPLIANCE RESTORATION
..... SITES – APPROVED
..... DLA ORE STORAGE AREAS (7 SITES)
..... COAL STORAGE AREAS
..... MMRP SITES
..... RAILROAD TRACKS
..... FENCELINE
..... STREAM OR CREEK

US Army Corps of Engineers Louisville District

SAIC. From Science to Solutions

RAVENNA ARMY AMMUNITION PLANT - RAVENNA, OHIO

DRAWN BY:	REV. NO./DATE:	CAD FILE:
P. HOLM	REV.1/12-12-11	08042/DWGS/K72FIG1-2

Figure 1-2. Location of AOCs at RVAAP/Camp Ravenna

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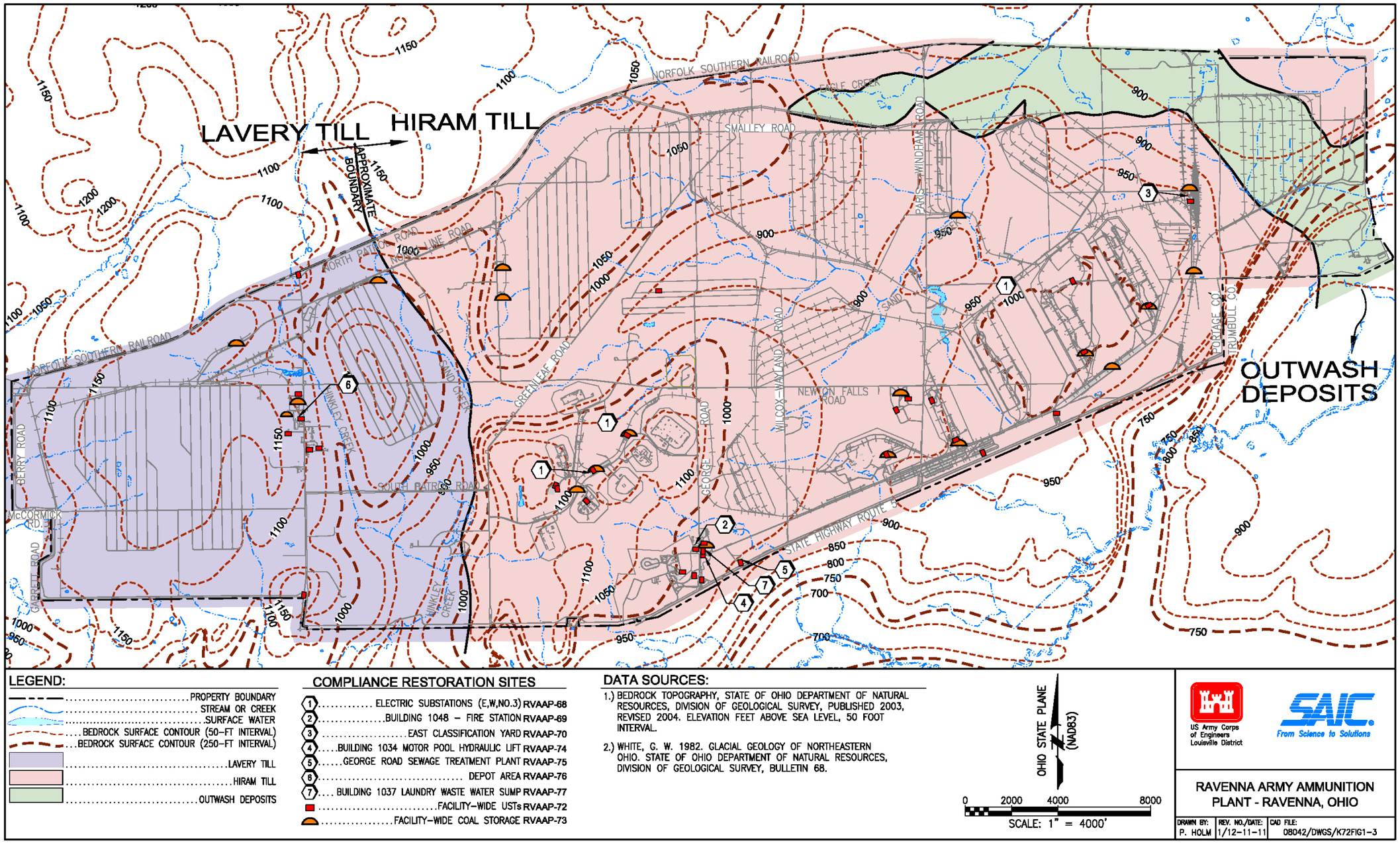

Figure 1-3. Geologic Map of Unconsolidated Deposits on RVAAP/Camp Ravenna

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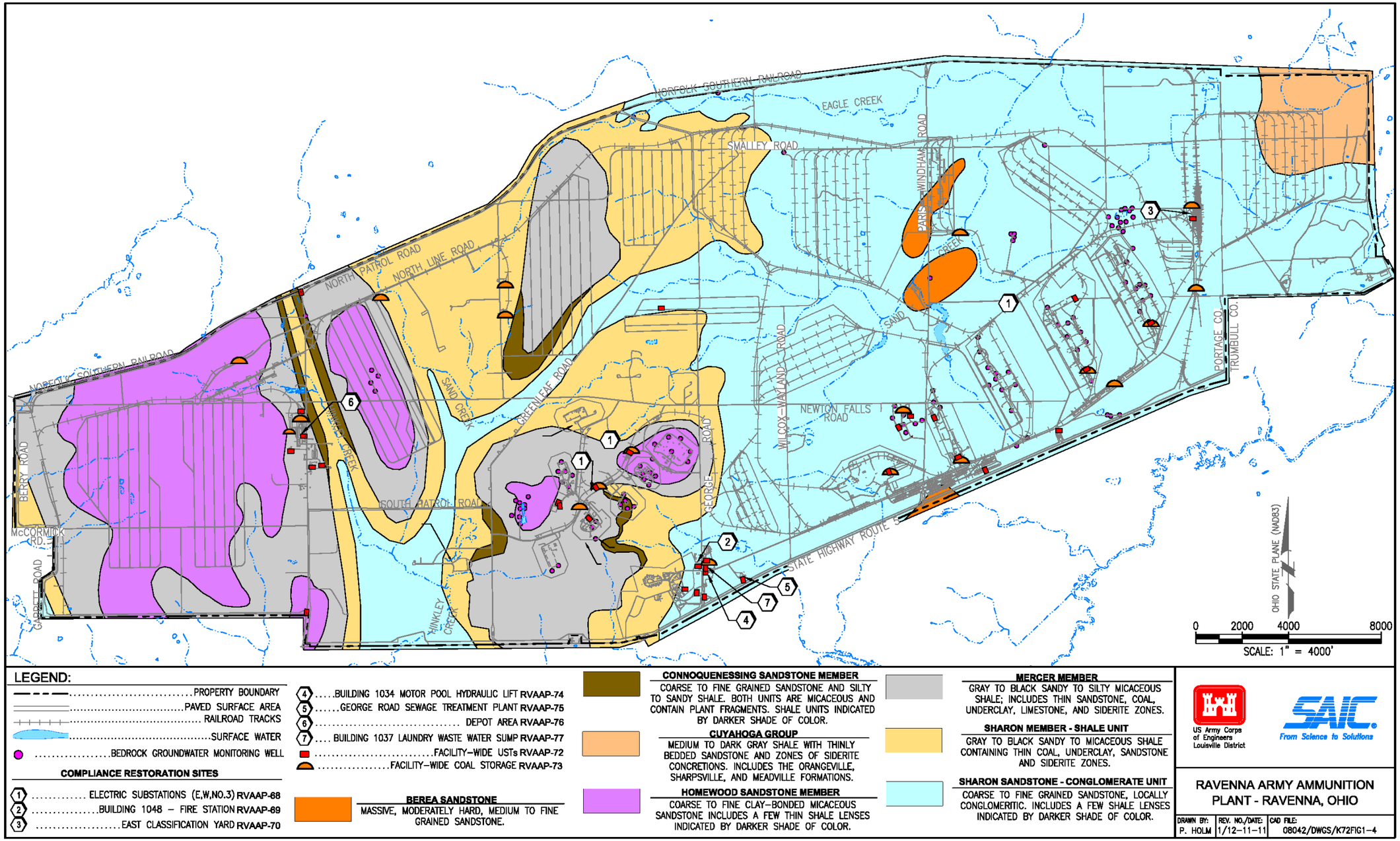

Figure 1-4. Geologic Bedrock Map and Stratigraphic Description of Units on RVAAP/Camp Ravenna

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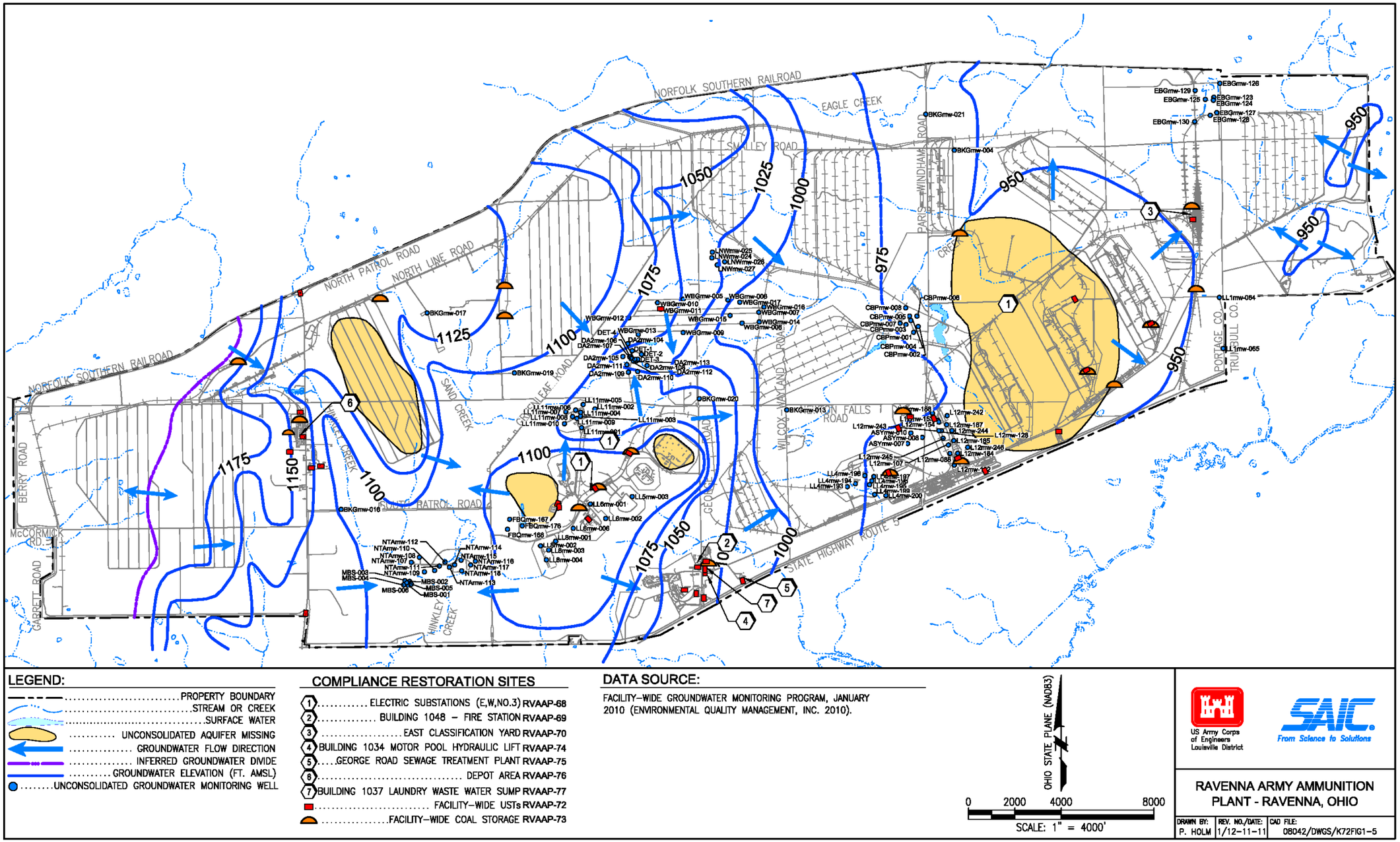

Figure 1-5. Potentiometric Surface of Unconsolidated Aquifer at RVAAP/Camp Ravenna

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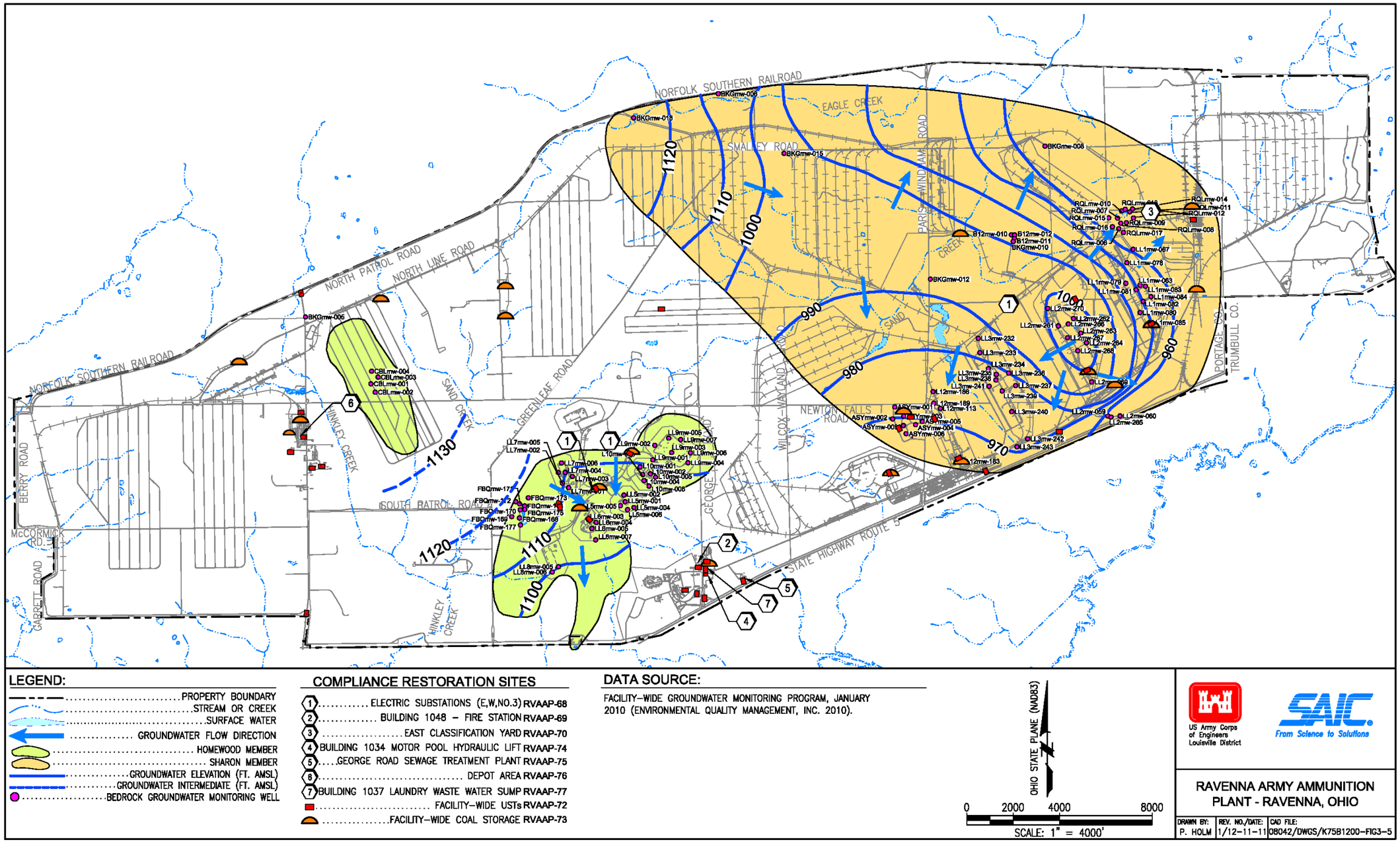

Figure 1-6. Potentiometric Surface of Bedrock Aquifer at RVAAP/Camp Ravenna

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2.0 CC-RVAAP-68: ELECTRIC SUBSTATIONS (EAST, WEST, AND NO. 3)

This section presents a description of the CC-RVAAP-68: Electric Substations, including a description of the property, summary of previous investigations, an evaluation of historical documents reviewed during the historical records review search, and a pathway and environmental hazard assessment. This AOC includes three inactive substations (East, West, and No. 3) at RVAAP. Appendix A provides a description of all reference sources and records reviewed during the course of this evaluation. Conclusions and a recommendation for NFA or further investigation for each former substation site are presented in Section 11.0.

2.1 PROPERTY DESCRIPTION, ACREAGE, AND LAND USE

CC-RVAAP-68: Electric Substations consists of three separate inactive properties located throughout the facility. The former East and West Substations were located adjacent to brick operational support buildings. The former East Substation is located adjacent to Building 25-27, the former West Substation is located near rehabilitated Building 28-28, and former Substation No. 3 did not have an association with an operational support structure. Each former substation is inactive and all associated equipment from operation, including transformers and capacitors, have been removed. The location of each former substation and associated descriptions are provided in the following subsections.

2.1.1 Location

The former East Substation is located approximately 325 ft from the intersection of Remalia Road and Load Line 2 Road in the eastern portion of the facility (Figure 2-1). The former West Substation is located northwest of Load Line 5 on Fuze and Booster Road in the central portion of the facility (Figure 2-2). Former Substation No. 3 is located in the Fuze and Booster Service Area southeast of Fuze and Booster Spur Road between Load Lines 10 and 11 (Figure 2-3).

2.1.2 Land Use and Ownership History

The three former substations were key distribution points for electrical power throughout RVAAP. Electricity for RVAAP was purchased from the Ohio Edison Company and was supplied from Newton Falls and Garrettsville, Ohio. Distribution of electricity occurred through the substations, each at approximately 24,000 volts.

The former East Substation was in use from the 1940s through 1993. While in use, the East Substation consisted of a brick Switch House (Building 25-27) of approximately 1,170 ft^2, constructed of a 6-inch thick reinforced concrete floor. The interior of the building was divided into a general area for the switch gear panel and a smaller room used for storing batteries for backup power. The switch gear panel was connected to two pad-mounted 3,000 kilovolt-ampere (KVA) transformers and 36 high voltage capacitors located outside the building. A metal fence surrounded the building

and exterior equipment. As part of ongoing operation and maintenance activities, oil in the transformers was analyzed in 1993. In August 1993, the transformers were drained and moved to Building 854 for disposal. Copies of available transformer records are provided in Appendix G. Currently, the former substation is a vacant building surrounded by gravel and sparse vegetation.

The only remaining structure at the former East Substation is the former switch house building (Building 25-27). According to several interviewees, Building 25-27 at the former East Substation contained a bank of lead acid batteries, which were used to provide backup power to the switch gear (Appendix J). A historical photograph of the battery room is provided in Appendix H, and a current photograph of the battery room from the 2010 property visit is provided in Appendix M. Adjacent land next to the former East Substation is mainly open field that is regularly maintained by mowing. There are above ground electrical lines that run to the south of the former East Substation.

The former West Substation was located immediately southwest of former Power House No. 52-15. The power house was demolished in 2010, and that plot of land is currently an open field. The only remaining structure at the former West Substation is Building 28-28. Building 28-28 is not included as part of this AOC and is currently used by OHARNG for military training exercises. The area immediately north of the West Substation is mainly a wooded area.

The layout of the former West Substation was similar to the former East Substation with a 964 ft^2 brick building (Building 28-28) with a switch gear panel room and battery storage room (currently in use by OHARNG), with two pad-mounted transformers, and other electrical equipment, surrounded by a metal fence. Equipment was removed from service in 1993. Copies of the transformer records are provided in Appendix G. Salvage operations including removal of the fence occurred in 1997. Part of the exterior area of the former substation is now gravel and grass with a small ditch that runs parallel to the west side of the building.

There was no building associated with former Substation No. 3. The only structures that remain at former Substation No. 3 include the concrete foundations for the transformers, other electrical equipment, and stumps from former utility poles.

All substations were located within RVAAP and, as such, were under U.S. Army ownership, as described in Section 1.2. A description of the population demographics for RVAAP is provided in Section 1.3. The substations were formerly operated as part of the former activities associated with RVAAP. The former substation property has been transferred to NGB who licenses the use of the AOCs to the OHARNG for military training and operations.

2.1.3 Physical Property Characteristics

The topography at the former East Substation is generally flat with a slight grade to the north such that the AOC drains toward the roadside ditch along Remalia Road (Figure 2-1). The area comprises approximately 12,300 ft^2 and is covered with grass and some shrubs. The gravel pad adjacent to Building 25-27, where the former transformers were located, is still present. Building 25-27 is a brick

building on a concrete slab foundation and is approximately 47 ft by 28 ft. An original design drawing for Building 25-27 is included in Appendix I.

The topography at the former West Substation is also generally flat. The AOC drains generally south to the roadside ditch located along Fuze and Booster Road (Figure 2-2). The substation comprised an area of approximately 3,000 ft^2. Grass surrounds the area where the transformers were located and around Building 28-28. In addition, there is a gravel area west of Building 28-28 used for parking by OHARNG personnel. The concrete foundations for the transformers still exist at the AOC.

The topography at the former Substation No. 3 is generally flat, and the AOC drains to the southeast toward a large wetland and tributary to Sand Creek (Figure 2-3). The substation comprised an area of approximately 10,000 ft^2. There is an approximately 12-inch culvert metal corrugated pipe located along the driveway to the northeast. The AOC is located in an open field and is surrounded by wooded areas. There is a wetland/pond located immediately southeast of the AOC. No building existed at former Substation No. 3. The concrete foundations used to support the transformers still remain at the AOC.

2.2 HISTORICAL PROPERTY SUMMARY

2.2.1 Chronological Property Summary

The design drawings of the three substations suggest the substations were built in the early 1940s (Appendix I). When the equipment was taken out of service during 1992 and 1993, as part of the modified caretaker status build down, the transformers were sampled, tested for PCBs, drained to drums, and moved to Building 854 for disposal. Documentation of equipment inspection, testing, analytical results, and removal documentation is provided in Appendix G.

2.2.2 Military Operations

No documented evidence of historical military operations being performed at the substations was found during the historical data review. The former East Substation serviced Load Lines 1, 2, 3, 4, and 12, as well as provided power for miscellaneous facilities on the eastern side of RVAAP. The former West Substation serviced the Fuze and Booster Hill area, including Load Lines 5 through 11, the Administration Area, and George Road Area. The former Substation No. 3 serviced the western portion of the facility including Depot Area. A map illustrating the electric distribution system at RVAAP is provided in Appendix I.

2.2.2.1 Operations Involving Military Munitions

No historical evidence that military munitions were used, stored, or disposed at the former substations was found during the historical data review.

2.2.2.2 Operations Involving HTRW

The use of several hazardous and regulated materials was documented during the operation of the three former substations, including petroleum products (fuels and oils), PCBs, and lead acid batteries. Transformers at the substations typically used transformer oil containing PCBs due to their non-flammability, chemical stability, and electrical insulating properties. Manufacturing of PCBs was banned in 1979. The facility's disposal practices for PCBs were documented in an RVAAP Standard Operating Procedure, and inventories of PCB material were maintained on the annual PCB inventory logs. Annual PCB inventory inspections were conducted on a facility-wide basis to document quantities of PCB oil located throughout the facility. The results of the inspections were documented in annual PCB inventory reports. These reports documented all PCB-containing items, including transformers, capacitors, contaminated soil, and hydraulic equipment containing contaminated oil. For each item, the annual report detailed the following:

- Information on PCB-containing items and equipment, such as manufacturer, serial number, and location;
- Date of last PCB-containing items or material inspection;
- Quantities of PCB oil;
- Dates when PCB-containing items or equipment were removed and returned to service;
- Dates PCB-containing items or material were placed in storage; and
- Disposal information for PCB-containing waste, including the final disposition (via incineration or landfill), landfill location, and waste manifest number.

In addition, standard procedure ME-4-0019, *Storage and Handling of Polychlorinated Biphenyl (PCB) Contaminated Items at Building 854*, was discovered during the review of available historical records. This document outlined the facility's policy for the handling of PCB-contaminated items at RVAAP in which all PCB-contaminated items were transferred to Building 854 to be stored for disposal or re-use.

2.2.3 Map Analysis

Seven drawings were found pertaining to the substations during the historical records review. Two drawings (6934 1151.201 and 6934 1151.301) were original design drawings for Building 25-27, which is the switch house at the former East Substation. The drawings provide the construction details for such items as the concrete foundation, fences, doorways, and the walls. In addition, the drawings confirm the battery storage room. Drawing 1150.551 presents the general layout of all equipment associated with the former East and West Substations including placement of transformers and electric cable. Drawings A-3061 and 6934 601.7 illustrate the general location of the former

West Substation. Only one drawing (6934 1153.301) was obtained for former Substation No. 3 and illustrates the placement and layout of transformer foundations. A general map of the electric distribution system for RVAAP is provided in drawing D-562. All copies of drawings are provided electronically in Appendix I.

2.2.4 Aerial Photographic Interpretation

Representative historical aerial photographs from 1952 and 2006 are included in Appendix R. The historical aerial photographs were analyzed to identify past waste management practices, the relationship between the CR site and the surrounding areas, and the chronological development of the AOC. No areas of interest were found during the analysis of the aerial photographs.

2.3 PREVIOUS INVESTIGATIONS

In 1997, there was a documented spill of approximately 1,500 gallons of transformer oil that was spilled during salvage operations at the former West Substation. During salvaging activities, a large transformer tipped when lifted off the concrete pad and one or more cooling fins cracked when the transformer impacted the building. The spill was reported through the facility's spill procedures and the Installation On-Scene Coordinator responded to the call. In addition, the Ohio EPA was notified of the spill. RVAAP conducted a voluntary clean up of the spill under the oversight of the Ohio EPA. The cleanup was conducted due to a concern that the oil would reach the surface water. Approximately 449 tons of soil were excavated and transported to a soil remediation plant in Lowellville, Ohio (USACE 1997). Samples were collected and results were compared against the State of Ohio's Bureau of Underground Storage Tank Regulations (BUSTR). Samples results were below BUSTR action levels and remediation was complete. Sample data is included in Appendix G. Photographs of the remedial activities are included in Appendix H. According to the historical annual PCB inventory reports, the transformer oil from the former West Substation was tested for PCBs and determined to be non-PCB.

Mr. Thomas Chanda, former RVAAP employee, noted during the interviews a leak of an old transformer at the former West Substation that began in the early 1980s (Appendix J – Mr. Thomas Chanda Interview). However, no documentation of the leak was found during the historical records review.

No other environmental investigations or actions were discovered during the historical records review.

2.4 EVALUATION OF PRESENCE OF MILITARY MUNITIONS AND TECHNICAL DATA

No documented evidence of the presence of military munitions at the substations was found during the historical data review.

2.5 EVALUATION OF HTRW PRESENCE AND AREAS

Based on a comprehensive review of historical records, interviews with former RVAAP employees, and observations made during the property visits/perimeter surveys, the following items were noted with respect to HTRW activities:

- Transformer oil containing PCBs;
- Historical spill/leak at the former West Substation;
- Lead acid batteries in the building at the former East and West Substations; and
- 55-gallon drums observed during the property visit/perimeter survey at Building 25-27 at the former East Substation.

Transformers and other oil containing equipment at the former substations typically contained PCBs prior to the 1990s when PCB-containing transformer oil was replaced with non-PCB oil. RVAAP maintained detailed records regarding equipment containing PCB oil, which was reported in their annual PCB inventory report. According to the annual PCB inventory reports found during the historical records review, samples collected from the former East, West, and No. 3 Substations did not contain PCB greater than 50 parts per million (ppm).

During the interviews, Mr. Thomas Chanda, former RVAAP employee, indicated a leak of approximately 100-150 gallons of transformer oil had occurred at the former West Substation. Mr. Chanda recalled that the soil in and around the leak was remediated and the soil was tested. However, no documentation was found with respect to the remediation or testing of the soil.

As described in Section 2.2.2, approximately 1,500 gallons of transformer oil spilled during transformer salvage operations at the former West Substation, in 1997. A removal report was discovered during the historical records review and concluded remedial activities at the AOC met applicable standards and NFA was required. No documentation of approval from Ohio EPA was discovered during the historical records review. The area of the former transformers is a candidate for further investigation. Suggested target analytes include heavy metals, PCBs, and semi-volatile organic compounds (SVOCs).

As discussed during the interviews with the former RVAAP employees, Building 25-27 at the former East Substation contained a bank of lead acid batteries which were used to provide backup power to the switch gear. The number of lead acid batteries stored at Building 25-27 is unknown; however, interviewees recalled approximately 80 batteries stored at the location at any one time (Appendix J). Mr. Jim McGee, a former RVAAP employee, speculated a leak of the batteries might have occurred at the former East Substation as staining of the wood racks was noted in the battery storage area. There was also staining on the floor beneath the storage racks, however this staining appears to be rust from the rack's metal supports. No documented evidence of a release was found during the

historical records review. No documented evidence of ASTs or USTs being present at the former substations was found.

During the property visit at the former East Substation, four rusted 55-gallon drums were observed at the AOC. Three of the drums were noted outside Building 25-27 at the former East Substation and one was located inside the building. Based on historical information, the empty drums were used by salvage contractors after their use of the building and were placed in the building for salvage operations. These drums were not used to contain hazardous material. Rusted drums are also used along this road as part of training operations along the Improvised Explosive Device (IED) lane. Therefore, the presence of these rusted drums does not constitute a potential release at this AOC.

No documented evidence of a release at the former Substation No. 3 was discovered during the historical records review or during the property visit.

2.6 EVALUATION OF CON/HTRW PRESENCE AND AREAS

No documented evidence of CON/HTRW was found during the historical records review for the former substations. CON/HTRW includes items such as USTs and ASTs.

2.7 PATHWAY AND ENVIRONMENTAL HAZARD ASSESSMENT

This section provides a preliminary description of the potential contaminant sources, migration pathways, contaminant discharge points, and potential receptors for the three former substations (CC-RVAAP-68), based on operational history and property surveys.

2.7.1 Groundwater Pathway

2.7.1.1 Hydrogeologic Setting

No facility-wide groundwater monitoring wells are located at the former East Substation AOC. The nearest facility-wide groundwater monitoring well is LL2mw-270, located approximately 1,750 ft to the southeast within the Load Line 2 AOC. The unconsolidated aquifer is not present within the vicinity of the former East Substation (Figure 1-5). The elevation of the groundwater table at the former East Substation is estimated to be 1,000 ft amsl based on the generalized potentiometric surface of the bedrock aquifer (Figure 1-6), and the generalized regional groundwater flow direction in the vicinity of the former East Substation is assumed to be to the east.

No facility-wide groundwater monitoring wells are located at the West Substation AOC. The nearest facility-wide groundwater monitoring well is SCFmw-001, a bedrock aquifer monitoring well located approximately 150 ft southwest of the former West Substation (Figure 2-2). The closest unconsolidated groundwater monitoring well, LL6mw-001, is located approximately 640 ft southwest of the former West Substation (Figure 2-2). The elevation of the groundwater table at the former West Substation is estimated to be 1,110 ft amsl, based on the generalized potentiometric surface of the

unconsolidated aquifer (Figure 1-5). The elevation of the potentiometric surface within the bedrock aquifer based on the closest bedrock groundwater monitoring well (SCFmw-001) is estimated to be 1,031 ft amsl (Figure 1-6). The generalized regional groundwater flow direction in the vicinity of the former West Substation is to the southeast.

No facility-wide groundwater monitoring wells are located at the Substation No. 3 AOC. The nearest facility-wide groundwater monitoring well is LL11mw-001, approximately 1,350 ft northwest of the Substation No. 3 AOC. The elevation of the groundwater table at the former East Substation is estimated to be 1,075 ft amsl based on the generalized potentiometric surface of the unconsolidated aquifer (Figure 1-5), and the generalized groundwater flow direction is assumed to be to the east. The closest bedrock groundwater monitoring well to former Substation No. 3 is LL9mw-002 approximately 2,000 ft to the east. The elevation of the potentiometric surface within the bedrock aquifer is estimated to be 1,110 ft amsl, based on the generalized potentiometric surface of the bedrock aquifer (Figure 1-6).

2.7.1.2 Groundwater Targets

Groundwater targets include human receptors that use groundwater for potable water supply, as well as environmental receptors (e.g., livestock, fish farms) and physical targets (e.g., springs) that may be affected by potential groundwater contamination on or adjacent to the AOC. Section 1.4.4.2 describes groundwater use at RVAAP. Groundwater in the vicinity of the former substations is not currently used by the Army or OHARNG for potable purposes. The OHARNG and Army do not have plans for future groundwater use in the area. There are no public, livestock, or commercial groundwater supply wells within RVAAP. Accordingly, no human or environmental receptors exist respective to groundwater at the AOC. Physical receptors such as springs or other potential groundwater discharge areas to surface water bodies are addressed in Section 2.7.2.2.

2.7.1.3 Groundwater Conclusions

No groundwater samples were collected as part of this project and no facility-wide groundwater monitoring wells are located in the immediate vicinity of the former substations. Leaching of PCBs from soil to groundwater is not a likely contaminant migration pathway due to low solubility and high sorption coefficients within vadose zone thicknesses ranging from approximately 8 ft at the East Substation, 11 ft at the West Substation, and 6 ft at Substation No. 3.

2.7.2 Surface Water Pathway

2.7.2.1 Hydrologic Setting

No surface water or wet sediment samples were collected as part of this project. Surface water at the substations occurs intermittently as storm water runoff overland and through constructed roadside ditches. Sediment within nearby roadside conveyances appears to be dry sediment, as defined by RVAAP guidance, and is not typically inundated for more than seven days at a time. No visual signs

of potential contamination were observed within drainage ditches during property visits; however undocumented spills may have occurred that may have migrated through drainage channels. Surface water flow is the primary migration pathway for potential contamination to leave the former substations flowing overland or through natural/manmade conveyances to Sand Creek.

2.7.2.2 Surface Water Targets

Surface water targets include human receptors that use surface water for potable water supply or recreation, as well as environmental (e.g., streams, wetlands, sensitive aquatic environments) and physical targets (e.g., public or private water distribution system intakes) that may be affected by potential groundwater contamination on or adjacent to the AOC. No perennial streams are located within the three former substations. Therefore, there is no direct exposure pathway for human receptors or targets to surface water. There are no observed springs or groundwater discharge points to a surface water body in the vicinity of the three substations. A jurisdictional wetland and associated aquatic habitat are located adjacent to former Substation No. 3; this wetland receives overland runoff from this substation AOC. Ecological receptors within this jurisdictional wetland may represent potential surface water targets.

2.7.2.3 Surface Water Conclusions

Available information indicates a potential environmental hazard associated with the three former substations. Potential contaminants may exist from unreported spills or leaks from electrical equipment or lead acid batteries. As spills may or may not have occurred at the former substations, there is the potential for contaminants to exist within soil and sediment and to have migrated as described in Section 2.7.2.1. Further evaluation of the sediment within drainage conveyances at the former substations and surface water environmental media in nearby perennial receiving streams (tributaries to Sand Creek) is recommended to determine the presence of contamination, if any.

2.7.3 Soil Exposure and Air Pathways

2.7.3.1 Physical Conditions

No soil borings were installed to confirm the composition of unconsolidated and bedrock deposits at the CR site as part of this project, and no historical soil boring logs were located for this area. The former West Substation is located within Hiram Till glacial deposits and the soil type is the Mahoning silt loam (2-6% slopes). The bedrock formation underlying the unconsolidated deposits at the former West Substation, as inferred from existing geologic data at SCFmw-001, is the Pennsylvanian-age Pottsville Formation, Homewood Sandstone Member. The estimated depth to bedrock is 35 ft bgs. The Mahoning silt loam and Homewood Sandstone Member are described in Section 1.4.

The former East Substation is located within Hiram Till glacial deposits and the soil type is the Fitchville silt loam (0-2% slopes). The bedrock formation underlying the unconsolidated deposits at the former East Substation, as inferred from existing geologic data, is the Pennsylvanian-age

Pottsville Formation, Sharon Sandstone Member, informally referred to as the Sharon Conglomerate (Winslow et al. 1966). Descriptions of the Fitchville silt loam and Sharon Sandstone Member are presented in Section 1.4.

Former Substation No. 3 is located within Hiram Till glacial deposits and the soil type is the Wadsworth silt loam (2-6% slopes). The bedrock formation underlying the unconsolidated deposits at former Substation No. 3, as inferred from existing geologic data, is the Pennsylvanian-age Pottsville Formation, Homewood Sandstone Member. Descriptions of the Wadsworth silt loam and Homewood Sandstone Member are presented in Section 1.4.

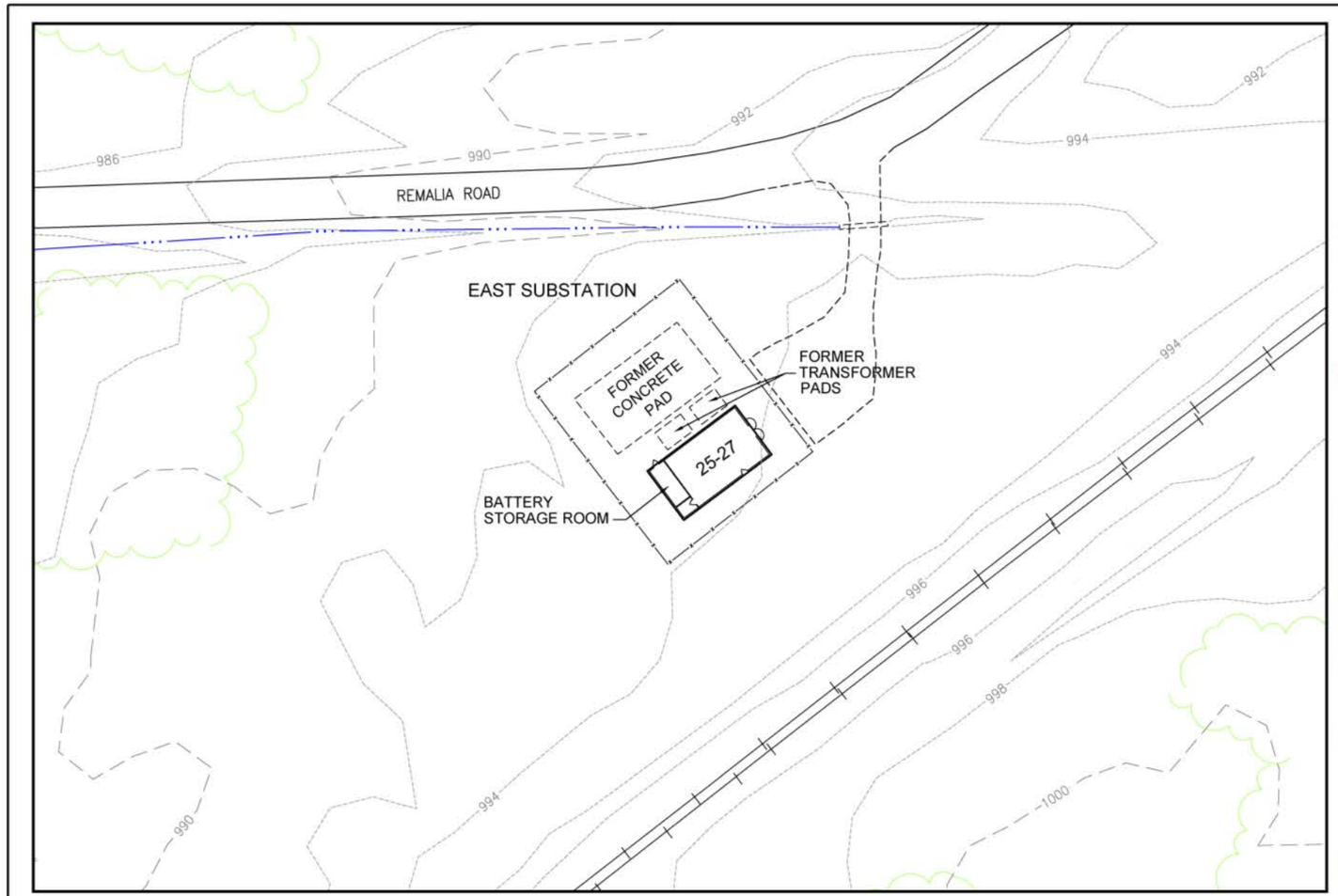
2.7.3.2 Soil and Air Targets

Current potential soil targets include human and ecological (animal and plant) receptors that may come into contact with surface or subsurface soil, if contaminants are present within or adjacent to the former substations. Likewise, future human exposure to potential soil contaminants could occur with active use of the AOC (e.g., training activities). Ecological receptors present in the substation's vicinity may also be exposed to potential soil contaminants in the future.

Airborne contamination is not considered a viable migration or exposure pathway at the three former substations. The likely contaminants associated with the former substations (PCBs, SVOCs, inorganic chemicals) have low volatility. The former substations are currently well vegetated. RVAAP is located in a humid climate, and soil moisture content is typically high, which reduces the potential for dust generation.

2.7.3.3 Soil Exposure and Air Pathway Conclusions

Potential contaminants from unreported spills or leaks from electrical equipment or lead acid batteries may represent a direct exposure pathway for human receptors under current and future land use. Surface and subsurface soil at the CR sites may represent a potential secondary source of contamination to surface water and groundwater. Environmental sampling of surface and/or subsurface soil is recommended to confirm the presence or absence of any soil contamination.



CC-RVAAP-68: EAST SUBSTATION

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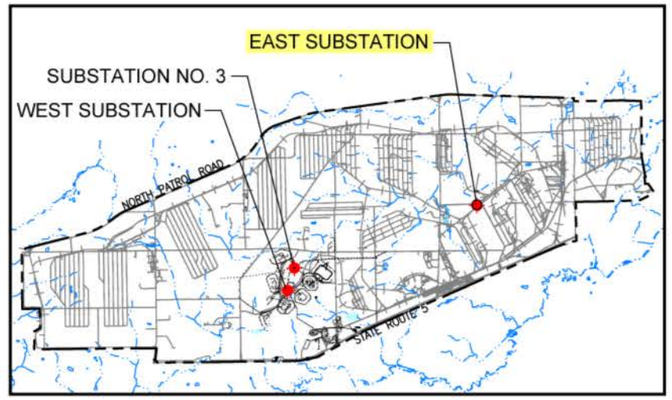
SCALE: 1" = 60'



RVAAP KEY MAP - CC-RVAAP-68: ELECTRIC SUBSTATIONS

0 1.25 2.5

SCALE:1"=2.5 MILES

BUILDING 25-27: EAST SUBSTATION (2010)

LEGEND:

- EXISTING BUILDING
- FORMER CONCRETE PAD
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FORMER FENCE LINE
- DITCH
- VEGETATION
- GROUND CONTOUR (10-FT)
- GROUND CONTOUR (2-FT)

OHIO STATE PLANE (NAD 83)

US Army Corps of Engineers Louisville District

SAIC From Science to Solutions

COMPLIANCE RESTORATION SITES
RAVENNA ARMY AMMUNITIOIN PLANT - RAVENNA, OHIO

DRAWN BY:	REV. NO./DATE:	CAD FILE:
P. HOLM	0/09-21-11	08042/DWGS/K72-CRS68-E

Figure 2-1. East Substation Map and Site Features

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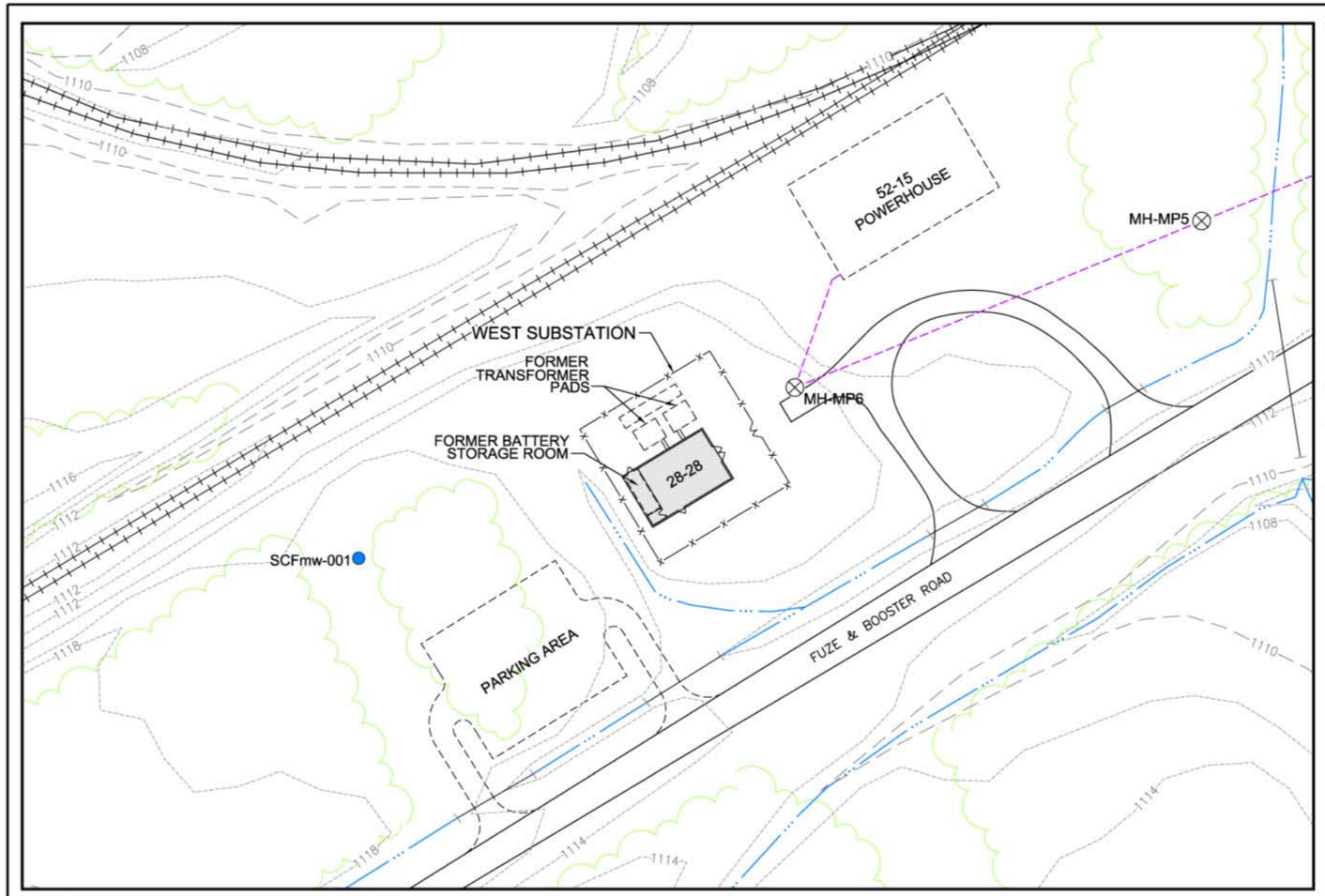

CC-RVAAP-68: WEST SUBSTATION

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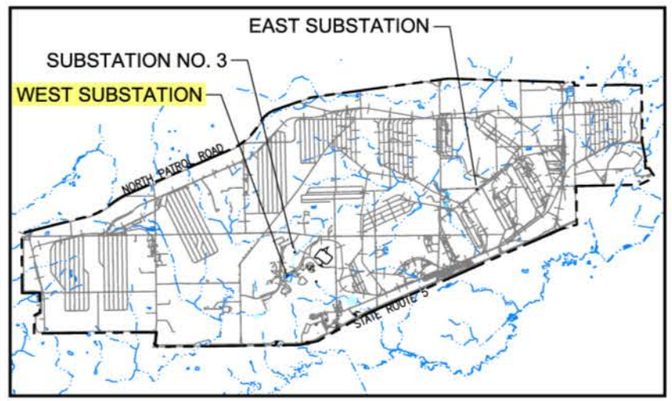
SCALE: 1" = 60'



RVAAP KEY MAP - CC-RVAAP-68: ELECTRIC SUBSTATIONS

0 1.25 2.5

SCALE:1"=2.5 MILES

BUILDING 28-28: WEST SUBSTATION

LEGEND:

- EXISTING BUILDING
- DEMOLISHED BUILDING
- ASPHALT ROAD
- RAILROAD TRACKS
- FORMER FENCE LINE
- DITCH
- VEGETATION
- GROUND CONTOUR (10-FT)
- GROUND CONTOUR (2-FT)
- GROUNDWATER MONITORING WELL
- ⊗ MH-220 MANHOLE
- SANITARY SEWER LINE
- DISCONTINUOUS CULVERT PIPE RUN

OHIO STATE PLANE (NAD 83)

US Army Corps of Engineers Louisville District

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COMPLIANCE RESTORATION SITES
RAVENNA ARMY AMMUNITIOIN
PLANT - RAVENNA, OHIO

DRAWN BY:	REV. NO./DATE:	CAD FILE:
P. HOLM	0/09-20-11	/08042/DWGS/K72-CRS68-W

Figure 2-2. West Substation Map and Site Features

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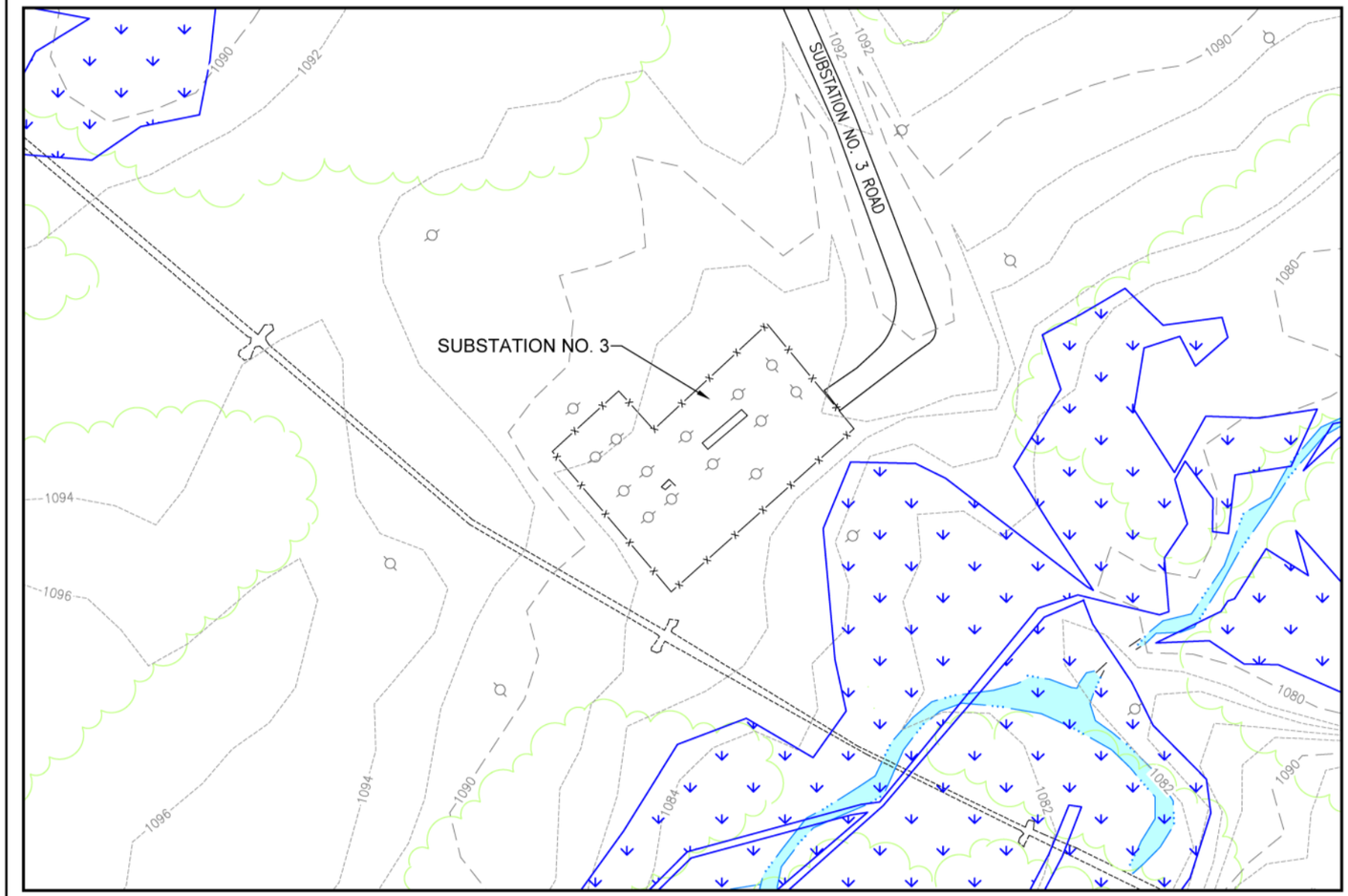

CC-RVAAP-68: SUBSTATION NO. 3

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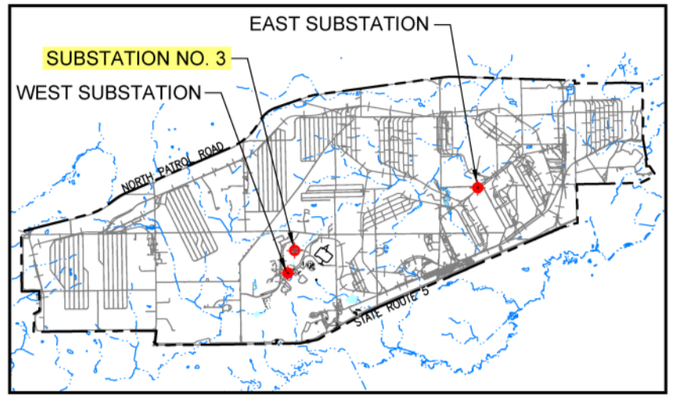

RVAAP KEY MAP - CC-RVAAP-68: ELECTRIC SUBSTATIONS

0 1.25 2.5

SCALE:1"=2.5 MILES

FORMER LOCATION OF SUBSTATION NO. 3

LEGEND:

- CONCRETE PAD
- ASPHALT ROAD
- FORMER FENCE LINE
- SURFACE WATER
- VEGETATION
- GROUND CONTOUR (10-FT)
- GROUND CONTOUR (2-FT)
- FORMER UTILITY POLE
- DEMOLISHED OVERHEAD STEAM LINE
- JURISDICTIONAL WETLAND

OHIO STATE PLANE (NAD 83)

US Army Corps of Engineers Louisville District

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COMPLIANCE RESTORATION SITES
RAVENNA ARMY AMMUNITIOIN PLANT - RAVENNA, OHIO

DRAWN BY:	REV. NO./DATE:	CAD FILE:
P. HOLM	0/04-06-11	/08042/DWGS/K72-CRS68-3

Figure 2-3. Substation No. 3 Map and Site Features

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3.0 CC-RVAAP-69: BUILDING 1048 FIRE STATION

This section presents a description of the CC-RVAAP-69: Building 1048 Fire Station, including a description of the property, summary of previous investigations, an evaluation of documents reviewed during the historical records review search, and a pathway and environmental hazard assessment. Appendix A provides a description of all reference sources and records reviewed during the course of this evaluation. Conclusions and a recommendation for NFA or further investigation at this AOC are presented in Section 11.0.

3.1 PROPERTY DESCRIPTION, ACREAGE, AND LAND USE

The Building 1048 Fire Station AOC consists of the area behind the former Administration Area fire station building where, reportedly, fire extinguishers containing carbon tetrachloride were discharged. The fire station building is not included as part of this CR site. The acreage where carbon tetrachloride was reported by former employees to have been discharged is not accurately defined but is assumed to be less than one acre northwest of former Building 1048. Interviewees noted an approximately 8-ft by 8-ft metal storage shed, used to store carbon tetrachloride and possibly other chemicals, was located adjacent to the fire station (Building T-4510). One interviewee noted the storage shed was dismantled in 1993 (Appendix J – Mr. Jim McGee Interview). The Building 1048 Fire Station was demolished in 2008 by the OHARNG and the demolition project was limited to the building; not the area where the fire extinguishers were reportedly discharged. One non-regulated UST was located at the Building 1048 Fire Station (Section 5.0).

3.1.1 Location

The Building 1048 Fire Station was located at the intersection of George Road and South Service Road in the Administration Area in the south-central portion of RVAAP (Figure 3-1).

3.1.2 Land Use and Ownership History

Building 1048 was known as Fire House No. 1 and was one of three fire houses at RVAAP. The fire station included sleeping quarters for fire department personnel. Adjacent buildings to Building 1048 contained security force quarters and an ambulance garage.

The Building 1048 Fire Station was situated between Building 1048A and 1048B. Building 1048A was known as the Guard Headquarters and Building 1048B was known as the Ambulance Garage. Building 1067, which was an equipment repair shop, is located to the north of the Building 1048 Fire Station. Buildings 1037 (former Laundry Building) and former Power House No. 6 are located to the east. An approximately 8 ft by 8 ft metal storage shed, denoted as Building T-4510, was located adjacent to the Building 1048 Fire Station. Original design drawings of the Building 1048 Fire Station are included in Appendix I.

The Building 1048 Fire Station was located within RVAAP and, as such, was under U.S. Army ownership, as described in Section 1.2. A description of the population demographics for RVAAP is provided in Section 1.3. Building 1048 was formerly used as part of the former activities associated with RVAAP. The AOC has been transferred to NGB who licenses the use of the AOC to the OHARNG for military training and operations.

3.1.3 Physical Property Characteristics

The Building 1048 Fire Station was a rectangular shaped building, which included a garage for the fire trucks and sleeping quarters for fire department personnel. Adjacent attached structures contained security police headquarters the ambulance garage and the key shop. The area behind Building 1048, where carbon tetrachloride was reported by former employees to have been discharged, is a relatively flat, grassy field. The Administration Area near the former Building 1048 Fire Station is open field that is regularly maintained by mowing. Topography is flat and there are no wetlands or surface water features at CC-RVAAP-69. No remnant structures of the building remain, such as slabs or footers.

3.2 HISTORICAL PROPERTY SUMMARY

3.2.1 Chronological Property Summary

No documented evidence was found regarding specific years of service for the Building 1048 Fire Station. A site schematic dated 1941 was found as part of this historical records review, so it is assumed services commenced shortly after the 1941 building construction. A description of the RVAAP facility operational history is included in Section 1.2.

3.2.2 Military Operations

No documented evidence of historical military operations being performed at the Building 1048 Fire Station was found during the historical data review.

3.2.2.1 Operations Involving Military Munitions

No documented evidence of operations involving military munitions at the Building 1048 Fire Station was found during the historical data review.

3.2.2.2 Operations Involving HTRW

Several interviewees noted that past operations at the Building 1048 Fire Station included the discharge of fire extinguishers, which contained carbon tetrachloride (Appendix J). Carbon tetrachloride was commonly used through the 1950s to extinguish fires as the chemical was readily available, nonflammable, easily volatilized, and inhibited the combustion process. Carbon tetrachloride is no longer used for fire suppression due to its hazardous and toxic characteristics to

human health and the environment. The interviewees reported that when the fire extinguishers were serviced, it was typical for fire department personnel to discharge the contents to the ground behind the fire station (Appendix J). No documented evidence of these practices was found during the historical records review.

In addition, the interviewees noted an approximately 8-ft by 8-ft metal storage shed was located to the northwest in the area behind Building 1048. The interviewees indicated the metal shed was used to store carbon tetrachloride for the fire extinguishers. No documentation was found to confirm the shed was used for the storage of carbon tetrachloride.

Historical records indicate a 100-gallon gasoline UST was located at Building 1048A, which serviced the Fire Station and adjacent Guard Quarters. Section 5.0 provides information related to this UST (Tank No. RV-5).

3.2.3 Map Analysis

Two original design drawings of the Building 1048 Fire Station were found during the historical records review. These drawings show details regarding the roof and foundation plan. One additional drawing was located that does not contain information about the buildings other than surrounding ground elevations. No drawings or maps were found of the metal storage shed. The Building 1048 Fire Station drawings are included in Appendix I.

3.2.4 Aerial Photographic Interpretation

Historical aerial photographs taken in 1952 and 2006 were evaluated during the historical records review and are included in Appendix R. The historical aerial photographs were analyzed to identify past waste management practices, the relationship between the CR site and the surrounding areas, and the chronological development of the CR site. No areas of interest were noted during the analysis of the aerial photographs.

3.3 PREVIOUS INVESTIGATIONS

No documentation of environmental investigations or actions at Building 1048 and the surrounding vicinity were discovered during the historical records review.

3.4 EVALUATION OF PRESENCE OF MILITARY MUNITIONS AND TECHNICAL DATA

No documented evidence of the presence of military munitions at the Building 1048 Fire Station was found during the historical data review.

3.5 EVALUATION OF HTRW PRESENCE AND AREAS

During the interview process, several interviewees noted the past practices for fire extinguisher maintenance included discharging old fire extinguishers containing carbon tetrachloride directly to the ground in the area behind the fire station. No documented evidence was discovered to confirm these practices. In addition, the interviewees noted a metal storage shed was located on-site and used to store carbon tetrachloride. No documented evidence of this storage shed was discovered during the historical records review. Inspection of the area during the property visit did not indicate visual evidence of contaminant releases (Appendix L).

The area behind the Building 1048 Fire Station and in the area of the former storage shed is a candidate for further investigation. Suggested target analytes include target analyte list (TAL) metals, SVOCs, and volatile organic compounds (VOCs).

3.6 EVALUATION OF CON/HTRW PRESENCE AND AREAS

Refer to Section 5.0 for a complete description and evaluation of the former UST located at the Building 1048 Fire Station. No other documented evidence of CON/HTRW was found during the historical records review of the former Building 1048 Fire Station.

3.7 PATHWAY AND ENVIRONMENTAL HAZARD ASSESSMENT

This section provides a preliminary description of the potential contaminant sources, migration pathways, contaminant discharge points, and potential receptors for the Building 1048 Fire Station (CC-RVAAP-69) based on operational history and property surveys.

3.7.1 Groundwater Pathway

3.7.1.1 Hydrogeologic Setting

No facility-wide groundwater monitoring wells are present at the Administration Area. The nearest facility-wide groundwater monitoring well is LL5mw-004, located over 3,500 ft northwest of the Building 1048 Fire Station. Due to lack of groundwater monitoring wells in the area, the depth to groundwater cannot be estimated with reasonable accuracy. Groundwater potentiometric data in the unconsolidated aquifer is not available within the Administration Area. Based on the inferred facility-wide potentiometric surface within the unconsolidated aquifer (Figure 1-5), the elevation of the groundwater surface ranges from 1,025 to 1,050 ft amsl. The groundwater elevation in the bedrock aquifer within the Administration Area is estimated to be 965 ft amsl, based on well installation logs for groundwater supply wells at Buildings 1067 and 1068. The generalized regional groundwater flow direction in the Administration Area is to the southeast toward a tributary to the west branch of the Mahoning River located southeast of the CR site.

3.7.1.2 Groundwater Targets

Groundwater targets include human receptors that use groundwater for potable water supply, as well as environmental receptors (e.g., livestock, fish farms) and physical targets (e.g., springs) that may be affected by potential groundwater contamination on or adjacent to the AOC. Section 1.4.4.2 describes groundwater use at RVAAP. There are no public, livestock, or commercial groundwater supply wells within RVAAP. A groundwater supply well is located in the Administration Area approximately 500 ft southwest of the Building 1048 Fire Station. This well provides a limited supply of potable water for non-drinking supply purposes for OHARNG. Accordingly, human exposure respective to potential groundwater contaminants at the AOC could occur if groundwater is used for domestic supply purposes in the future. Physical receptors, such as springs or other potential groundwater discharge areas to surface water bodies are addressed in Section 3.7.2.2.

3.7.1.3 Groundwater Conclusions

No groundwater samples were collected as part of this project. Leaching of potential soil contaminants to groundwater is a potential contaminant migration pathway for the CR site, which may require further evaluation.

3.7.2 Surface Water Pathway

3.7.2.1 Hydrologic Setting

No surface water or wet sediment samples were collected as part of this project. Surface water within the Administration Area occurs intermittently as storm water runoff overland, through constructed roadside ditches, and a storm sewer network throughout the Administration Area. Sediment within nearby roadside conveyances appears to be dry sediment, as defined by RVAAP guidance, and is not typically inundated for more than seven days at a time. Sediment within the storm sewer network may exist but was not confirmed during the AOC property visit; the storm sewer network within the RVAAP Administration Area is currently being addressed under a separate CERCLA RI conducted under the Performance-Based Acquisition 2008 (PBA08) project. No visual signs of potential contamination were observed within drainage ditches during the property visit.

Surface water flow is a primary migration pathway for potential contamination to leave the former CR site, flowing overland or through natural/manmade conveyances. There are no perennial surface water features at the CR site. The closest perennial feature to receive drainage from the Administration Area is a tributary to the west branch of the Mahoning River, located southeast of the CR site.

3.7.2.2 Surface Water Targets

Surface water targets include human receptors that use surface water for potable water supply or recreation, as well as environmental (e.g., streams, wetlands, sensitive aquatic environments) and

physical targets (e.g., public or private water distribution system intakes) that may be affected by potential groundwater contamination on or adjacent to the AOC. No perennial streams are located within the AOC. There are no observed springs or point groundwater discharge points to a surface water body in the immediate vicinity of the Building 1048 Fire Station. Therefore, there is no direct exposure pathway for human receptors or ecological targets to surface water at the AOC.

3.7.2.3 Surface Water Conclusions

Available information indicates a potential environmental hazard associated with the Building 1048 Fire Station. Potential contaminants may exist in soil and dry sediment from unreported spills or leaks from fire fighting equipment. As releases may or may not have occurred at the Building 1048 Fire Station, there is the potential for contaminants to exist and to have migrated as described in Section 3.7.2.1. Further evaluation of dry sediment within drainage conveyances at the Building 1048 Fire Station may be required as part of soil evaluation to determine the presence of contamination, if any.

3.7.3 Soil Exposure and Air Pathways

3.7.3.1 Physical Conditions

No soil borings were installed to confirm the composition of unconsolidated and bedrock deposits at the CR site as part of this project, and no historical soil boring logs were located. The Administration Area is located within Hiram Till glacial deposits. Two soil types found at the CR site are Mahoning silt loams (0-2% and 2-6% slopes). The Mahoning silt loam (MgA) (0-2% slopes) is present in the eastern portion of the AOC including the former building footprint, while the Mahoning silt loam (MgB) (2-6% slopes) occurs only the area southwest of the former building footprint (USDA 2010). The bedrock formation at the Administration Area, based on groundwater well installation logs, is the Pennsylvanian-age Pottsville Formation, Sharon Shale member. The elevation of the Sharon Shale member in the Administration Area is 986 to 1,006 ft amsl, based on available well installation logs. The Sharon Sandstone member, informally referred to as the Sharon Conglomerate, is observed in the eastern portions of the Administration Area (Winslow et al. 1966). Complete descriptions of the Mahoning silt loam soil type, the Sharon Shale, and the Sharon Conglomerate are presented in Section 1.4.

3.7.3.2 Soil and Air Targets

Current potential soil targets include human and ecological (animal and plant) receptors that may come into contact with surface or subsurface soil, if contaminants are present within or adjacent to the former Building 1048 Fire Station. Likewise, future human exposure to potential soil contaminants could occur with active use of the AOC (e.g., training activities). Ecological receptors present in the AOC vicinity may also be exposed to potential soil contaminants in the future.

Airborne contamination (e.g., windblown dust) is not considered a viable migration or exposure pathway at this CR site. Although the likely contaminant associated with the Building 1048 Fire Station (carbon tetrachloride) has high volatility, the estimated timeframe of any releases would result in attenuation of the contaminant in surface soil. The Building 1048 Fire Station area is currently well vegetated. RVAAP is located in a humid climate, and soil moisture content is typically high, which reduces the potential for dust generation.

3.7.3.3 Soil Exposure and Air Pathway Conclusions

No soil samples were collected as part of this project. Potential contaminants in soil may represent a direct exposure pathway for human receptors under current and future land use. Surface and subsurface soil at the CR site may represent a potential secondary source of contamination to surface water and groundwater. Environmental sampling of surface and/or subsurface soil is recommended to confirm the presence or absence of any potential soil contamination.

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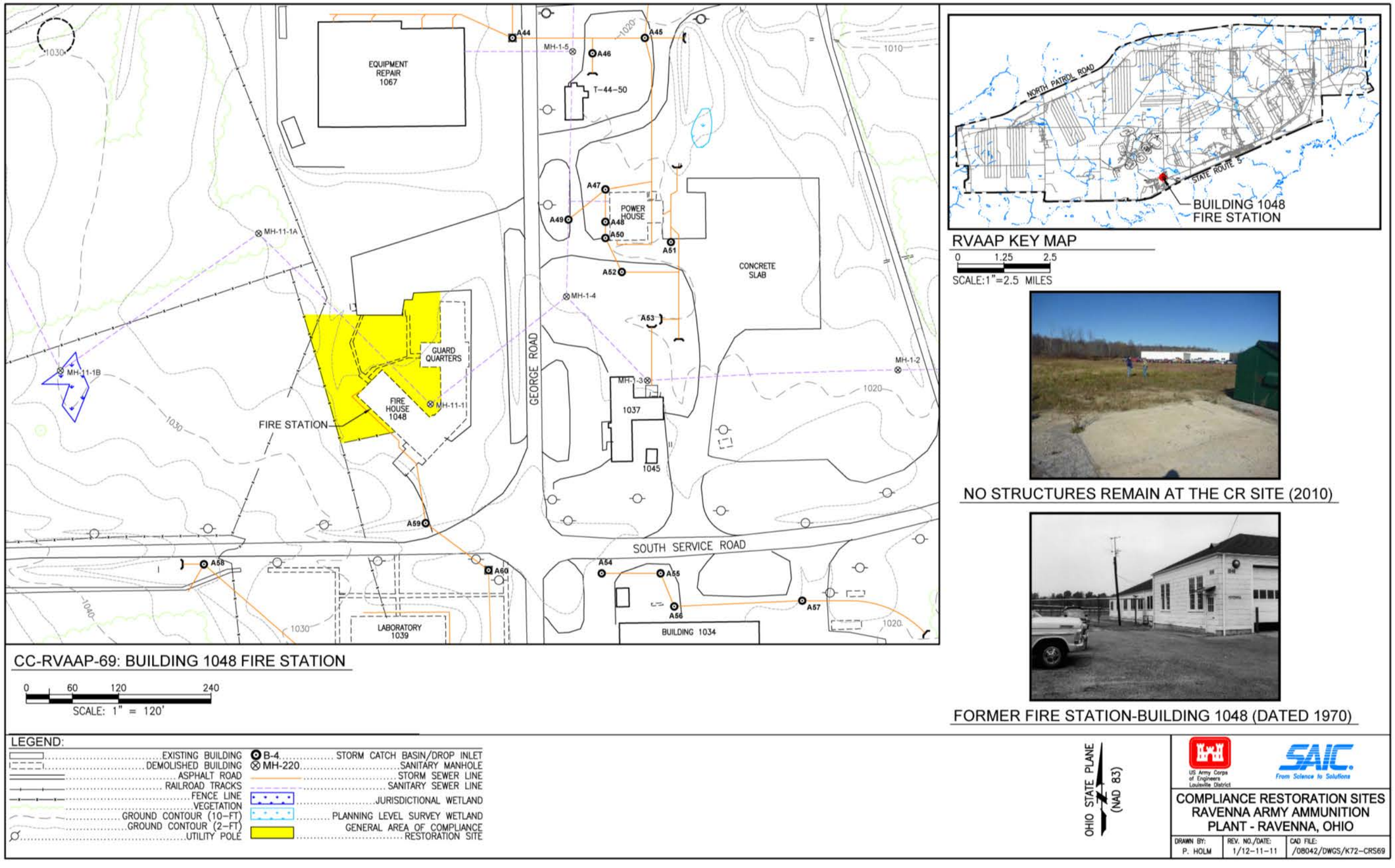

Figure 3-1. Building 1048- Fire Station Map and Site Features

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4.0 CC-RVAAP-70: EAST CLASSIFICATION YARD

This section presents a description of the CC-RVAAP-70: East Classification Yard, including a description of the property, summary of previous investigations, an evaluation of historical documents reviewed during the historical records review search, and a pathway and environmental hazard assessment. Appendix A provides a description of all reference sources and records reviewed during the course of this evaluation. Conclusions and a recommendation for NFA or further investigation at this AOC are presented in Section 11.0.

4.1 PROPERTY DESCRIPTION, ACREAGE, AND LAND USE

The East Classification Yard AOC (Figure 4-1) consists of Building 47-40 (Round House) and the former herbicide storage shed (former Building 47-60). The area surrounding the Round House and herbicide storage shed consists of approximately 20,000 ft^2. Building 47-40 is still present on-site but is not actively used. The herbicide storage shed has been demolished. Two USTs were located at the East Classification Yard (Section 5.0).

4.1.1 Location

The East Classification Yard is located on South Service Road, south of Ramsdell Road, and northeast of Irons Road and part of the former Transportation Storage Area (Figures 1-2 and 4-1).

4.1.2 Land Use and Ownership History

The East Classification Yard was used for switching and maintaining railroad cars. Building 47-40 (Round House) was used for locomotive engine repairs and other maintenance activities. The former herbicide storage shed was used to store a track-mounted herbicide sprayer and the herbicides used to control vegetation along the railroads at RVAAP.

Building 47-40 and several other structures remain intact at and around the CR site. A former boiler house (Building 47-42), former Transportation Storage Area Office (Building 47-41), and oil pumping/sand drying facility were connected to a fuel oil AST within a bermed enclosure west of Building 47-40 (Round House). Above-grade fuel oil tanks have been removed. The Transportation Storage Area was on a separate sanitary septic system and the sanitary lines, septic tank, and sludge basin structure are still present. Currently, the land adjacent to the East Classification Yard is mainly open fields or wooded areas. A railroad track complex is located east of the CR site and is currently utilized by the OHARNG. ASTs that stored No. 5 fuel oil were located immediately to the west of Building 47-40 (Round House) (designated as 47-44, 47-44A, 47-44B, 47-44C on Figure 4-1 and as ASTs 65, 65A, 65B and 71 in the RVAAP Tank Inventory). Load Line No. 1 and Ramsdell Quarry are located to the west and the Defense Logistics Agency (DLA) Ore Piles are located to the southwest.

The East Classification Yard is located within RVAAP and, as such, has remained under U.S. Army ownership since its construction, as described in Section 1.2. A description of the population demographics for RVAAP is provided in Section 1.3. The East Classification Yard was operated as part of the former activities associated with RVAAP. The East Classification Yard has been transferred to NGB who licenses the use of the AOC to the OHARNG for military and training operations.

4.1.3 Physical Property Characteristics

The topography in the former Transportation Storage Area and around the East Classification Yard is generally flat. Storm water runoff drains to the existing storm sewer system located in the area, which discharges to a drainage ditch along the west side of the railroad track yard that flows to the north (Figure 4-1). A drainage conveyance also drains the area west of the former AST bermed enclosure that also flows to the north.

Building 47-40 (Round House) is a red brick building approximately 55 ft by 143.5 ft by 36 ft. There is an attached section that was used as a locker room for the workers. The building has two large bay doors on the north and south side ends of the building used to allow the locomotives to enter the building. Inside the building, there was a pit area used by the maintenance workers to access the underside of the engines. The building interior is also equipped with an overhead crane with a 25-ton capacity. Original design drawings found during the historical records review indicate a parts storage area that was located adjacent to the locker rooms (Appendix I).

Interviewees noted an outdoor open wash rack was located to the south of the East Classification Yard that was used to wash box cars, which carried explosives. The wash rack was also reportedly to wash the engines (Appendix J). The wash rack was supplied with water from nearby Well House #15. One interviewee noted there were no controls in place to collect the wash water (Appendix J – Mr. Thomas Chanda Interview).

4.2 HISTORICAL PROPERTY SUMMARY

4.2.1 Chronological Property Summary

The Transportation Storage Area was part of initial RVAAP construction, based on design drawings dated 1941 and 1942, and, based on historical reports, was one of the first areas constructed. No documentation was found during the historical records review to define the specific years of operation of the CR site. Refer to Section 1.2 of this report for a description of the RVAAP facility operational history.

A spill report documenting a leak of No. 5 fuel oil from an AST located immediately west of Building 47-40 was discovered during the historical records review (Appendix G). The report indicates the containment area was scarified, and the contaminated soil was piled within the containment area. However, no quantities of contaminated soil were noted. The report indicated approximately 16,632

gallons of fuel oil was salvaged from the containment area, and approximately 120 gallons of oil mixed with dirt and straw were to be disposed per Ohio EPA instructions.

The report also indicated samples of the contaminated soil were collected to determine if the contaminated soil could be incinerated in accordance with the regulations at the time. The report stated that the sample results were acceptable for burning. No final report regarding the cleanup or burning of the contaminated soil was discovered during the historical records review.

No documentation was found relating to spills or releases of herbicides at the CR site.

4.2.2 Military Operations

No documented evidence of historical military operations being performed at the East Classification Yard was found during the historical records review.

4.2.2.1 Operations Involving Military Munitions

No documented evidence of operations involving military munitions at the East Classification Yard was found during the historical data review.

4.2.2.2 Operations Involving HTRW

As stated in the previous section, Building 47-40 (Round House) was used as a locomotive repair shop. According to the *Support Service Operation Report – Locomotive Maintenance* (USACE 2005), typical chemicals/products used during locomotive maintenance activities may have included engine washing chemicals, valve oil, electrolytes (battery maintenance), locomotive black paint, solvents for parts degreasing, lubrication oil, metal preservatives, Carbolineum, Creosote, and cold patch asphalt. In addition, the resident locomotive stored within the Round House building also contained at least two PCB transformers. Service to the transformers is unknown. Interviewees indicated the transformer oil was tested for PCB concentrations; however, no records of testing were discovered during the historical data review. No documentation was found to describe the waste management practices for material used at the East Classification Yard.

According to interviewees, the herbicide storage shed was used to house the track-mounted sprayer and herbicides. No documentation was found pertaining to the amount of herbicides stored in the herbicide storage shed; however, one interviewee noted the amount stored was approximately 20 gallons. Herbicide mixing operations may also have occurred at the building. The interviewees noted the herbicides may have been mixed with waste oil and applied for vegetation control (Appendix J).

As noted in Section 4.1.2, four ASTs were located immediately west of Building 47-40. The ASTs were used to store fuel oil and had varying capacities. The tanks have been demolished; however, no documentation was found regarding the years of operation of the tanks.

4.2.3 Map Analysis

Seven original design drawings were discovered during the historical records review (Appendix I). Two design drawings (6934 1051.202 and 6934 1051.203 show the floor plan and different elevation views of Building 47-40 (Round House), also known as the locomotive repair shop. The floor plan also shows the location of the pit within the building and the parts storage area near the locker rooms. A utility drawing was also located, which details all of the major utility systems, including septic, storm, and drainage controls (6934 1050.2). A 1976 revision of the plot plan (1500.33) was found as part of the historical records review. This plot plan is important as it clearly indicates the location of the coal track where a previously undocumented coal pile was found (Section 6.0). One drawing (6934 1050.4) illustrates the northern Transportation Storage Area as it connects to B&O/Erie Railroad Tracks. The final two drawings were associated with the ASTs at the Transportation Storage Area. Maps 6934 1050.101 and 6934 1056.402 illustrate the location and grading plan, piping, berms, and walkways.

4.2.4 Aerial Photographic Interpretation

Representative historical aerial photographs from 1952 and 2006 were evaluated during the historical records review are included in Appendix R. The historical aerial photographs were analyzed to identify past waste management practices, the relationship between the CR site and the surrounding areas, and the chronological development of the CR site. No specific items of interest were found during the analysis of the aerial photographs.

4.3 PREVIOUS INVESTIGATIONS

With the exception of the soil removal to remediate the fuel oil spill at the ASTs adjacent to Building 47-40 within the Transportation Storage Area, no other environmental investigations or actions were discovered during the historical records review. An ongoing investigation and remedial actions (if required) for the sanitary and storm sewer network within the Transportation Storage Area, including the East Classification Yard, is currently being conducted under a separate project.

4.4 EVALUATION OF PRESENCE OF MILITARY MUNITIONS AND TECHNICAL DATA

No documented evidence of the presence of military munitions at the East Classification Yard was found during the historical data review.

4.5 EVALUATION OF HTRW PRESENCE AND AREAS

No documented evidence of a release at the former herbicide storage shed or Building 47-40 was discovered during the historical records review. As noted in Section 4.2.1, a No. 5 fuel oil spill from an AST occurred in the bermed enclosure west of Building 47-40. Although spill response actions were taken, HTRW contaminants may be present in the soil in the AST vicinity due to this or other releases. During inspection of the outdoor wash rack area located to the south of the East

Classification Yard, concrete AST supports were discovered along with old abandoned pipes and valves, assumed to be water pipes from Well House #15. No visible evidence of impacts (e.g., stained soil, stressed vegetation) was noted during the property visit and perimeter survey.

4.6 EVALUATION OF CON/HTRW PRESENCE AND AREAS

Besides the No. 5 fuel oil spill referenced in Section 4.2.1, there was no documentation of CON/HTRW releases at the CR site. Discussion of the two USTs located within the Transportation Storage Area is included in Section 5.0. No remaining containment tanks, basins, or sumps containing potential CON/HTRW were noted during the property visit.

4.7 PATHWAY AND ENVIRONMENTAL HAZARD ASSESSMENT

This section provides a preliminary description of the potential contaminant sources, migration pathways, contaminant discharge points, and potential receptors for the East Classification Yard (CC-RVAAP-70) based on operational history and property surveys.

4.7.1 Groundwater Pathway

4.7.1.1 Hydrogeologic Setting

No facility-wide groundwater monitoring wells are present at the East Classification Yard. The nearest facility-wide groundwater monitoring well is SCFmw-005, located upgradient approximately 2,300 ft west of the East Classification Yard. No unconsolidated aquifer groundwater monitoring wells exist in the vicinity of the East Classification Yard. As no monitoring wells exist in the area, the groundwater elevation cannot be estimated with reasonable accuracy. Based on the inferred facility-wide potentiometric surface within the unconsolidated aquifer (Figure 1-5), the elevation of the groundwater surface is estimated to be slightly less than 950 ft amsl. The groundwater elevation within the bedrock aquifer in the vicinity of the East Classification Yard is estimated to be 945 ft amsl, based on surrounding facility-wide groundwater monitoring well data. The generalized regional groundwater flow direction in the East Classification Yard is to the southeast to a tributary to the west branch of the Mahoning River located east of the CR site.

4.7.1.2 Groundwater Targets

Groundwater targets include human receptors that use groundwater for potable water supply, as well as environmental receptors (e.g., livestock, fish farms) and physical targets (e.g., springs) that may be affected by potential groundwater contamination on or adjacent to the AOC. Section 1.4.4.2 describes groundwater use at RVAAP. There are no public, livestock, or commercial groundwater supply wells within RVAAP. Groundwater in the vicinity of the East Classification Yard is not currently used by the Army or OHARNG for potable or industrial purposes. The OHARNG and Army do not have plans for future groundwater use in the area. Accordingly, no human or environmental receptors exist

respective to groundwater at the AOC. Physical receptors such as springs or other potential groundwater discharge areas to surface water bodies are addressed in Section 4.7.2.2.

4.7.1.3 Groundwater Conclusions

No groundwater samples were collected as part of this project and no groundwater monitoring wells are located in the immediate vicinity of the AOC. Leaching of potential soil contaminants to groundwater, with subsequent lateral migration to either surface water discharge or other surface water exposure points, are potential migration pathways for the CR site, which may require future evaluation.

4.7.2 Surface Water Pathway

4.7.2.1 Hydrologic Setting

No surface water or wet sediment samples were collected as part of this project. Surface water within the East Classification Yard occurs intermittently as storm water runoff overland, through constructed roadside ditches, and through the storm sewer network. Sediment within nearby roadside conveyances appears to be dry sediment, as defined by RVAAP guidance, and is not typically inundated for more than seven days at a time. Sediment within the storm and sanitary sewer networks exists but is being investigated under a separate project. No visual signs of potential contamination were observed within drainage areas during the property visit.

Surface water flow is a primary migration pathway for potential contamination to leave the former CR site, flowing overland or through natural/manmade conveyances. There are no perennial surface water features at the CR site. The closest perennial feature to receive drainage from the East Classification Yard is a tributary to the west branch of the Mahoning River located approximately 2,000 ft to the northeast of the CR site.

4.7.2.2 Surface Water Targets

Surface water targets include human receptors that use surface water for potable water supply or recreation, as well as environmental (e.g., streams, wetlands, sensitive aquatic environments) and physical targets (e.g., public or private water distribution system intakes) that may be affected by potential groundwater contamination on or adjacent to the AOC. No perennial streams are located within the East Classification Yard. There are no observed springs or groundwater discharge points to a surface water body in the vicinity of the AOC. Therefore, there is no direct exposure pathway for human receptors or environmental and physical targets to surface water at the AOC.

4.7.2.3 Surface Water Conclusions

Available information indicates a potential environmental hazard associated with the East Classification Yard. Contaminants in soil and dry sediment may exist from unreported releases

related to maintenance operations, petroleum storage, or herbicide storage and mixing operations. As releases may or may not have occurred at the AOC, there is the potential for contaminants to exist within soil and sediment and to have migrated as described in Section 4.7.2.1. Further evaluation of dry sediment within drainage conveyances at the East Classification Yard may be required as part of soil evaluation to determine the presence of contamination, if any. If surface water is discovered in drainage conveyances for extended periods during wet periods of the year, evaluation of this media may be also be warranted.

4.7.3 Soil Exposure and Air Pathways

4.7.3.1 Physical Conditions

No soil borings were installed as part of this project. The East Classification Yard is located within Hiram Till glacial deposits. Three soil types found at the CR site are Mahoning silt loams (0-2% and 2-6% slopes) which comprise about 55% of the soil at the East Classification Yard and the Fitchville silt loam, 0-2% slopes (FcA). The Mahoning silt loam (MgA) (0-2% slopes) is present in the northern portion of the CR site, while the Mahoning silt loam (MgB) (2-6% slopes) occurs in the southern portion of the CR site. The Fitchville silt loam series (0-2% slopes), which is the remaining 45%, is found in the center of the AOC (USDA 2010). The inferred bedrock formation at the East Classification Yard is the Pennsylvanian-age Pottsville Formation, Sharon Sandstone member, informally referred to as the Sharon Conglomerate (Winslow et al. 1966). The Sharon Conglomerate bedrock interface in the East Classification Yard is estimated to be 900-950 ft amsl, based on Ohio Department of Natural Resources (ODNR) bedrock topography maps (Figure 1-3). Complete descriptions of soil types and the Sharon Conglomerate are presented in Section 1.4.

4.7.3.2 Soil and Air Targets

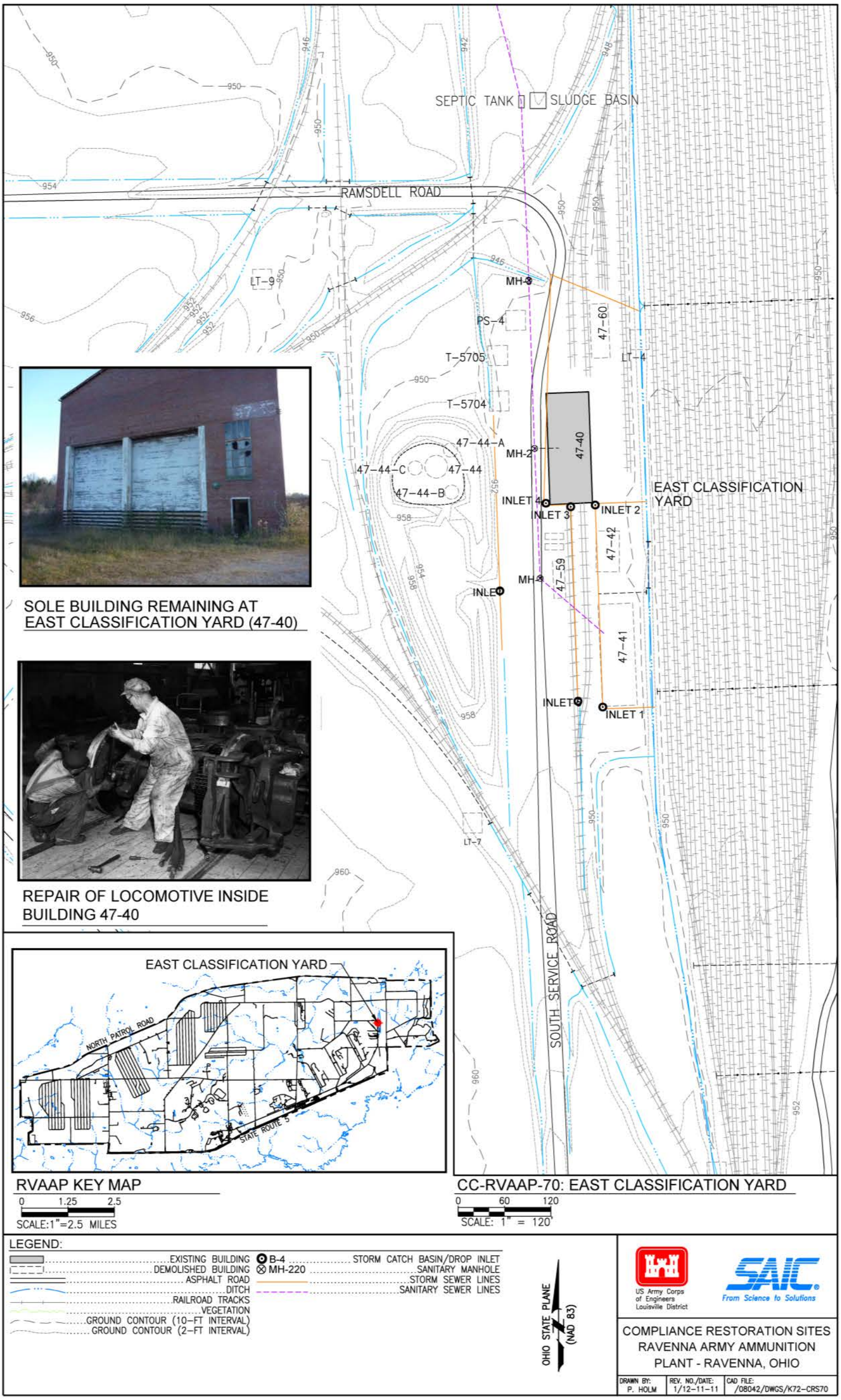
Current potential soil targets include human and ecological (animal and plant) receptors that may come into contact with surface or subsurface soil, if contaminants are present within or adjacent to the East Classification Yard. Likewise, future human exposure to potential soil contaminants could occur with active use of the AOC (e.g., training activities). Ecological receptors present in the vicinity of the East Classification Yard may also be exposed to potential soil contaminants in the future.

Airborne contamination (e.g., windblown dust) is not considered a viable migration or exposure pathway at this CR site. The likely contaminants associated with the East Classification Yard (SVOCs, PCBs, inorganic chemicals) have low volatility. Former operational areas lots are paved, gravel covered, or well vegetated. RVAAP is located in a humid climate, and soil moisture content is typically high, which reduces the potential for dust generation.

4.7.3.3 Soil Exposure and Air Pathway Conclusions

No soil samples were collected as part of this project. Potential contaminants from unreported spills or leaks and from historical activities and processes may represent a direct exposure pathway for

human receptors under current and future land use. Surface and subsurface soil at the CR site may represent a potential secondary source of contamination to surface water and groundwater. Environmental sampling of surface and/or subsurface soil is recommended to confirm the presence or absence of any soil contamination.



SOLE BUILDING REMAINING AT EAST CLASSIFICATION YARD (47-40)

REPAIR OF LOCOMOTIVE INSIDE BUILDING 47-40

Figure 4-1. East Classification Yard Map and Site Features

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5.0 CC-RVAAP-72: FACILITY-WIDE UNDERGROUND STORAGE TANKS

This section presents a description of CC-RVAAP-72 Facility-Wide USTs, including a description of the various tanks comprising the CR site, summary of previous investigations, an evaluation of documents reviewed during the historical records review search, and pathway and environmental hazard assessments. This AOC includes only petroleum USTs (e.g., gasoline, fuel oil, diesel, etc.) and does not include USTs that were used to store waste products from RVAAP operations, such as waste oil, pink water, wastewater, and spent chemical reagents. Appendix A provides a description of all reference sources and records reviewed during the course of this evaluation. Conclusions and recommendations for NFA or further investigation at this AOC are presented in Section 11.0.

Table 5-1 presents a list of USTs included in the historical records review for this CR site. All USTs evaluated as part of this historical records review are all within the RVAAP facility boundary. This review included an evaluation of all documented USTs located at RVAAP that were installed to support RVAAP operations. USTs associated, owned, and/or maintained by NGB/OHARNG are not evaluated as part of this historical records review. USTs that were used to store pink water were not encompassed under this review as they have been identified and managed as a separate RVAAP IRP AOC. ASTs were not reviewed in conjunction with this CR site. During the historical records review, information was discovered for eight USTs not previously documented on the available RVAAP inventory.

The primary focus of the historical records review for facility-wide USTs was to perform due diligence to identify any previously undocumented USTs, determine whether any USTs of record had not been removed to date, and if regulatory closure had been performed for those USTs regulated through BUSTR. Regulatory closure documents and official tank status records have been obtained for USTs regulated by BUSTR and are included in Appendices G and S.

As part of this historical records review, each documented or formerly undocumented UST was researched, and a thorough review was conducted of all available information for each UST. Information was obtained from previous studies, BUSTR, and the Ohio State Fire Marshal. The city of Ravenna Fire Department was contacted but did not have any records for the USTs and verbally indicated that historical files were transferred to BUSTR. Ohio EPA Central and Northeast District Offices were also contacted but did not maintain any files related to USTs and closures at RVAAP. No sampling was conducted as part of this historical records review. During the property visits, each UST location was visually inspected to confirm the presence or absence of above-grade UST components (e.g., vent pipes, fill pipes, and transfer lines) (Appendix L). Summaries of each UST, a summary of documented information including historical closure reports, site maps, property visit findings, and NFA letters are presented on the UST inventory summary forms in Appendix S.

5.1 PROPERTY DESCRIPTION, ACREAGE, AND LAND USE

CC-RVAAP-72: Facility-Wide USTs consists of 58 USTs located throughout RVAAP. The location of each UST and associated descriptions are provided in the following subsections.

5.1.1 Location

USTs were located throughout RVAAP operational production areas, including load lines, maintenance areas, gate houses, water works, power houses, and fueling stations or other functional areas supporting RVAAP operations. An RVAAP facility description and location is presented in Section 1.2. Locations and associated facilities for each UST are listed in Table 5-1. Figure 5-1 illustrates the locations of the USTs within RVAAP. Detailed maps and functional descriptions of the USTs are presented in subsequent sections. Available details on site features associated with the USTs are provided in the UST inventory summary forms in Appendix S.

5.1.2 Land Use and Ownership History

An RVAAP facility ownership and property description is presented in Section 1.2. All USTs included in this review were located within RVAAP and, as such, were under U.S. Army ownership, as described in Section 1.2. This historical records review does not encompass USTs that may have been present on private properties purchased in 1940 by the U.S. Government prior to the construction of RVAAP. As noted previously, USTs more recently installed, owned, and maintained by OHARNG are not evaluated as part of this historical records review.

5.1.3 Physical Property Characteristics

Physical property characteristics of each UST site vary. However, all USTs were installed above bedrock in unconsolidated material. The majority of USTs were installed above the water table in the vadose zone. Descriptions of facility-wide soil and bedrock geology, hydrogeology including groundwater and surface water, facility topography, and climate is provided in Section 1.4.

During RVAAP operations, USTs were typically installed within former or current industrial facilities. Available documentation shows removal of all but one of the regulated USTs in this CR site by the end of 1993. Mapping of individual former UST locations with respect to more recently defined sensitive environments, such as jurisdictional wetlands or locations of threatened and endangered species, was not performed as part of this historical records review.

5.2 HISTORICAL PROPERTY SUMMARY

A description of RVAAP facility operational history is located in Section 1.2. Historical records document the former presence and use of 58 USTs at RVAAP. Approximately 45 of the USTs were installed in 1941 and the remaining were installed between 1941 and 1981. All USTs included as part of CC-RVAAP-72 are inactive and suspected to be removed. Years of operation for individual USTs

vary and are documented in UST inventory summary forms which are provided in Appendix S. The smallest USTs on-site were 100 gallons and the largest were 20,000 gallons. The USTs were used for the storage of gasoline, diesel fuel, No. 5 heating oil, and No. 6 fuel oil. USTs are used for fuel supply for heating boilers, gasoline and diesel service stations for RVAAP vehicles and equipment, and emergency fuel supply for generators. The purpose of individual USTs are described on the UST inventory summary forms provided in Appendix S. A thorough review of available records documents that 43 of the 58 USTs have been closed by proper removal, and the tanks have been disposed off-site. Table 5-1 presents brief descriptions of former USTs at RVAAP, including their location, function, size, and contents.

Eight USTs not previously documented as part of the RVAAP tank inventory were discovered as part of this historical records review. Four of these tanks are located at Atlas Scrap Yard/former Construction Camp and were associated with the historical northern service station. One undocumented kerosene UST is believed to have been installed at Building U-3 in the Depot Administration Area. A previously undocumented UST at the George Road service station (Building 1055) was removed prior to installation of RV-1 and RV-2. Another undocumented UST was a 280-gallon fuel oil UST located at Water Works No. 3. The final UST was installed for approximately three months near Building 848 in 1971. There is a documented fuel spill at this location due to equipment malfunction.

5.2.1 Chronological Property Summary

Each UST was assessed as an individual unit under the historical records review. Information on the chronological summary of each UST from installation, last use, and removal, as well as purpose, analytical data, and other available documented information is provided in the UST inventory summary forms in Appendix S. Table 5-1 provides removal dates for those USTs where documentation of removal was found.

5.2.2 Military Operations

All USTs were installed to support government-owned, contractor operated activities at RVAAP. All USTs indirectly supported ongoing military operations for munitions production, demilitarization, and support activities for the facility. Specific information on the purpose of each UST is summarized on Table 5-1 and detailed in the UST inventory summary forms in Appendix S.

5.2.2.1 Operations Involving Military Munitions

Petroleum USTs at RVAAP were not directly involved with the production or testing of military munitions; however, some were part of the supporting infrastructure (e.g., boiler houses, power houses, maintenance shops) for facilities involved with the production of munitions. USTs were identified within Winklepeck Burning Grounds and Atlas Scrap Yard. Winklepeck Burning Grounds is currently an active range area operated by the OHARNG. Atlas Scrap Yard is within MRS areas due to MEC hazards within that AOC. Ongoing investigations at the Atlas Scrap Yard are

incorporated as part of the Military Munitions Response Program (MMRP) and discussion of MEC is not included as part of this review.

5.2.2.2 Operations Involving HTRW

Each UST was assessed as an individual unit under the CR site. Information on the chronological summary of each UST from installation, last use, and removal, as well as purpose and other documented information are provided in Appendix S. USTs historically contained petroleum products (gasoline, diesel fuel, fuel oil, and kerosene) that may have HTRW implications. Soil samples were collected and analyzed during a majority of UST removals; where records were discovered, these analytical data are provided as part of the UST inventory summary forms (Appendix S) and are summarized on Table 5-1. Interviewees and historical records indicated USTs located in the Depot Administration Area were filled with potassium dichromate to prevent corrosion when not in use.

Both regulated and non-regulated USTs were located at RVAAP. A UST is defined by Ohio Administrative Code (OAC) 1301:7-9-02 as one tank or a combination of tanks that is 10% or more below ground. This includes underground piping used to contain an accumulation of regulated substances (BUSTR 2005).

As specified in OAC 1301:7-9-02, the following tanks do not meet the regulatory definition of a UST and; therefore, are exempt from closure and corrective action requirements:

- Farm or residential tanks of 1,110 gallons or less capacity used for storing motor fuel for non-commercial purposes;
- Tanks used for storing heating fuel for consumptive use on the premises where stored;
- Pipeline facilities, including gathering lines, regulated under the Natural Gas Pipeline Safety Act of 1968, 82 Stat. 720, 49 USCA 2001 (United States Code Annotated), as amended;
- Surface impoundments, pits, ponds, or lagoons;
- Storm or wastewater collection systems (i.e., oil/water separators);
- Flow-through process tanks;
- Storage tanks located in underground areas, including without limitation, basements, cellars, mine workings, drifts, shafts, or tunnels, when the tanks are located on or above the surface of the floor and are visible for inspection on all sides;
- Septic tanks; and

- Liquid traps or associated gathering lines directly related to oil or gas production and gathering operations.

A number of USTs at RVAAP did not meet the requirement of a UST for closure and corrective action as they were used for storing heating fuel for consumptive use. The following tanks were exempt from BUSTR closure due to this OAC regulation: RV-10, 20, 21, 29, 33, 37, 41, 46, 47, 50, 52, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 66, 67, 73, 88, 97, and CC-RVAAP-72-08. Table 5-1 summarizes those USTs that were not required to meet the closure and corrective action requirements.

Furthermore, according to the *Technical Guidance Manual* (BUSTR 2005) the following regulated UST systems are exempt from the 2005 closure rules:

- Any UST system holding hazardous waste listed or identified under OAC Chapter 3745-51 or a mixture of such hazardous waste and other regulated substances;

- Any wastewater treatment tank system that is part of a wastewater treatment facility regulated under Section 402 or 307(B) of the Federal Water Pollution Control Act (33 USCA 1251 and following);

- Equipment or machinery that contains regulated substances for certain operational purposes such as hydraulic lift tanks and electrical equipment tanks;

- Any UST system whose capacity is 110 gallons or less;

- Any UST system that contains a *de minimis* concentration of regulated substances;

- Any emergency-spill or overflow-containment UST system that is emptied expeditiously after use;

- Wastewater treatment systems;*

- Any UST system containing radioactive material that are regulated under the Atomic Energy Act of 1954 (42 USCA 2014 and following);*

- Any UST system that is part of an emergency generator system at nuclear power generation facilities regulated by the United States Nuclear Regulatory Commission;*

- Airport hydrant fuel distribution systems*; and

- Any UST systems with field-constructed tanks.*

Those items marked with an asterisk indicate the regulated UST systems are exempt from the Closure Rule, but releases from these systems are regulated under the Corrective Action Rule, OAC 1301:7-9-

13 (BUSTR 2005). Two USTs (RV-4 and RV-5) were 100 gallons and do not fall under BUSTR regulated systems (Table 5-1).

Table 5-1. Summary of Historical Records Review Findings for CC-RVAAP-72 Facility-Wide Underground Storage Tanks

RVAAP UST#	Regulated under BUSTR	Date Removed	Summary of Removal Documentation available from field notes and reports	Available Soil Analytical Data	Functional Area	Building	Size (gal)	Contents /Purpose	If Regulated, NFA Documentation Available
RV-1	Yes	November-1991	Closure Report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling.	Data tabulated in closure report (Appendix G)	Administration Area	Building 1055- George Road Gas Station	12,000	Gasoline/ fueling station	Yes
RV-2	Yes	November-1991	Closure Report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling.	Data tabulated in closure report (Appendix G)	Administration Area	Building 1055- George Road Gas Station	12,000	Gasoline/ fueling station	Yes
RV-3	Yes	July-1996	Closure Report by TolTest dated August 1996 provides all details of tank removal and sampling.	BTEX- ND (<5 ppb) Max TPH: 16.6 ppm	Administration Area	Administration Area Building 950A	285	Gasoline for back-up generator	Yes
RV-4	No	1987	Not regulated by BUSTR <110 gallon. RVAAP UST inventory documentation states tank “removed” and two others not found.	Unknown	Administration Area	Building 1026 Telephone Exchange	100	Gasoline	Not Applicable
RV-5	No	Removed prior to 1990–date unknown	Not regulated by BUSTR <110 gallon. RVAAP UST inventory documentation states tank “removed and scrapped.”	Unknown	Administration Area	Building 1048A	100	Gasoline	Not Applicable
RV-10	No	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling. BUSTR indicated UST was not regulated through agency- requested information forwarded to Ohio EPA. No further correspondence provided from Ohio EPA.	Final Excavated Limits: Max BTEX: <0.2 ppm Max TPH: 27 ppm Lead: ND Chromium: 5.4 ppm	Post #24	Charleston Guard House	500	Fuel Oil	Not Applicable
RV-11	Yes	February-1990	Closure report by R&R International dated April 1990 provides all details of tank removal and soil sampling.	BTEX- ND (<2 ppb) Max TPH: 44 ppm	East Classification Yard	Building 47-59	15,000	Diesel	Yes
RV-12	Yes	July-1993	Closure report by Autumn Technical Services (1993) provides all details of tank removal and soil sampling. During closure, further excavation of tank pit was approved by BUSTR due to observed contamination.	BTEX- ND (<0.2 ppm) Max TPH: 46 ppm	Administration Area	Power House #6	1,000	Diesel	Yes
RV-13	Yes	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling.	Data tabulated in closure report	Depot Area	Building U-6, North Tank	12,000	Diesel	Yes
RV-14	Yes	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling.	Data tabulated in closure report	Depot Area	Building U-6, South Tank	12,000	Diesel	Yes
RV-15	Yes	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling.	Data tabulated in closure report	Depot Area	Building U-3, South Tank	12,000	Gasoline	Yes
RV-16	Yes	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling.	Data tabulated in closure report	Depot Area	Building U-3, North Tank	12,000	Gasoline	Yes
RV-17	Yes	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling.	Data tabulated in closure report	Depot Area	Building A-6, North	3,900	Gasoline	Yes
RV-18	Yes	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling.	Data tabulated in closure report	Depot Area	Building A-6, Center	3,900	Gasoline	Yes
RV-19	Yes	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling.	Data tabulated in closure report	Depot Area	Building A-6 South	3,900	Gasoline	Yes

Table 5-1. Summary of Historical Records Review Findings for CC-RVAAP-72 Facility-Wide Underground Storage Tanks (continued)

RVAAP UST#	Regulated under BUSTR	Date Removed	Summary of Removal Documentation available from field notes and reports	Available Soil Analytical Data	Functional Area	Building	Size (gal)	Contents /Purpose	If Regulated, NFA Documentation Available
RV-20	No	June-1991	Closure report by Nozzle New (1991) provides details of tank removal and soil sampling. Field notes indicate no visible contamination or field PIDs, tanks appeared in good condition.	BTEX- ND (<2ppb) TPH: 10-12 ppm Max Pb: 10.1 ppm Max Cr: 15.7 ppm	Load Line 2	Building DB-27 Boiler House	15,000	# 2 Fuel Oil for Load Line steam process heat	Not Applicable
RV-21	No	June-1991	Closure report by Nozzle New (1991) provides details of tank removal and soil sampling. Field notes indicate no visible contamination or field PIDs, tanks appeared in good condition.	BTEX- ND (<2ppb) TPH: 10 ppm Max Pb: 9.34 ppm Max Cr: 16.5 ppm	Load Line 2	Building DB-27 Boiler House	15,000	# 2 Fuel Oil for Load Line steam process heat	Not Applicable
RV-22	Yes	February-1990	Closure report by R&R International dated April 1990 provides all details of tank removal and soil sampling.	BTEX- ND (<2ppb) TPH: 44 ppm	East Classification Yard	Building 47-59	15,000	Diesel	Yes
RV-23	Yes	February-1990	Closure report by R&R International dated April 1990 provides all details of tank removal and soil sampling.	BTEX- ND (<2ppb) Max TPH: 394 ppm Max Pb: 37.0 ppm	Administration Area	Building 1045 Pump House	15,000	Diesel	Yes
RV-29	No	August-1993	Closure report by Autumn Technical Services dated September 1993 provides all details of tank removal and soil sampling. No visible or field PID signs of contamination; TPH below site action limit of 904 ppm.	BTEX- ND (<2 ppb) Max TPH: 197 ppm PAHs: ND	Load Line 12	Building FE-22	1,000	# 2 Fuel Oil for Change House Building Heat	Not Applicable
RV-33	No	February-1990	Closure report by R&R International dated April 1990 provides details of tank removal and soil sampling. Tank was not regulated through BUSTR-they requested information forwarded to Ohio EPA. No further information provided from Ohio EPA.	BTEX- ND (<2ppb) Max TPH: 305 ppm	Winklepeck Burning Grounds	Deactivation Furnace Building S-340/T-3401	2,000	Diesel	Not Applicable
RV-37	No	February-1990	Closure report by Cardamone Construction (1990) provides details of tank removal and soil sampling. Tank was not regulated through BUSTR–they requested information forwarded to Ohio EPA. No further information provided from Ohio EPA.	BTEX- ND (<2 ppb) Max TPH: 16 ppm Max Pb: ND Max Cr: ND	Depot Area	Building A-1	5,000	Heating Oil	Not Applicable
RV-41	No	June-1993	Tenant Tank (Physics International Co.) UST removal inspection report indicates no visible signs of soil contamination or visible holes in tank upon removal.	Not Available, may not exist	Load Line 6	Building 2F-11	6,000	No. 2 Fuel Oil for Building and Process Heat	Not Applicable
RV-46	No	1968, as listed in report, cannot verify	Nozzle New's report from December 1991 indicates a 20 ft by 20 ft grid search in potential area of tank. No tank was ever found. Interviewees recollect removal of tank from Bolton Mansion.	Not Available, may not exist	Depot Area	Building EE-102 (Bolton Mansion)	1,500	No. 2 Fuel Oil for Steam Boiler	Not Applicable
RV-47	No	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling. Tank was not regulated through BUSTR-they requested information forwarded to Ohio EPA. No further information provided from Ohio EPA.	BTEX- ND (<2 ppb) Max TPH: ND Max Total Pb: 23 ppm Max Total Cr: 11 ppm	Post #32	Freedom Gate House at Route 80 and North Patrol Road	500	No. 2 Fuel Oil	Not Applicable

Table 5-1. Summary of Historical Records Review Findings for CC-RVAAP-72 Facility-Wide Underground Storage Tanks (continued)

RVAAP UST#	Regulated under BUSTR	Date Removed	Summary of Removal Documentation available from field notes and reports	Available Soil Analytical Data	Functional Area	Building	Size (gal)	Contents /Purpose	If Regulated, NFA Documentation Available
RV-50	No	June-1991	Closure report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling.	BTEX- ND (<2 ppb) Max TPH: 18 ppm Max Total Pb: 4.43 ppm Max Total Cr: 3.90 ppm	Water Works 4	Water Works 4	1,000	No. 2 Fuel Oil for heat purposes	Not Applicable
RV-51	Yes	1993	Supporting documentation for UST removal in addition to NFA was found.	BTEX- ND (<2 ppb) Max TPH: 70 ppm PAHs: ND	Water Works 3 and 4	Water Works 3 and 4	550	No. 2 Fuel Oil for generator	Yes
RV-52	No	February-1990	Closure report by Cardamone Construction (1990) provides details of tank removal and soil sampling. Tank was not regulated through BUSTR- they requested information forwarded to Ohio EPA. No further information provided from Ohio EPA.	BTEX- ND (<2 ppb) Max TPH: 16 ppm Max Pb: ND Max Cr: 13 ppm	Atlas Scrap Yard	Building T-18	1,000	No. 2 Fuel Oil	Not Applicable
RV-55	No	October-1991	Closure report by Nozzle New (1991) provides details of tank removal and soil sampling. Field notes indicate no visible contamination or field PIDs, tanks appeared in good condition.	BTEX- ND (<2 ppb) Max TPH: 13 ppm Max Pb: 10.3 ppm Max Cr: 2.07 ppm	Load Line 1	Power House #1; Building CC-1	20,000	No. 5 Heating Oil for Load Line steam process heat	Not Applicable
RV-56	No	October-1991	Closure report by Nozzle New (1991) provides details of tank removal and soil sampling. Field notes indicate no visible contamination or field PIDs, tanks appeared in good condition.	BTEX- ND (<2 ppb) Max TPH: 14 ppm Max Pb: 11.7 ppm Max Cr: 1.95 ppm	Load Line 1	Power House #1; Building CC-1	20,000	No. 5 heating oil for Load Line steam process heat	Not Applicable
RV-57	No	June-1991	Closure report by Nozzle New (1991) provides details of tank removal and soil sampling. UST excavation looked okay, however a black substance beneath railroad tracks and storm drain were observed; larger area was excavated until no contamination observed.	BTEX- ND (<2 ppb) TPH: 15 ppm Max Pb: 7.58 ppm Max Cr: 14.1 ppm	Load Line 2	Power House #2; Building DC-1	15,000	No. 5 heating oil for Load Line steam process heat	Not Applicable
RV-58	No	June-1991	Closure report by Nozzle New (1991) provides details of tank removal and soil sampling. UST excavation looked okay, however a black substance beneath railroad tracks and storm drain were observed; larger area was excavated until no contamination observed.	BTEX- ND (<2 ppb) TPH: 15 ppm Max Pb: 15.8 ppm Max Cr: 13.2 ppm	Load Line 2	Power House #2; Building DC-1	15,000	No. 5 heating oil for Load Line steam process heat	Not Applicable
RV-59	No	June-1991	Closure report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling. Logbook notes indicate excavated tank pit appears "very clean."	BTEX- ND (<2 ppb) TPH: ND (<10 ppm) Max Pb: 11.6 ppm Max Cr: 6.23 ppm	Fuze and Booster Road Area	Power House #4; Building 52-15	20,000	No. 5 heating oil	Not Applicable
RV-60	No	June-1991	Closure report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling. Logbook notes indicate excavated tank pit appears "very clean."	BTEX- ND (<2 ppb) Max TPH: ND (<10 ppm) Max Pb: 12.1 ppm Max Cr: 6.69 ppm	Fuze and Booster Road Area	Power House #4; Building 52-15	20,000	No. 5 heating oil	Not Applicable

Table 5-1. Summary of Historical Records Review Findings for CC-RVAAP-72 Facility-Wide Underground Storage Tanks (continued)

RVAAP UST#	Regulated under BUSTR	Date Removed	Summary of Removal Documentation available from field notes and reports	Available Soil Analytical Data	Functional Area	Building	Size (gal)	Contents /Purpose	If Regulated, NFA Documentation Available
RV-61	No	October-1991	Closure report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling.	BTEX- ND (<2 ppb) Max TPH: 14 ppm Max Pb: 9.63 ppm Max Cr: 2.27 ppm	Fuze and Booster Road Area	Power House #5 Building 51-25	20,000	No. 5 heating oil	Not Applicable
RV-62	No	October-1991	Closure report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling.	BTEX- ND (<2 ppb) Max TPH: 13 ppm Max Pb: 12.5 ppm Max Cr: 3.96 ppm	Fuze and Booster Road Area	Power House #5 Building 51-25	20,000	No. 5 heating oil	Not Applicable
RV-63	No	June-1991	Closure report by Nozzle New (1991) provides details of tank removal and soil sampling. Minor visual contamination by train fill vault; area was excavated.	BTEX- ND (<2 ppb) Max TPH: 12 ppm Max Pb: 8.24 ppm Max Cr: 6.75 ppm	Load Line 4	Power House #7; Building G-4	20,000	No. 5 heating oil for Load Line steam process heat	Not Applicable
RV-64	No	June-1991	Closure report by Nozzle New (1991) provides details of tank removal and soil sampling. Minor visual contamination by train fill vault; area was excavated.	BTEX- ND (<2 ppb) Max TPH: 12 ppm Max Pb: 6.90 ppm Max Cr: 6.48 ppm	Load Line 4	Power House #7; Building G-4	20,000	No. 5 heating oil for Load Line steam process heat	Not Applicable
RV-66	No	July-1993	Autumn Technical Services report dated 9/28/93 provides details of tank removal and soil sampling. Report indicated that there were no visible signs of contamination following excavation. TPH below site action limit of 904 ppm.	Max TPH: 36 ppm	Administration Area	Power House # 6	20,000	No. 6 Fuel Oil	Not Applicable
RV-67	No	July-1993	Autumn Technical Services report dated 9/28/93 provides details of tank removal and soil sampling. Report indicated that there were no visible signs of contamination. TPH below site action limit of 904 ppm.	Max TPH: 40 ppm	Administration Area	Power House # 6	20,000	No. 6 Fuel Oil	Not Applicable
RV-73	No	July-1993	Closure report by Autumn Technical Services dated September 1993 provides details of tank removal and soil sampling. Report indicated no visible or field PID signs of contamination; TPH below site action limit of 904 ppm.	BTEX- ND (<2 ppb) Max TPH: 69 ppm PAHs: ND	Load Line 12	Building T-2501	5,000	No. 2 Fuel Oil for Building and Melt-Out Process Heat	Not Applicable
RV-80	Yes	November-1991	Closure Report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling. In 1968 this tank was abandoned in place and filled with sand. The tank was later removed in 1991.	BTEX- ND (<2 ppb) Max TPH: 42 ppm Max Pb: 24.8 ppm Max Cr: 5.0 ppm	Administration Area	Building 1055- George Road Gas Station	12,000	Leaded Gasoline/ Fueling Station	Yes
RV-81	No	June-1991	Closure Report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling.	BTEX- ND (<2 ppb) Max TPH: 10 ppm Max Pb: 5.4 ppm Max Cr: 6.83 ppm	Administration Area	Building 1047	1,000	Leaded Gasoline/ Fueling Station	Not Applicable
RV-82	No	June-1991	Closure Report by Nozzle New Dated December 1991 provides all details of tank removal and soil sampling.	BTEX- ND (<2 ppb) Max TPH: 25 ppm Max Pb: 4.56 ppm Max Cr: 6.95 ppm	Administration Area	Building 1047	1,500	Leaded Gasoline/ Fueling Station	Not Applicable

Table 5-1. Summary of Historical Records Review Findings for CC-RVAAP-72 Facility-Wide Underground Storage Tanks (continued)

RVAAP UST#	Regulated under BUSTR	Date Removed	Summary of Removal Documentation available from field notes and reports	Available Soil Analytical Data	Functional Area	Building	Size (gal)	Contents /Purpose	If Regulated, NFA Documentation Available
RV-83	No	June-1991	Closure Report by Nozzle New Dated December 1991 provides all details of tank removal and soil sampling.	BTEX- ND (<2 ppb) Max TPH: 15 ppm Max Pb: 5.33 ppm Max Cr: 7.25 ppm	Administration Area	Building 1047	1,500	Leaded Gasoline/ fueling station	Not Applicable
RV-86	Unknown	Unknown	Nozzle New's report from December 1991 indicates a 20 ft by 20 ft grid search in potential area of tank. No tank was ever found. No visual evidence of above grade tank components observed during 2010 property visit.	Not Available	Administration Area	Building 1026 Telephone Exchange	Unknown	Unknown	Not Applicable
RV-87	Unknown	Unknown	Nozzle New's report from December 1991 indicates a 20 ft by 20 ft grid search in potential area of tank. No tank was ever found. No visual evidence of above grade tank components observed during 2010 property visit.	Not Available	Administration Area	Building 1026 Telephone Exchange	Unknown	Unknown	Not Applicable
RV-88	Unknown	Unknown	Nozzle New's report from December 1991 indicates a 20 ft by 20 ft grid search in potential area of tank. No tank was ever found. No visual evidence of above grade tank components observed during 2010 property visit.	Not Available	Building 1103	McClintocksburg Gate/ Fire Station #2	Unknown	Diesel; for boiler	Not Applicable
RV-89	Unknown	Unknown	Nozzle New's report from December 1991 indicates a 20 ft by 20 ft grid search in potential area of tank. No tank was ever found. No visual evidence of above grade tank components observed during 2010 property visit.	Not Available	South Service Road	George Road Sewage Treatment Plant- 100yd south of South Service Road	Unknown	Support dechlorination system at sewage treatment plant	Not Applicable
RV-97	No	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling.	BTEX- ND (<2 ppb) Max TPH: ND Max Pb: ND Max Cr: ND	Depot Area	Building A-6	550	Heating Oil	Not Applicable
CC-RVAAP-72-01	Yes, only if tank is still present	Unknown	Drawing 6698-RU A-10 indicates the presence of a kerosene tank at U-3. Some above grade piping was noticed at the U-3 during the property visit.	Not Available	Depot Area	Building U-3	Unknown	Kerosene	Not Applicable
CC-RVAAP-72-02	Yes, only if tank is still present	Unknown	No tank was located during a geophysical survey performed by MKM in 2004. No visual evidence of above grade tank components observed during 2010 property visit.	Not Available	Atlas Scrap Yard	Northern Service Station; Building T-15	1,000	Leaded Gasoline; Fueling Station	Not Applicable
CC-RVAAP-72-03	Yes, only if tank is still present	Unknown	No tank was located during a geophysical survey performed by MKM in 2004. No visual evidence of above grade tank components observed during 2010 property visit.	Not Available	Atlas Scrap Yard	Northern Service Station; Building T-15	1,000	Leaded Gasoline; Fueling Station	Not Applicable
CC-RVAAP-72-04	Yes, only if tank is still present	Unknown	No tank was located during a geophysical survey performed by MKM in 2004. No visual evidence of above grade tank components observed during 2010 property visit.	Not Available	Atlas Scrap Yard	Northern Service Station; Building T-15	1,000	Fuel Oil	Not Applicable
CC-RVAAP-72-05	Yes, only if tank is still present	Unknown	No tank was located during a geophysical survey performed by MKM in 2004. No visual evidence of above grade tank components observed during 2010 property visit.	Not Available	Atlas Scrap Yard	Northern Service Station; Building T-15	2,000	Kerosene	Not Applicable

Table 5-1. Summary of Historical Records Review Findings for CC-RVAAP-72 Facility-Wide Underground Storage Tanks (continued)

RVAAP UST#	Regulated under BUSTR	Date Removed	Summary of Removal Documentation available from field notes and reports	Available Soil Analytical Data	Functional Area	Building	Size (gal)	Contents /Purpose	If Regulated, NFA Documentation Available
CC-RVAAP-72-06	Unknown	Unknown	Map for Water Works #3 indicated the presence of a UST at the AOC. It is unknown whether this UST has been removed.	Not Available	Water Works 3	Water Works 3	280	Fuel Oil	Not Applicable
CC-RVAAP-72-07	No	November-1968	In 1968 this UST was removed. The adjacent tank, RV-80, was abandoned in place by filling with sand. RV-1 and RV-2 were installed in the same location as the removed CC-RVAAP-72-07.	No records available. RV-1 and RV-2 were in same tank pit and were sampled upon removal.	Administration Area	Building 1055- George Rd Gas Station	12,000	Leaded Gasoline/Fueling Station	Not Applicable
CC-RVAAP-72-08	No	December 10, 1971	Tank was installed in October 1971. UST was replaced with an AST in December 1971 due to a November malfunction causing a release of 400 gallons of fuel oil.	Not Available	Inert Storage Area 8	Building 848	550	# 2 Fuel Oil	Not Applicable

BUSTR = Bureau of Underground Storage Tank Regulations
BTEX = Benzene, Toluene, Ethylbenzene, Xylene
Cr= Chromium
ND = Non-Detectable Concentration
NFA = No Further Action
Ohio EPA = Ohio Environmental Protection Agency
PAH = Polycyclic Aromatic Hydrocarbon
Pb = Lead
PID = Photoionization Detector
ppb = parts per billion
ppm = parts per million
TPH = Total Petroleum Hydrocarbon
RVAAP = Ravenna Army Ammunition Plant
UST = Underground Storage Tank

The following USTs at RVAAP meet all requirements of BUSTR and OAC for regulated USTs and have documented NFAs: RV-1, 2, 3, 11, 12, 13, 14, 15, 16, 17, 18, 19, 22, 23, 51, and 80. BUSTR assigned each potentially regulated UST unit an incident number for administrative tracking purposes. Some historical documents reference this incident number rather than the RVAAP-assigned identification (ID). Table 5-2 lists the BUSTR-assigned incident numbers and their correlating RVAAP-assigned ID.

Table 5-2. BUSTR Incident Numbers and Corresponding RVAAP Identification

BUSTR Incident Number	RVAAP Identification Number
679298-00	RV-23
679298-01	RV-33
679298-02	RV-11 & RV-22
679298-03	RV-13 & RV-14
679298-04	RV-15 and RV-16
679298-05	RV-17, RV-18, and RV-19
679298-06	RV-97 (subsequently determined to be not regulated)
679298-07	RV-37 (subsequently determined to be not regulated)
679298-08	RV-10 (subsequently determined to be not regulated)
679298-09	RV-47 (subsequently determined to be not regulated)
679298-10	RV-52 (subsequently determined to be not regulated)
679298-11	RV-23 (reassigned ID from 679298-00)
679298-12	RV-1, RV-2 and RV-80
679298-13/ 67000501-00008	RV-51
679298-14/ 67000501-00009	RV-12
679298-15	RV-3

BUSTR = Bureau of Underground Storage Tank Regulations
RVAAP = Ravenna Army Ammunition Plant

The following USTs were abandoned in 1968 prior to BUSTR regulations requiring closure: RV- 81, 82, and 83. These USTs were physically removed in 1991 despite prior abandonment. USTs CC-RVAAP-72-01 through CC-RVAAP-72-08, RV-46, RV-86, RV-87, RV-88, and RV-89 are likely to have been removed, but no documentation confirming removal or associated samples was located as part of the historical records review.

One interviewee noted the presence of one UST at F-15. The historical records review produced documentation of a 1,100-gallon AST previously undocumented in the RVAAP tank inventory at Building U-17, the boiler house adjacent to Building F-15. Documentation of this AST is provided in Appendix G. An interviewee also noted the presence and removal of one UST at Building F-1. No documentation or reference to the presence of this UST, its location, or its removal was located as part of this historical records review.

5.2.3 Map Analysis

Analysis of historical maps was performed as part of this historical records review. The placement of the USTs on historical maps was frequent, and maps/plates are referenced in the UST inventory summary forms as appropriate and are included in Appendix S. In some cases, historical maps did not exist for the USTs, but sketches were made during UST removals to identify the placement and size of UST pits in relation to known site features. Sketches provided in the removal and/or closure documentation, where available, are included as part of the UST inventory summary forms (Appendix S).

5.2.4 Aerial Photographic Interpretation

Analysis of aerial photographs and historical photographs was performed as part of this historical records review. Historical aerial and ground-level photographs were reviewed to determine placement of USTs where possible. Exact locations of USTs or releases in most cases could not be discerned from historical aerial photographs.

Where historical photographs for the locations of USTs were available, they were included in supporting photographic information contained in Appendix H. Reference to available historical photographs is also provided as part of the UST inventory summary forms (Appendix S).

5.3 PREVIOUS INVESTIGATIONS

No sampling at UST sites was performed for this project. All references to sample results are from historical samples collected during removal and/or closure of the USTs. Closure investigations were completed for the majority of UST removals. As part of these investigations, analytical samples of tank pits or UST contents were collected, regardless of whether they were regulated by BUSTR. The closure investigations listed below were completed at RVAAP to document the removal of USTs. Table 5-1 provides an abbreviated summary of sampling results for those USTs not requiring regulatory closure reports. Electronic copies of closure reports and other sampling information are provided in Appendix G.

- Review of Underground Storage Tank Closure (Cardamone Construction 1990)
  - RV-10, 13, 14, 15, 16, 17, 18, 19, 37, 47, 52, and 97

- Final Report for the Removal of Four Underground Storage Tanks (R&R 1990)
  - RV-11, 22, 23, and 33

- UST Closure Report for Ravenna Arsenal Inc. (Nozzle New 1991a)
  - RV-20, 21, 50, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 80, 81, 82, and 83
  - RV-46, 86, 87, 88, and 89 were not located despite 20-ft by 20-ft search

- UST Closure Report for Ravenna Arsenal Inc. (Nozzle New 1991b)
  - RV-1 and RV-2

- Closure Report for RVAAP (Autumn 1993a)
  - RV-12 and RV-51

- Closure Report for RVAAP (Autumn 1993b)
  - RV-29, 73, 66, and 67

- Closure Report Case No. T-BT (TolTest 1996)
  - RV-3

No closure sampling documentation exists for RV-4 and RV-5, as these two USTs had capacities of 100 gallons and were exempt from BUSTR requirements. Limited information could be obtained for RV-41, as that was a tenant UST operated by Physics International. No historical sampling data was discovered for RV-46, which was reportedly removed in 1968 (Appendix J).

In addition to closure investigations, the USTs in Table 5-3 were located within AOCs that are currently part of CERCLA investigations under the RVAAP IRP. Environmental data for soil, surface water, sediment, and groundwater have been collected at these AOCs, which are presented in respective RI reports or characterization reports that provide comprehensive characterization of contaminant releases. These investigations may or may not have included sample locations adjacent to, or specifically targeting, former UST locations.

Table 5-3. CERCLA AOCs with Co-Located USTs

UST	AOC	Description
RV-55, RV-56	Load Line 1 (LL1)	Documented removal of USTs. Soil at LL1 addressed under CERCLA ROD.
RV-20, RV-21, RV-57, RV-58	Load Line 2 (LL2)	Documented removal of USTs. Soil at LL2 addressed under CERCLA ROD.
RV-63, RV-64	Load Line 4 (LL4)	Documented removal of USTs. Soil at LL4 addressed under CERCLA ROD.
RV-29, RV-73	Load Line 12 (LL12)	Documented removal of USTs. Soil at LL12 addressed under CERCLA ROD.
RV-33	Winklepeck Burning Grounds (WBG)	Documented removal of UST. Soil at WBG addressed under CERCLA ROD.
RV-41	Load Line 6 (LL6)	Documented removal of UST. Soil at LL6 currently being investigated under CERCLA RI.
RV-52	Atlas Scrap Yard (ASY)	Documented removal of UST. Soil at ASY currently being investigated under CERCLA RI.
CC-RVAAP-02, -03, -04 & -05	Atlas Scrap Yard	No documented removal of USTs. Soil at ASY currently being investigated under CERCLA RI.

AOC = Area of Concern
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
RI = Remedial Investigation
ROD = Record of Decision
UST = Underground Storage Tank

5.4 EVALUATION OF PRESENCE OF MILITARY MUNITIONS AND TECHNICAL DATA

No documented evidence of the presence of military munitions at the UST sites was found during the historical data review. Several USTs are located within MRSs defined by the RVAAP MMRP. The most recent list of MMRP sites and MRS areas are presented in *Final Site Inspection Report, Ravenna Army Ammunition Plant, Ohio, Military Munitions Response Program, Site Inspection, Munitions Response Sites* (USACE 2008).

5.5 EVALUATION OF HTRW PRESENCE AND AREAS

All of the USTs stored petroleum products for on-site operations. For all USTs except RV-4, RV-5, RV-41, RV-46, RV-86, RV-87, RV-88, RV-89, CC-RVAAP-72-01, CC-RVAAP-72-02, CC-RVAAP-72-03, CC-RVAAP-72-04, CC-RVAAP-72-05, CC-RVAAP-72-06, CC-RVAAP-72-07, and CC-RVAAP-72-08, records of sampling at the time of removal were found. Several USTs were removed based on failure of tank tightness tests. A tank tightness test is a requirement of Ohio Administrative Code 1301:7-9-07 as a method of release detection. Failure of tank tightness tests may indicate a release to the environment. USTs that failed tank tightness tests are identified in the UST inventory summary forms in Appendix S. For USTs with documented closure, the tank pit and associated piping were sampled upon removal, scanned for VOCs using a photoionization detector (PID), and visually inspected for the presence of staining or contamination. For the majority of USTs, there was no visual evidence or indication of HTRW presence. However, potential HTRW releases to the environment were indicated for some USTs based on PID readings and soil analytical data. The proper regulatory agency was contacted and in all instances contamination was removed during UST excavation until soil results were below BUSTR action levels. Details of individual USTs and documentation related to the presence of HTRW is provided in Appendix G and the UST inventory summary forms in Appendix S.

5.6 EVALUATION OF CON/HTRW PRESENCE AND AREAS

Description of available data with respect to CON/HTRW presence is presented in Sections 5.3 and 5.5. The majority of USTs have received either:

- NFA from BUSTR for regulated USTs; or

- Closure consistent with an NFA based on BUSTR action levels and sampling methodology, with no formal approval from a regulatory agency for non-regulated USTs.

Table 5-1 provides a summary of the available closure documentation for each UST. Based on evaluation of UST closures at RVAAP, records of CON/HTRW sampling were not found for the following USTs and are identified for potential further investigation: RV-4, RV-5, RV-41, RV-46, RV-86, RV-87, RV-88, RV-89, CC-RVAAP-72-01, CC-RVAAP-72-02, CC-RVAAP-72-03, CC-RVAAP-72-04, CC-RVAAP-72-05, CC-RVAAP-72-06, and CC-RVAAP-72-08. Available

information that was discovered for these USTs is provided in Appendix G and the UST inventory summary forms in Appendix S.

5.7 PATHWAY AND ENVIRONMENTAL HAZARD ASSESSMENT

This section provides a preliminary description of the potential contaminant sources, migration pathways, contaminant discharge points, and potential receptors for the Facility-Wide USTs (CC-RVAAP-72) based on operational history, historical records review, and property surveys. No sampling was conducted as part of this pathway and environmental hazard assessment.

5.7.1 Groundwater Pathway

5.7.1.1 Hydrogeologic Setting

USTs are located across the entirety of RVAAP. Depth to groundwater and groundwater flow directions vary across the facility. The majority of USTs were installed above the groundwater table. Groundwater from both unconsolidated and bedrock aquifers predominantly flows in an eastward direction across the facility. A description of facility-wide unconsolidated and bedrock groundwater is provided in Section 1.4.

Nine former UST locations had nearby facility-wide groundwater monitoring wells with available analytical data. All USTs were assessed to determine if facility-wide groundwater monitoring wells were in proximity to the former UST locations (e.g., within 300 ft according to BUSTR groundwater guidelines). If facility-wide groundwater monitoring wells were within 300 ft of the UST; VOC, and SVOC data were reviewed to determine if releases to groundwater had occurred. USTs, associated nearby facility-wide groundwater monitoring wells, and associated VOC and SVOC data are presented below in Table 5-4.

Table 5-4. USTs with Nearby Groundwater Monitoring Wells and Associated Analytical Data

UST	Nearby Groundwater Monitoring Well	Associated Analytical Data
RV-59 and RV-60	SCFmw-001	NA; screened 201-211 ft bgs
RV-41	LL6mw-003	Few estimated concentrations of acetone and bis(2-ethylhexyl-phalate).
RV-33	WBGmw-003	Few estimated concentrations of acetone and bis(2-ethylhexyl-phalate).
Atlas Scrap Yard USTs (RV-52, CC-RVAAP-72-02; -03; -04, and -05)	Multiple Atlas Scrap Yard groundwater monitoring wells	Few estimated concentrations of acetone and bis(2-ethylhexyl-phalate).

Table 5-4. USTs with Nearby Groundwater Monitoring Wells and Associated Analytical Data (continued)

UST	Nearby Groundwater Monitoring Well	Associated Analytical Data
RV-55 and RV-56	LL1mw-085	Few estimated concentrations of acetone, bis(2-ethylhexyl-phalate), and one phenol concentration.
RV-29 and RV-73	LL12mw-153, 154, 183 and 184	Few estimated concentrations of acetone and bis(2-ethylhexyl-phalate).

bgs = below ground surface
NA = Not Applicable
UST = Underground Storage Tank

Overall no evidence exists to indicate that USTs at these select locations have impacted groundwater based on the review of available data.

5.7.1.2 Groundwater Targets

Groundwater targets include human receptors that use groundwater for potable water supply, as well as ecological receptors and physical targets (e.g., springs) that may be affected by potential groundwater contamination on or adjacent to the AOC. Section 1.4.4.2 describes groundwater use at RVAAP. There are no public, livestock, or commercial groundwater supply wells within RVAAP. The Army and OHARNG currently maintain groundwater supply wells for non-potable sanitary and institutional use in the Administration Area in the vicinity of UST sites located in that specific area. Groundwater was observed in very few UST tank pits upon excavation. When groundwater was encountered in excavations, samples were collected to confirm the presence or absence of contamination. Results of groundwater analysis are provided in the UST inventory summary forms (Appendix S) and respective closure reports (Appendix G). Accordingly, human exposure respective to potential groundwater contaminants at the AOC could potentially occur if groundwater was used for domestic potable supply purposes in the future. Physical receptors, such as springs or other potential groundwater discharge areas to surface water bodies are addressed in Section 5.7.2.2.

5.7.1.3 Groundwater Conclusions

No groundwater samples were collected as part of this project. Leaching of potential soil contaminants to groundwater, is a potential contaminant migration pathway for the CR site. Further evaluation may be required for those USTs identified in Section 5.6, as they have no available sampling records.

5.7.2 Surface Water Pathway

5.7.2.1 Hydrologic Setting

No surface water or wet sediment samples were collected as part of this project. The hydrogeologic setting for RVAAP is presented in Section 1.4. Surface water at the UST locations occurs intermittently as storm water runoff overland, through constructed roadside ditches, and through storm sewer networks where present. No visual signs of potential contamination were observed within drainage ditches during property visits; however, undocumented spills may have occurred that may have migrated through drainage channels. None of the USTs were located immediately adjacent to perennial surface water features. Notations of any potentially affected surface water features due to HTRW releases at individual UST locations are contained in the UST inventory summary forms in Appendix S.

5.7.2.2 Surface Water Targets

Surface water targets include human receptors that use surface water for potable water supply or recreation, as well as environmental (e.g., streams, wetlands, sensitive aquatic environments) and physical targets (e.g., public or private water distribution system intakes) that may be affected by potential groundwater contamination on or adjacent to the AOC. No perennial streams are located within the immediate UST vicinities. Available data from nearby groundwater monitoring wells do not indicate petroleum-related contaminant releases (Section 5.7.1.1). There are no observed springs or groundwater discharge points to a surface water body in the immediate vicinity of the USTs. Therefore, there is no direct exposure pathway for human receptors or environmental and physical targets to surface water.

5.7.2.3 Surface Water Conclusions

Other than possible instances of overfilling or leaks in any above-grade portions of product transfer lines, potential contaminant releases from the USTs would have been directly to subsurface soil. Based on available information and characteristics of the UST sites, a low likelihood exists that surface water features would have been directly impacted by any subsurface releases from the USTs. Visual inspections of the UST locations did not indicate any observable impacts to surface water features due to former UST operations. Based on AOC characteristics, evaluation of surface water media is not recommended. Because releases to surface soil or dry sediment may or may not have occurred at various UST locations comprising the AOC, there is the potential for contaminants to exist within soil and sediment within intermittent drainage conveyances and to have migrated as described in Section 5.7.2.1. Evaluation of soil and dry sediment media to determine the presence of contamination, if any, is addressed in Section 5.7.3.

5.7.3 Soil Exposure and Air Pathway

5.7.3.1 Physical Conditions

No soil borings were installed as part of this project. All USTs were installed on or above bedrock in silty clay glacial till. Descriptions of primary soil types and bedrock at RVAAP are presented in Section 1.4. Records of tank installation at the bedrock interface are included in Appendix S.

5.7.3.2 Soil and Air Targets

Current potential soil targets include human and ecological (animal and plant) receptors that may come into contact with surface or subsurface soil, if contaminants are present within or adjacent to the former UST locations. Likewise, future human exposure to potential soil contaminants could occur with active use of the AOC (e.g., training activities). Ecological receptors present in the vicinity of USTs may also be exposed to potential soil contaminants in the future.

Airborne contamination (e.g., windblown dust) is not considered a viable migration or exposure pathway for this CR site. The primary mechanism for contaminant releases, where they occurred, was directly to subsurface soil. Most UST locations are currently well vegetated. RVAAP is located in a humid climate, and soil moisture content is typically high, which reduces the potential for dust generation.

5.7.3.3 Soil Exposure and Air Pathway Conclusions

No soil samples were collected as part of this project. Potential contaminants from unreported spills or leaks from historical activities and processes may represent a direct exposure pathway for human receptors under current and future land use.

Surface and subsurface soil at the UST locations may represent a source of direct exposure and a potential secondary source of contamination to surface water and groundwater. Environmental sampling may be appropriate to confirm the presence or absence of any contamination at locations where removal is undocumented. Those UST sites with recommended soil sampling to confirm the presence or absence of soil contamination are presented in Section 11.0 and detailed in the UST inventory summary forms in Appendix S.

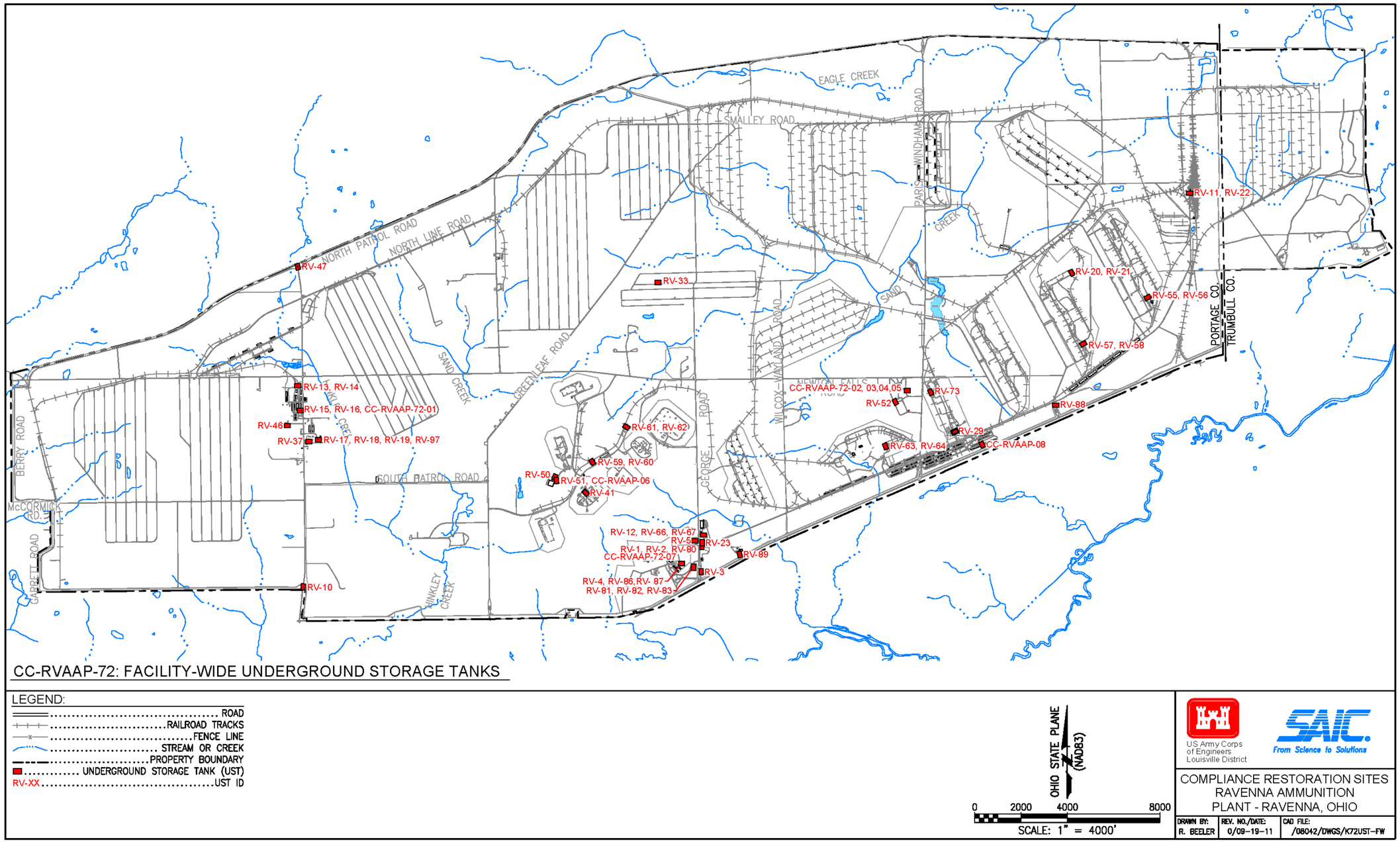

Figure 5-1. Facility-Wide Underground Storage Tanks Map and Site Features

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6.0 CC-RVAAP-73: FACILITY-WIDE COAL STORAGE

This section presents a description of the CC-RVAAP-73: Facility-Wide Coal Storage locations, including a description of the property, summary of previous investigations, an evaluation of documents reviewed during the historical records review search, and a pathway and environmental hazard assessment. Appendix A provides a description of all reference sources and records reviewed during the course of this evaluation. Conclusions and a recommendation for NFA or further investigation at these coal storage sites are presented Section 11.0.

6.1 PROPERTY DESCRIPTION, ACREAGE, AND LAND USE

The Facility-Wide Coal Storage AOC consists of 17 former documented coal storage locations located throughout RVAAP (Figure 6-1). Historical facility operations included the use of coal to fuel power houses, boiler houses, and for heating of other buildings at RVAAP (Table 6-1). The 17 documented former coal storage locations include:

- Load Line No. 1 Power House (Power House No. 1);
- Load Line No. 2 Power House (Power House No. 2);
- Load Line No. 4 Power House (Power House No. 7);
- Load Line No. 12 Power House (Power House No. 3);
- Building F-15;
- Building F-16;
- Atlas Scrap Yard;
- North Line Road Coal Tipple;
- Sand Creek Coal Tipple;
- East Classification Yard;
- Administration Area (Power House No. 6);
- Building U-5;
- Building U-14;
- Building 51-25 (Power House No. 5);
- Building 52-15 (Power House No. 4);
- Inert Storage 2F-21; and
- Area No. 6 Inert Storage.

During the property visit conducted as part of this historical records review, visual evidence of previously undocumented former coal storage was found approximately 2,000 ft south of the East Classification Yard and at the Building U-16 boiler house (Figure 6-1). Available information discovered respective to these previously undocumented coal storage areas is included in this section.

6.1.1 Location

Figure 6-1 illustrates the locations of the former coal storage locations. Table 6-1 summarizes the locations, primary purpose, and property characteristics of each former coal storage area.

Table 6-1. Location, Land Use, and Property Characteristics of Facility-Wide Coal Storage Areas

Coal Storage	Location	Primary Purpose	Property Characteristics
Load Line No. 1 Power House (Power House No. 1)	Located east of Load Line No. 1 Road and west of South Service Road; adjacent to former Building CC-1 (Power House No. 1).	Power generation	Topography is generally flat. Buildings associated with Load Line No. 1 have been demolished. Demolition and grading occurred prior to this area being identified as a CR site.
Load Line No. 2 Power House (Power House No. 2)	Located east of Load Line No. 2 and northwest of South Service Road; adjacent to former Building DC-1 (Power House No. 2).	Power generation	Topography is generally flat. Buildings associated with Load Line No. 2 have been demolished. Demolition and grading occurred prior to this area being identified as a CR site.
Load Line No. 4 Power House (Power House No. 7)	Located west of Paris-Windham Road and north of South Service Road; adjacent to former Building G-4 (Power House No. 7).	Power generation	Topography is generally flat. Buildings associated with Load Line No. 4 have been demolished. Demolition and grading occurred prior to this area being identified as a CR site.
Load Line No. 12 Power House (Power House No. 3)	Located east of Paris-Windham Road and north of South Service Road at Building FE-17 (Power House No. 3).	Power generation	Topography is generally flat. Buildings associated with Load Line No. 12 have been demolished. Demolition and grading occurred prior to this area being identified as a CR site.
Building F-15	Located just east of Slagle Road; south of Building F-15.	Boiler supply/steam generation	Topography is generally flat. Building F-15 has been demolished. Demolition and grading occurred prior to this area being identified as a CR site.
Building F-16	Located just east of Slagle Road; south of Building F-16.	Boiler supply/steam generation	Topography is generally flat. Building F-16 has been demolished. Demolition and grading occurred prior to this area being identified as a CR site.

Table 6-1. Location, Land Use, and Property Characteristics of Facility-Wide Coal Storage Areas (continued)

Coal Storage	Location	Primary Purpose	Property Characteristics
Atlas Scrap Yard	Located south of Newton Falls Road and west of Paris-Windham Road. Historical photographs indicate multiple small quantity coal piles for boiler houses supplying steam heat to large office buildings, dormitories, commissary, and maintenance buildings.	Boiler supply/steam generation	Topography is generally flat. All buildings associated with Atlas Scrap Yard have been demolished. Demolition and grading occurred prior to this area being identified as a CR site.
North Line Road Coal Tipple	Located just south of North Line Road, north of Road 7C, and west of Road 20-X-2.	Bulk coal receiving, storage, and distribution	Topography is generally flat and the area is an open field. No building is associated with this location. Residual coal was observed at this location, which had affected vegetation in the area.
Sand Creek Coal Tipple	Located east of Paris-Windham Road and west of Building 1200.	Bulk coal receiving, storage, and distribution	The location of the tipple is at the base of the former rail spur. Residual coal was observed at the AOC.
East Classification Yard (Power House No. 8)	Located near the former boiler house at the southeast corner of Building 47-40.	Boiler house supply/steam generation	The topography is generally flat. The boiler house has been demolished. Demolition and grading occurred prior to this area being identified as a CR site.
Administration Area (Power House No. 6)	Located east of former Building 44-16 (Power House No. 6), northeast of Building 1037, and east of George Road.	Power generation	The topography is generally flat. Power House No. 6 has been demolished and the AOC has been graded. This occurred prior to this area being identified as a CR site.
Building U-5	Located west of State Route 80/Freedom Road and south of Building U-5. Building U-5 was used as a locomotive/equipment repair building.	Boiler supply/steam generation	The topography is generally flat. Building U-5 remains at the AOC. No residual coal was observed.
Building U-14	Located west of State Route 80/Freedom Road and south of Building U-14. Building U-14 was used as a dunnage storage building.	Boiler supply/steam generation	The topography is generally flat. Building U-14 remains at the AOC.

Table 6-1. Location, Land Use, and Property Characteristics of Facility-Wide Coal Storage Areas (continued)

Coal Storage	Location	Primary Purpose	Property Characteristics
Building 51-25 (Power House No. 5)	Located west of Detonator Spur Road and northwest of Fuze and Booster Road adjacent to Building 51-25.	Power generation	The topography is generally flat with vegetation around the former Building 51-25. Building 51-25 has been demolished and the AOC has been graded. This occurred prior to the area being identified as a CR site.
Building 52-15 (Power House No. 4)	Located north of Fuze and Booster Road and east of Fuze and Booster Spur Road adjacent to Building 52-15 (Power House No. 4).	Power generation	The topography is generally flat and Building 52-15 has been demolished. Demolition and grading occurred prior to this area being identified as a CR site.
Inert Storage 2F-21	Located north of Fuze and Booster Road, west of Fuze and Booster Spur Road, and adjacent to Building 2F-21.	Boiler supply/steam generation	The topography is generally flat and Building 2F-21 remains.
Area No. 6 Inert Storage	Located north of South Service Road and west of Load Line No. 1 Road adjacent to Building 28-18. The former coal storage area does not include all of Inert Storage Area No. 6.	Boiler supply/steam generation	The topography is generally flat. The buildings associated with Area No. 6 Inert Storage remain.
Undocumented Former Coal Pile South of East Classification Yard	Approximately 2,000 ft south of the East Classification Yard.	Unknown	The topography is generally flat. Coal residue was observed during the property visit/perimeter survey.
Boiler House U-16 near Buildings BB-223 and BB-224	Located north of Bundling Road; west of Route 80, north of Newton Falls Road; in the northwestern portion of RVAAP.	Boiler supply/steam generation	The topography is generally flat. The boiler house has been demolished. Demolition and grading occurred prior to this area being identified as a CR site. Residual coal was observed at the AOC.

CR = Compliance Restoration
RVAAP = Ravenna Army Ammunition Plant

6.1.2 Land Use and Ownership History

Table 6-1 summarizes the land uses at each former coal storage location. All coal storage areas were located within RVAAP and, as such, were under U.S. Army ownership, as described in Section 1.2. The former coal storage locations are located on property under ownership of the BRAC Division of the Army, as well as property that has been transferred to the NGB and licensed to the OHARNG for Camp Ravenna military training and operations. Upon completion of any required environmental actions under the IRP, the remaining portions of this CR site under BRAC ownership will be transferred to NGB and subsequently licensed to OHARNG. A description of population demographics for RVAAP is included in Section 1.3.

6.1.3 Physical Property Characteristics

The former coal storage locations are throughout the historical operational areas of RVAAP; therefore, the physical characteristics of the surrounding properties vary. Table 6-1 summarizes the physical property characteristics for each coal storage location.

6.2 HISTORICAL PROPERTY SUMMARY

6.2.1 Chronological Property Summary

A description of RVAAP facility operational history is included in Section 1.2. No documentation was found during the historical records review to define the years of operation of each specific former coal storage location. No documentation of accidental coal spills was found during the historical records review. Remnant coal pieces were found at the following coal storage areas during the property visit:

- North Line Road Coal Tipple;
- Sand Creek Coal Tipple;
- Building U-16; and
- Undocumented former coal location south of the East Classification Yard.

6.2.2 Military Operations

No documented evidence of historical military operations being performed at each coal storage site was found during the historical records review. The historical use of coal at the facility indirectly supported RVAAP operations, including steam generation for power houses, production facilities, and large-space heating, as well as direct heating smaller buildings.

6.2.2.1 Operations Involving Military Munitions

Coal storage at RVAAP did not directly involve military munitions operations. Former coal storage locations within Atlas Scrap Yard are within an MRS as currently defined by the RVAAP MMRP.

Any further investigation of coal storage locations within the Atlas Scrap Yard MRS should comply with applicable MMRP and RVAAP safety requirements. At the time of this report, the most recent list of MMRP sites and MRSs are presented in *Final Site Inspection Report, Ravenna Army Ammunition Plant, Ohio, Military Munitions Response Program, Site Inspection, Munitions Response Sites* (USACE 2008).

6.2.2.2 Operations Involving HTRW

The historical use of coal at RVAAP was consistent with conventional industrial practices at the time for steam generation supplying power houses, production facilities, and heating systems, as well as direct heating of small spaces. RVAAP did not have any coal gasification (producer gas) facilities. RVAAP received bulk coal primarily by rail at the Sand Creek and North Line coal tipples. Bulk coal was typically stored and staged in uncovered piles on the ground surface. Coal was distributed throughout RVAAP by truck. Point-of-use coal storage locations included covered bins and uncovered storage piles on the ground surface. No documentation of accidental large-volume spills or releases associated with the coal storage areas was found during the historical records review.

There are no ASTs or USTs associated specifically with the former coal storage areas.

6.2.3 Map Analysis

A review of historical facility drawings noted several buildings with coal storage locations associated with the buildings. For example, historical drawing 1050.102 (Appendix I) notes a coal bin associated with former Power House No. 8. Seventeen drawings depicting former coal storage locations are included in Appendix I.

6.2.4 Aerial Photographic Interpretation

Representative historical aerial photographs from 1952 and 2006 were evaluated during the historical records review and are included in Appendix R. Additionally, Appendix R contains a presentation prepared by USACE Louisville District in July 2010 containing aerial photographs denoting the documented former coal storage locations. The historical aerial photographs were analyzed to identify past waste management practices, the relationship between the CR site and the surrounding areas, and the chronological development of the AOC. The following items of interest were noted during the analysis:

- North Line Road Coal Tipple: coal piles are visible in the 1952 aerial photograph (Figure R-11 in Appendix R);

- Sand Creek Coal Tipple: potential coal piles are visible in the 1952 aerial photograph (Figure R-13 in Appendix R);

- Load Line No. 1: potential coal piles are visible in the 1952 aerial photograph (Figure R-15 in Appendix R);

- Load Line No. 2: potential coal piles are visible in the 1952 aerial photograph (Figure R-17 in Appendix R);

- Buildings F-15 and F-16: potential coal piles are visible in the 1952 aerial photograph (Figure R-19 in Appendix R);

- Power House No. 6 in Administration Area: potential coal piles are visible in the 1952 aerial photograph (Figure R-21 in Appendix R); and

- Atlas Scrap Yard: small quantity coal piles are visible in an undated aerial photograph (circa early-mid 1940s) in association with boiler houses attached to large office buildings and dormitories and potential coal piles are visible in the 1952 aerial photograph (Figure R-23 in Appendix R).

Reviews of aerial photographs for Load Line 4, Load Line 12, East Classification Yard (both the documented pile in the north and the undocumented pile in the south), Building U-5, Building U-14, Building U-16, Power House 51-25, Power House 52-15, Inert Storage 2F-21, and Inert Storage Area 6 did not provide conclusive evidence of coal piles within aerial photographs.

6.3 PREVIOUS INVESTIGATIONS

No documentation of investigations specific to the former coal storage areas was found during the historical records review. However, multiple investigations have been conducted, or are in progress, throughout RVAAP to investigate AOCs containing former coal storage locations, specifically Load Lines 1, 2, 3, 4, and 12, Atlas Scrap Yard, and Buildings F-15 and F-16. Various environmental data for soil, surface water, sediment, and groundwater have been collected at these AOCs, which are presented in respective RI reports or characterization reports that provide comprehensive characterization of contaminant releases. These investigations included sample locations in the vicinity of, and in some cases within, former coal storage locations.

6.4 EVALUATION OF PRESENCE OF MILITARY MUNITIONS AND TECHNICAL DATA

As stated previously, coal storage operations did not directly involve military munitions. Coal storage and use occurred at multiple former munitions production facilities at RVAAP and within the Depot Administration Area. Atlas Scrap Yard, a currently defined MRS, was not used for munitions production; however, MEC scrap and wooden ammunition box storage historically occurred in this area until removal in 2003 (e2m 2008). No visual evidence of the presence of military munitions at the coal storage areas was found during the property visits.

6.5 EVALUATION OF HTRW PRESENCE AND AREAS

All coal storage areas were assessed as part of the property visits for the visual presence of HTRW. During the property visits and perimeter surveys at the CR sites, remnants of coal were noted at the following locations and require further investigation:

- North Line Road Coal Tipple;
- Sand Creek Coal Tipple;
- Building U-16; and
- Undocumented coal location south of the East Classification Yard.

Stressed vegetation and bare areas were observed in association with coal residues at the North Line Coal Tipple (Figure 6-1).

No remnants of coal or stressed vegetation were observed at the other coal storage sites. This is largely due to extensive previous demolition and restoration of areas.

6.6 EVALUATION OF CON/HTRW PRESENCE AND AREAS

No documentation or visual evidence was found for CON/HTRW storage areas, ASTs, or USTs associated specifically with the former coal storage locations. While coal piles and USTs or ASTs may have been located at a power house together, the purposes of the USTs were not directly related to coal storage. USTs related to the storage of petroleum products are discussed in Section 5.0.

6.7 PATHWAY AND ENVIRONMENTAL HAZARD ASSESSMENT

This section provides a preliminary description of the potential contaminant sources, migration pathways, contaminant discharge points, and potential receptors for the Facility-Wide Coal Storage CR site (CC-RVAAP-73) based on operational history and property surveys.

6.7.1 Groundwater Pathway

6.7.1.1 Hydrogeologic Setting

The hydrogeologic setting for RVAAP is presented in Section 1.4. Topography at the coal storage locations varies depending on their location within RVAAP. The topography of RVAAP is gently undulating with an overall decrease in ground elevation from a topographic high of approximately 1,220 ft amsl in the far western portion of the facility to low areas at approximately 930 ft amsl in the far eastern portion of the facility.

Soil types, subsurface conditions, depth to bedrock, and depth to groundwater and groundwater flow directions vary depending on the specific former coal storage location. The thickness of the unconsolidated interval at RVAAP ranges from thin to absent in the eastern and northeastern portion

of RVAAP to an estimated 150 ft (46 m) in the central portion of the facility. Unconsolidated and bedrock geologic maps are illustrated on Figures 1-3 and 1-4, respectively. Likewise, depths to groundwater and flow directions vary depending on the former coal storage location; unconsolidated and bedrock potentiometric maps are presented in Figures 1-5 and 1-6.

6.7.1.2 Groundwater Targets

Groundwater targets include human receptors that use groundwater for potable water supply, as well as ecological receptors (e.g., livestock, fish farms) and physical targets (e.g., springs) that may be affected by potential groundwater contamination on or adjacent to the AOC. Section 1.4.4.2 describes groundwater use at RVAAP. There are no public, livestock, or commercial groundwater supply wells within RVAAP. The Army and OHARNG currently maintain groundwater supply wells for non-potable sanitary and institutional use in the Administration Area in the vicinity of former coal storage sites located in that area. Physical receptors, such as springs or other potential groundwater discharge areas to surface water bodies are addressed in Section 6.7.2.2. Human receptor exposure to potential groundwater contaminants could occur if groundwater was used for domestic supply purposes in the future.

6.7.1.3 Groundwater Conclusions

No groundwater samples were collected as part of project. Leaching of potential soil contaminants to groundwater, with subsequent lateral migration to surface water discharge points or other surface water exposure points, are potential migration pathways for the CR site, which may require further evaluation.

6.7.2 Surface Water Pathway

6.7.2.1 Hydrologic Setting

No surface water or wet sediment samples were collected as part of this project. The hydrologic setting for RVAAP is presented in Section 1.4.4.3. The majority of former coal storage locations were within industrialized portions of RVAAP that had engineered drainage controls. In these areas surface water occurs intermittently as storm water runoff overland, through constructed roadside ditches, and through storm sewer networks, where present. Storm water runoff from engineered drainage control systems ultimately discharged to natural conveyances feeding the major streams draining RVAAP. Storm runoff through sewers is currently assessed as a separate project. Three of the former coal storage locations in particular were located adjacent to key perennial surface water features and may have had runoff directly into these receiving streams (Figure 6-1):

- Sand Creek Coal Tipple: located immediately adjacent and upslope of Sand Creek;
- North Line Coal Tipple: located approximately 150 west and upslope of a tributary to Sand Creek; and

- Building F-16 coal storage location: located approximately 150 north and upslope of a tributary to Sand Creek.

The other coal storage areas were not observed to be adjacent to perennial surface water features.

6.7.2.2 Surface Water Targets

Surface water targets include human receptors that use surface water for potable water supply or recreation, as well as environmental (e.g., streams, wetlands, sensitive aquatic environments) and physical targets (e.g., public or private water distribution system intakes) that may be affected by potential groundwater contamination on or adjacent to the AOC. Three former coal storage sites noted in Section 6.7.2.1 may have a direct exposure pathway for human receptors or environmental targets to surface water, as well as potential groundwater discharge points to their respective adjacent surface water bodies.

6.7.2.3 Surface Water Conclusions

Available information indicates a potential environmental hazard to surface water associated with former coal storage locations noted in Section 6.7.2.1. Contaminants may exist in soil at these locations and potentially migrated to adjacent surface water bodies as described in Section 6.7.2.1. Further evaluation of the sediment and surface water environmental media at locations with residual coal adjacent to surface water receptors may be required to determine the extent of contamination, if any. Contaminant releases to surface soil or dry sediment may or may not have occurred at the coal storage locations comprising the AOC and potential contaminants may have migrated to nearby intermittent drainage conveyances. Evaluation of soil and dry sediment media to determine the presence of residual contamination within these intermittent conveyances, if any, is addressed in Section 6.7.3.

6.7.3 Soil Exposure and Air Pathways

6.7.3.1 Physical Conditions

No soil samples were collected as part of this project. The Sharon Member of the Pennsylvanian-age Pottsville Formation is the primary bedrock beneath RVAAP. In the western half of the facility, the upper members of the Pottsville Formation, including the Sharon Shale, Connoquenessing Sandstone (also known as the Massillon Sandstone), Mercer Shale, and uppermost Homewood Sandstone, have been found. The regional dip of the Pottsville Formation measured in the west portion of RVAAP is between 1.5-3.5 m per 1.6 km (5-11.5 ft per mile) to the south.

Soil at RVAAP is generally derived from the Wisconsin-age silty clay glacial till. Distributions of soil types are discussed and mapped in the *Soil Survey of Portage County, Ohio*, which describes soil as nearly level to gently sloping and poor to moderately well drained (USDA 1978). Much of the native soil at RVAAP was disturbed during construction activities in former production and

operational areas of the facility. Complete descriptions of soil types and bedrock at RVAAP are presented in Section 1.4.

6.7.3.2 Soil and Air Targets

Current potential soil targets include human and ecological (animal and plant) receptors that may come into contact with surface or subsurface soil, if contaminants are present within or adjacent to the former coal storage locations. Likewise, future human exposure to potential soil contaminants could occur with active use of the former coal storage locations comprising the AOC (e.g., training activities). Ecological receptors present in the former coal storage locations may also be exposed to potential soil contaminants in the future.

Airborne contamination (e.g., windblown dust) is not considered a viable migration or exposure pathway for the former coal storage locations. The likely contaminants associated with coal (primarily metals) have low volatility. The coal storage locations are generally well vegetated. RVAAP is located in a humid climate, and soil moisture content is typically high, which reduces the potential for dust generation.

6.7.3.3 Soil Exposure and Air Pathway Conclusions

Potential contaminants in soil may represent a direct exposure pathway for human receptors under current and future land use, as well as terrestrial ecological receptors. Where present, residual coal may represent a primary source of contaminants to underlying soil, surface water, and groundwater. Contaminants in surface and subsurface soil derived from former coal storage may represent a potential secondary source of contamination to surface water and groundwater. Environmental sampling is recommended for those former coal storage locations having observed residual coal to confirm the presence or absence of any potential contamination (North Line Coal Tipple, Sand Creek Coal Tipple, Building U-16, and undocumented coal storage area south of the East Classification Yard).

NORTH LINE ROAD COAL TIPPLE

SAND CREEK COAL TIPPLE

CC-RVAAP-73: FACILITY WIDE COAL STORAGE

LEGEND:
- ASPHALT ROAD
- RAILROAD TRACKS
- FENCE LINE
- STREAM OR CREEK
- PROPERTY BOUNDARY
- COAL STORAGE SITE LOCATION

OHIO STATE PLANE (NAD83)

0 2000 4000 8000

SCALE: 1" = 4000'

US Army Corps of Engineers Louisville District

SAIC From Science to Solutions

COMPLIANCE RESTORATION SITES
RAVENNA ARMY AMMUNITION PLANT - RAVENNA, OHIO

DRAWN BY:	REV. NO./DATE:	CAD FILE:
P. HOLM	0/09-30-11	/08042/DWGS/K72COAL-FW

Figure 6-1. Facility-Wide Coal Storage Map and Site Features

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7.0 CC-RVAAP-74: BUILDING 1034 MOTOR POOL HYDRAULIC LIFT

This section presents a description of the CC-RVAAP-74: Building 1034 Motor Pool Hydraulic Lift, including a description of the property, summary of previous investigations, an evaluation of documents reviewed during the historical records review search, and a pathway and environmental hazard assessment. This site was considered an AOC to address the former leaking underground hydraulic lift in Building 1034. Appendix A provides a description of all reference sources and records reviewed during the course of this evaluation. Conclusions and a recommendation for NFA or further investigation at this AOC are presented in Section 11.0 of this report.

7.1 PROPERTY DESCRIPTION, ACREAGE, AND LAND USE

The Building 1034 Motor Pool Hydraulic Lift consists of the former underground hydraulic lift at Building 1034. The underground hydraulic lift is no longer active; however, the building is still used as a maintenance facility. No documentation was found during the historical records review to document the specific years of operation for the hydraulic lift. The lift system potentially leaked hydraulic oil. Acreage of this CR site is not defined but is estimated to be less than one acre.

7.1.1 Location

The Building 1034 Motor Pool Hydraulic Lift is located south of the intersection of George Road and South Service Road just south of Building 1037 in the Administration Area in the south-central portion of RVAAP (Figure 7-1). The underground hydraulic lift was located inside the southeastern corner Building 1034.

7.1.2 Land Use and Ownership History

The Building 1034 Motor Pool is used as an automotive garage for repairs and maintenance of service vehicles. Building 1034 design drawings dated 1941 indicate it was part of the original RVAAP construction. Original design drawings indicate the hydraulic lift is a below-grade, twin-post system (Appendix I).

The Building 1034 Motor Pool was located within RVAAP and, as such, was under U.S. Army ownership, as described in Section 1.2. The property is currently under the ownership of the BRAC Division of the Army. Upon completion of any required environmental actions under the IRP, this CR site will be transferred to the NGB and subsequently licensed to OHARNG. A discussion of population demographics for RVAAP is included in Section 1.3.

7.1.3 Physical Property Characteristics

Original design drawings indicate the hydraulic lift is a below-grade, twin-post system. The system consisted of a movable post and a stationary post. The hydraulic lift utilized hydraulic oil as a fluid to raise and lower the posts. This hydraulic system was controlled by pneumatics/compressed air. The components of the underground lift system were enclosed in a pit. The pit for the hydraulic lift is "L" shaped and approximately 12 ft by 3 ft and approximately 4 ft deep with the inner components of the lift covered by flush mounted metal plates. The hydraulic lift location was found during the property visit and the flush mounted cover plates were in place. Photographs taken during the property visit/perimeter survey is included in Appendix M.

The Building 1034 Motor Pool remains intact and is currently used for vehicle maintenance and repairs. The surrounding area is generally flat and drains to the existing storm sewer network. The area is maintained and is currently part of the active Administration Area.

7.2 HISTORICAL PROPERTY SUMMARY

7.2.1 Chronological Property Summary

No documented evidence was found regarding specific years of service for the Building 1034 Motor Pool Hydraulic Lift. A site schematic dated circa 1941 was found as part of this historical records review, so it is assumed services commenced shortly after 1941 building construction. A description of the RVAAP facility operational history is included in Section 1.2.

7.2.2 Military Operations

No documented evidence of historical military operations being performed at the Building 1034 Motor Pool Hydraulic Lift was found during the historical data review.

7.2.2.1 Operations Involving Military Munitions

No documented evidence of operations involving military munitions at the Building 1034 Motor Pool Hydraulic Lift was found during the historical data review.

7.2.2.2 Operations Involving HTRW

Multiple interviewees noted maintenance workers would need to add hydraulic oil to the underground lift system on a yearly basis. During the Building 1034 property visit, Mr. Jim McGee indicated approximately an estimated 300 gallons of oil were added to the lift over a 10-year period. Once it was discovered the lift system was leaking, an attempt was made to discover where the leaked hydraulic oil was located. As no leak could be located, the underground lift system was taken out of service and replaced by an aboveground lift system. No documents were discovered regarding the specific year the underground lift system was removed from service.

Given the building was used for car repairs and maintenance, it was presumed that the garage used typical garage maintenance chemicals such as oils, gasoline, and solvents for degreasing. The interviewees also noted the Building 1034 Motor Pool was used to store batteries, contained a car wash area, and an oil/water separator approximately 30 or 40 ft bgs. The oil/water separator was discovered during the property visit/perimeter survey and was determined to be 12 ft bgs. No documentation relating to spills or releases from the battery storage were found for this AOC.

No documentation on ASTs or USTs within the Building 1034 Motor Pool Building was discovered during the historical records review.

The Building 1034 Motor Pool Hydraulic Lift is a candidate for further investigation. Suggested target analytes include inorganic chemicals, SVOCs, and VOCs.

7.2.3 Map Analysis

Original design drawings that show the location and general construction of the hydraulic lift were discovered during the historical records review. The design drawings also note storage areas within Building 1034. No other design drawings were discovered during this review. A copy of the Building 1034 Motor Pool Hydraulic Lift original design drawings is included in Appendix I.

7.2.4 Aerial Photographic Interpretation

Representative aerial photographs taken in 1952 and 2006 were evaluated during the historical records review and are included in Appendix R. The historical aerial photographs were analyzed to identify past waste management practices, the relationship between the CR site and the surrounding areas, and the chronological development of the AOC. No areas of interest were noted during the analysis of the aerial photographs.

7.3 PREVIOUS INVESTIGATIONS

No previous environmental investigations or actions related to the Building 1034 Motor Pool Hydraulic Lift were discovered during the historical records review.

7.4 EVALUATION OF PRESENCE OF MILITARY MUNITIONS AND TECHNICAL DATA

No documented evidence of the presence of military munitions at the Building 1034 Motor Pool Hydraulic Lift was found during the historical data review.

7.5 EVALUATION OF HTRW PRESENCE AND AREAS

As noted in previous sections, maintenance workers would add hydraulic oil to the twin-post lift system each year. Inspection of the area during the property visit indicated potential oil and oil sheen

in the sump (Appendix L). In addition, the current lift system was well maintained and no visual evidence of leaks was noted. No other documented evidence of a release at the AOC was found during the historical records review or property visit.

7.6 EVALUATION OF CON/HTRW PRESENCE AND AREAS

No documentation of CON/HTRW including ASTs or USTs associated the Building 1034 Motor Pool Building was discovered during the historical records review.

7.7 PATHWAY AND ENVIRONMENTAL HAZARD ASSESSMENT

This section provides a preliminary description of the potential contaminant sources, migration pathways, contaminant discharge points, and potential receptors for the Building 1034 former hydraulic lift based on operational history and property surveys.

7.7.1 Groundwater Pathway

7.7.1.1 Hydrogeologic Setting

No facility-wide groundwater monitoring wells are present in the Administration Area. The nearest facility-wide groundwater monitoring well is LL5mw-004, located over 4,300 ft to the northwest of the Building 1034 Motor Pool. Groundwater potentiometric data in the unconsolidated aquifer is not available within the Administration Area. Based on the inferred facility-wide potentiometric surface within the unconsolidated aquifer (Figure 1-5), the elevation of the groundwater surface ranges from 1,025 to 1,050 ft amsl. The groundwater elevation in the bedrock aquifer within the Administration Area is estimated to be 965 ft amsl, based on well installation logs for groundwater supply wells at Buildings 1067 and 1068. The generalized regional groundwater flow direction in the Administration Area is to the southeast toward a tributary to the west branch of the Mahoning River located southeast of the CR site.

7.7.1.2 Groundwater Targets

Groundwater targets include human receptors that use groundwater for potable water supply, as well as environmental receptors (e.g., livestock, fish farms) and physical targets (e.g., springs) that may be affected by potential groundwater contamination on or adjacent to the Building 1034 Motor Pool Hydraulic Lift. Section 1.4.4.2 describes groundwater use at RVAAP. There are no public, livestock, or commercial groundwater supply wells within RVAAP. The Army and OHARNG currently maintain groundwater supply wells for non-potable sanitary and institutional use in the Administration Area in the vicinity of the AOC. Human exposure to potential groundwater contaminants could occur if groundwater was used for domestic supply purposes in the future. Physical receptors, such as springs or other potential groundwater discharge areas to surface water bodies are addressed in Section 7.7.2.2.

7.7.1.3 Groundwater Conclusions

No groundwater samples were collected as part of this project. Leaching of potential soil contaminants to groundwater, with subsequent lateral migration to either surface water discharge or other surface water exposure points, are potential contaminant migration pathways for the CR site, which may require further evaluation.

7.7.2 Surface Water Pathway

7.7.2.1 Hydrologic Setting

No surface water or wet sediment samples were collected as part of this project. Surface water within the Administration Area occurs intermittently as storm water runoff overland into the storm sewer network that drains the area adjacent to Building 1034. Storm sewers direct flow to the south and east to outlets into drainage ditches. Sediment within the storm sewer network may exist but its presence was not confirmed during the AOC property visit; the storm sewer network within the RVAAP Administration Area is currently being addressed under a separate CERCLA RI conducted under the PBA08 project.

Natural drainage conveyances exist to the southeast that potentially receive overland runoff. There are no perennial surface water features or wetlands adjacent to the CR site. The closest perennial feature to receive drainage from the Administration Area is a tributary to the west branch of the Mahoning River located southeast of the CR site. Surface water flow is not believed to be a primary migration pathway for potential contamination transport at this CR site.

7.7.2.2 Surface Water Targets

Surface water targets include human receptors that use surface water for potable water supply or recreation, as well as environmental (e.g., streams, wetlands, sensitive aquatic environments) and physical targets (e.g., public or private water distribution system intakes) that may be affected by potential groundwater contamination on or adjacent to the AOC. No perennial streams are located within the AOC. There are no observed springs or point groundwater discharge points to a surface water body in the immediate vicinity of the Building 1034 Motor Pool Hydraulic Lift. Therefore, there is no direct exposure pathway for human receptors or ecological targets to surface water at the AOC.

7.7.2.3 Surface Water Conclusions

Based on system design, potential HTRW releases from the Building 1034 Motor Pool Hydraulic Lift would most likely have been directly to subsurface soil. Considering the characteristics of the CR site, a low likelihood exists that surface water features would have been directly impacted by any subsurface hydraulic fluid releases from the system. Visual inspections of the CR site did not indicate any observable impacts to surface water features due to former lift operations. Further evaluation of

wet sediment and surface water environmental media at the CR site is not likely required to determine presence of contamination, if any.

7.7.3 Soil Exposure and Air Pathways

7.7.3.1 Physical Conditions

No soil borings were installed to confirm the composition of unconsolidated and bedrock deposits at the CR site as part of this project. The Administration Area is located within Hiram Till glacial deposits. The soil type found at the CR site is the Mahoning silt loam, 0-2% slopes (MgA) (USDA 2010). The bedrock formation at the Administration Area based on groundwater well installation logs is the Pennsylvanian-age Pottsville Formation, Sharon Shale member. The elevation of the Sharon Shale member in the Administration Area is 986 to 1,006 ft amsl, based on available well installation logs. The Sharon Sandstone member, informally referred to as the Sharon Conglomerate is observed in the eastern portions of the Administration Area (Winslow et al. 1966). Descriptions of the soil type, Sharon Shale, and the Sharon Conglomerate are presented in Section 1.4.

7.7.3.2 Soil and Air Targets

Current potential soil targets include human and ecological (animal and plant) receptors that may come into contact with surface or subsurface soil, if contaminants are present within or adjacent to the former Building 1034 Motor Pool Hydraulic Lift. Considering that contaminant releases would most likely have been directly to subsurface soil, a low likelihood exists that ecological receptors present in the AOC vicinity would be exposed. Future human exposure to potential soil contaminants associated with the AOC could occur with active use of the AOC (e.g., training activities).

Airborne contamination (e.g., windblown dust) is not considered a viable migration or exposure pathway at this CR site. The likely contaminants associated with the Building 1034 Motor Pool Hydraulic Lift (SVOCs, inorganic chemicals) have low volatility and potential releases of contaminants would likely have been to subsurface soil. The operational areas are paved, gravel covered, or currently well vegetated. RVAAP is located in a humid climate and soil moisture content is typically high, which reduces the potential for dust generation.

7.7.3.3 Soil Exposure and Air Pathway Conclusions

No soil samples were collected as part of this project. Potential contaminants in soil may represent a direct exposure pathway for human receptors under current and future land use. Surface and subsurface soil at the CR site may represent a potential secondary source of contamination to surface water and groundwater. Environmental sampling is recommended to confirm the presence or absence of any soil contamination.

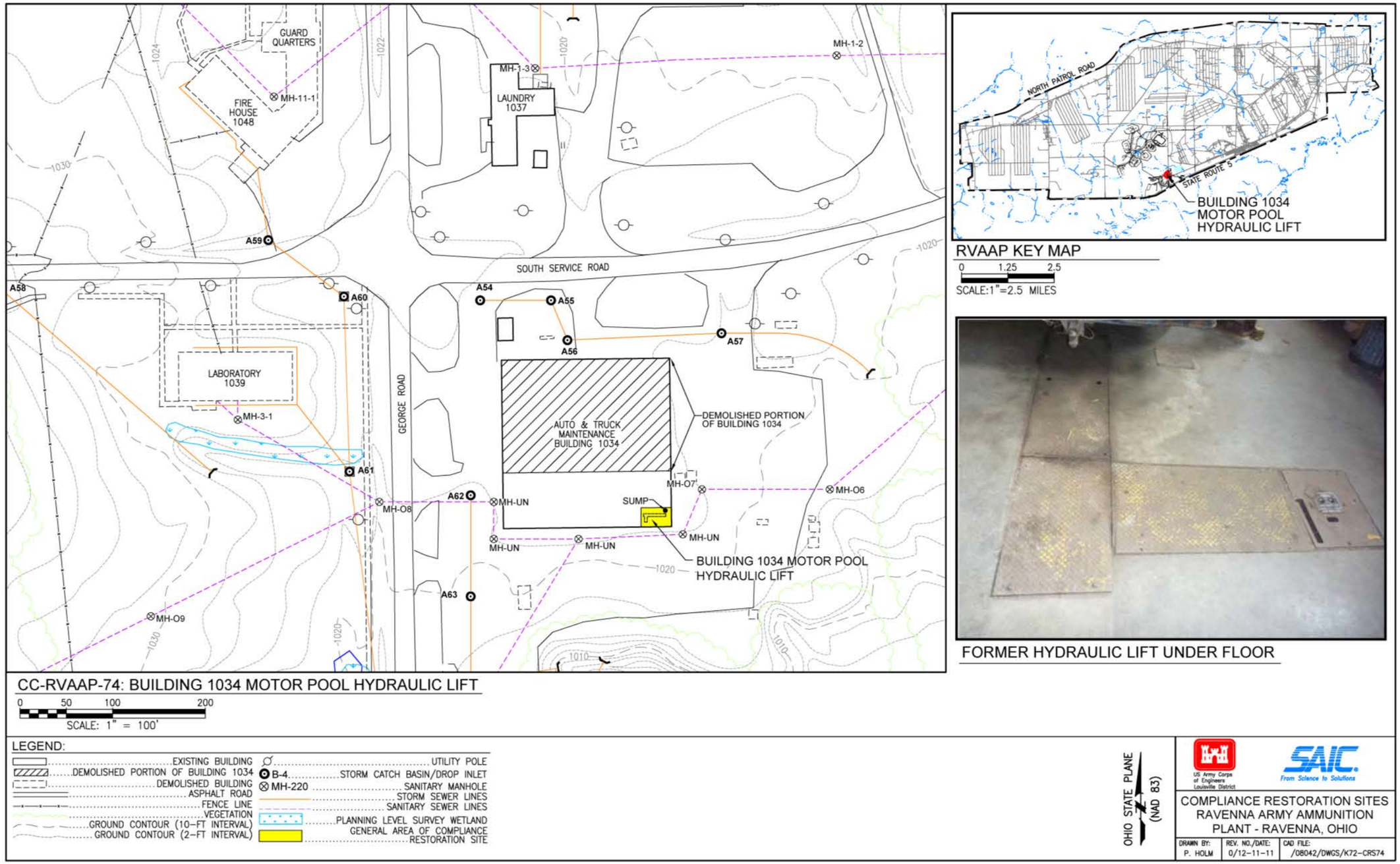

Figure 7-1. Building 1034-Motor Pool Hydraulic Lift Map and Site Features

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8.0 CC-RVAAP-75: GEORGE ROAD SEWAGE TREATMENT PLANT

This section presents a description of the CC-RVAAP-75: George Road Sewage Treatment Plant, including a description of the property, summary of previous investigations, an evaluation of documents reviewed during the historical records review search, and a pathway and environmental hazard assessment. One UST of unknown size and content was located approximately 100 yd south of South Service Road at the George Road Sewage Treatment Plant (Section 5.0). Appendix A provides a description of all reference sources and records reviewed during the course of this evaluation. Conclusions and a recommendation for NFA or further investigation at this AOC are presented in Section 11.0.

8.1 PROPERTY DESCRIPTION, ACREAGE, AND LAND USE

The George Road Sewage Treatment Plant is an inactive domestic sewage treatment plant that was used to process domestic sewage and discharge from Load Lines 5 through 11 during operational periods and from Load Line 6 (RVAAP-15) and Load Line 7 (RVAAP-30) pink water treatment. The George Road Sewage Treatment Plant received influent for the Administration Area, Hospital, Family Housing (approximately 15 units), Power House No. 6, and the vehicle maintenance garage. The George Road Sewage Treatment Plant also received sludge from the Depot Sewage Treatment Plant (RVAAP-21). The George Road Sewage Treatment Plant was taken out of service in 1993 and was properly closed under an Ohio National Pollutant Discharge Elimination System (NPDES) permit (#31000000BD). No documentation was discovered when the sewage treatment plant began operations; however, a 1941 site schematic was found as part of this historical records review, so it is assumed services commenced shortly after 1941 building construction. Interviewees noted a spill of a pint-sized jar of elemental mercury occurred in the comminutor building and went into the floor drain of the building (Appendix J). This AOC was listed as a CR site due to the spill of mercury to the floor drain in the comminutor building. Acreage of this AOC has not been accurately defined but is estimated to be less than 2 acres.

8.1.1 Location

The George Road Sewage Treatment Plant is located south of South Service Road and north of Patrol Road, about 0.5 miles east of the Administration Area (Figure 8-1).

8.1.2 Land Use and Ownership History

As described above, the George Road Sewage Treatment Plant was used to process domestic discharge and discharge/pink water treatment from Load Lines 6 and 7. The George Road Sewage Treatment Plant is located about 0.5 mile east of the RVAAP Administration Area, which also includes the Building 1034 Motor Pool and Building 1037 former laundry building, now used as administration offices.

George Road Sewage Treatment Plant was located within RVAAP and, as such, was under U.S. Army ownership, as described in Section 1.2. The George Road Sewage Treatment Plant was operated as part of the former activities associated with RVAAP. The AOC has been transferred to NGB who licenses the use of the AOC to the OHARNG for military training and operations. Currently, this AOC is not actively used by the OHARNG. A description of population demographics for RVAAP is located in Section 1.3.

8.1.3 Physical Property Characteristics

The George Road Sewage Treatment Plant consisted of the comminutor building, two Imhoff tanks, two trickling filters (also known as sprinkling filters), sludge beds contained within greenhouses, a secondary/final clarification tank, and a chlorine contact tank/building. According to the interviewees, the Imhoff tanks were abandoned in place and filled with soil. The trickling filters were removed and sludge from the drying beds was removed. The comminutor and chlorine buildings still remain at the AOC. Both buildings are small brick buildings. The topography of the AOC slopes to the southwest. The Imhoff tanks were located along the slope, and the trickling filters and sludge beds were located at the base of the slope. The comminutor building is located at the top of the slope at the end of the driveway that leads to the facility.

8.2 HISTORICAL PROPERTY SUMMARY

8.2.1 Chronological Property Summary

No documentation was found describing when the sewage treatment plant began operations; however, the *Preliminary Assessment for the Characterization of Areas of Contamination* (USACE 1996) indicated the George Road Sewage Treatment Plant ceased operations in 1993. A 1941 site schematic was found as part of this historical records review, so it is assumed services commenced shortly after 1941 building construction. A description of the RVAAP facility operational history is included in Section 1.2.

8.2.2 Military Operations

No documented evidence of historical military operations being performed at the George Road Sewage Treatment Plant was found during the historical records review.

8.2.2.1 Operations Involving Military Munitions

No documented evidence of operations involving military munitions at the George Road Sewage Treatment Plant was found during the historical records review.

8.2.2.2 Operations Involving HTRW

According to one interviewee, the trickling filters had mercury seals, which tended to leak. There were under drains associated with the trickling filters which drained into a collection box. The mercury was periodically collected after heavy flows and placed in a pint-sized jar for storage. As noted in Section 8.1 of this report, interviewees indicated a pint-sized jar of elemental mercury spilled into the floor drain of the comminutor building. The interviewees noted the mercury was never recovered. One interviewee noted during decommissioning, sludge from the drying beds were removed and spread along Greenleaf Road. One interviewee noted silver recovery operations from photographic and x-ray development solutions occurred at the AOC (Appendix J). No other documentation was found regarding other chemicals used at the AOC; however, it is assumed that chlorine was used as a disinfectant.

8.2.3 Map Analysis

Original design drawings of the comminutor building and other site features were discovered during the historical records review. Building schematics show the comminutor floor drain leads outside the building and ties into a 15-inch vitrified clay pipe, which appears to be channeled back into the treatment system. The drain line is tied back into the sanitary sewer at manhole O-1. No other drawings were found during the historical records review. A copy of the design drawings found for the George Road Sewage Treatment Plant are included in Appendix I.

8.2.4 Aerial Photographic Interpretation

Representative historical aerial photographs taken in 1952 and 2006 were evaluated during the historical records review and are included in Appendix R. The historical aerial photographs were analyzed to identify past waste management practices, the relationship between the CR site and the surrounding areas, and the chronological development of the CR site. No specific items of interest were found during the analysis of the aerial photographs.

Low-altitude aerial photographs of the George Road Sewage Treatment Plant were discovered during the historical records review. The date of the photographs is unknown. A copy of these photographs is included in Appendix H.

8.3 PREVIOUS INVESTIGATIONS

The George Road Sewage Treatment Plant was evaluated as an AOC (RVAAP-22) in the *Preliminary Assessment for the Characterization of Areas of Contamination* (USACE 1996). The report concluded RVAAP-22 was maintained under an Ohio NPDES permit (#31000000BD) and was not considered a high-priority AOC.

On-going CERCLA investigations of the facility's sanitary sewer system have revealed mercury detections in the sediment at the current sanitary line outfall (downstream and southwest of the

treatment plant). A CERCLA RI report for the sanitary sewer investigation is pending. Preliminary data from the Performance-Based Acquisition 2008 Remedial Investigation (PBA08 RI) (in preparation) indicates mercury concentrations in sanitary sewer line sediment samples upstream of the George Road Sewage Treatment Plant were higher than those in samples collected downstream of the plant. Decreasing overall longitudinal mercury trend was observed from the Administration Area/Fuze and Booster Hill area downstream in the sanitary system. PBA08 RI preliminary data showed mercury was detected in sediment at 2.5 mg/kg at the current sanitary line outfall. Mercury concentrations in sediment upstream in the sanitary sewer trunk line from Fuze and Booster Hill area were 7.3 mg/kg. Other upstream locations had higher mercury concentrations in sanitary sewer line sediment, including the Administration Area former Key Shop area (27.6 mg/kg) and a feeder line location downstream of the former Building 1037 Laundry Facility and Administration Area Power House (21.5 mg/kg).

No other documents describing investigations or actions were found during the historical records review.

8.4 Evaluation of Presence of Military Munitions and Technical Data

No documented evidence of the presence of military munitions at the George Road Sewage Treatment Plant was found during the historical records review.

8.5 Evaluation of HTRW Presence and Areas

As described in Section 8.2.2.2, a spill of a pint-sized jar of elemental mercury was reported at the George Road Sewage Treatment Plant comminutor building and attempts to recover the spilled mercury were not successful. Given the mercury was not recovered, investigations into the building floor drain and pipe trap (if present) and surrounding soil may be warranted.

8.6 Evaluation of CON/HTRW Presence and Areas

Section 5.0 contains a complete description and evaluation of the former UST located at the former George Road Sewage Treatment Plant. No other documented evidence of CON/HTRW was found during the historical records review of this CR site.

8.7 Pathway and Environmental Hazard Assessment

This section provides a preliminary description of the potential contaminant sources, migration pathways, contaminant discharge points, and potential receptors for the George Road Sewage Treatment Plant, based on operational history and property surveys.

8.7.1 Groundwater Pathway

8.7.1.1 Hydrogeologic Setting

Section 1.4 presents the general hydrogeologic setting for RVAAP. No groundwater monitoring wells are present at the George Road Sewage Treatment Plant. The nearest facility-wide groundwater monitoring well is LL9mw-004, located approximately 5,500 ft to the northwest of the George Road Sewage Treatment Plant. As no monitoring wells exist in the area, the groundwater elevation cannot be estimated with reasonable accuracy. Based on the inferred facility-wide potentiometric surface within the unconsolidated aquifer (Figure 1-5), the elevation of the groundwater surface ranges from 1,000 to 1,025 ft amsl. Groundwater elevations in the bedrock aquifer within the Administration Area is estimated to be 965 ft amsl, based on well installation logs for groundwater supply wells at Buildings 1067 and 1068, approximately 2,000 ft east of the George Road Sewage Treatment Plant. The generalized regional groundwater flow direction in the vicinity is to the southeast to a tributary of the west branch of the Mahoning River located southeast of the CR site.

8.7.1.2 Groundwater Targets

Groundwater targets include human receptors that use groundwater for potable water supply, as well as ecological receptors (e.g., livestock, fish farms) and physical targets (e.g., springs) that may be affected by potential groundwater contamination on or adjacent to the AOC. Section 1.4.4.2 describes groundwater use at RVAAP. There are no public, livestock, or commercial groundwater supply wells within RVAAP. Groundwater in the vicinity of the George Road Sewage Treatment Plant is not currently used by the Army or OHARNG for potable purposes. The OHARNG and Army do not have plans for future groundwater use in the area. Accordingly, no human or environmental receptors currently exist respective to potential groundwater contaminants at the AOC. Physical receptors, such as springs or other potential groundwater discharge areas to surface water bodies are addressed in Section 8.7.2.2.

8.7.1.3 Groundwater Conclusions

No groundwater samples were collected as part of this project. Leaching of potential contaminants to groundwater, with subsequent lateral migration to either surface water discharge or other surface water exposure points, are potential contaminant migration pathways for the CR site, which may require further evaluation.

8.7.2 Surface Water Pathway

8.7.2.1 Hydrologic Setting

No surface water or wet sediment samples were collected as part of this project. Surface water within the Administration Area occurs intermittently as storm water runoff overland, through constructed ditches and a limited storm sewer network throughout the area. Sediment within nearby conveyances

appears to be dry sediment, as defined by RVAAP guidance, and is not typically inundated for more than seven days at a time. Sediment within the storm and sanitary sewer networks exists but is being investigated under a separate project.

Surface water flow is the primary migration pathway for potential contamination to leave the former CR site. Currently, the George Road sanitary sewer trunk line has been plugged at manhole O-1 (Figure 8-1) and infiltrating surface water and groundwater flow is directed into an outfall to a drainage conveyance southwest of the former sewage treatment plant. No visual signs of potential contamination were observed within drainage ditches during the property visits. Drainage from the CR site flows southeast along a drainage conveyance, exits RVAAP, and flows beneath State Route 5, approximately 200 ft to the southeast. There are no perennial surface water features in the immediate vicinity of the CR site. The closest perennial feature to receive drainage from the George Road Sewage Treatment Plant is a tributary to the west branch of the Mahoning River located off of RVAAP, southeast of the CR site.

8.7.2.2 Surface Water Targets

Surface water targets include human receptors that use surface water for potable water supply or recreation, as well as environmental (e.g., streams, wetlands, sensitive aquatic environments) and physical targets (e.g., public or private water distribution system intakes) that may be affected by potential groundwater contamination on or adjacent to the AOC. No perennial streams are located within the AOC. Other than the sanitary sewer outfall noted above, there are no observed springs or point groundwater discharge points to a surface water body in the immediate vicinity of the George Road Sewage Treatment Plant. Therefore, there is no direct exposure pathway for human receptors or ecological targets to surface water at the AOC.

8.7.2.3 Surface Water Conclusions

Available information indicates a potential environmental hazard associated with the George Road Sewage Treatment Plant. Because of the absence of a direct exposure pathway, evaluation of wet sediment and surface water environmental media at the CR site is not recommended. Potential mercury contamination associated with the historical spill may have been released to soil and dry sediment and potentially migrated along intermittent drainage conveyances as described in Section 8.7.2.1. Further evaluation of soil and dry sediment within the George Road Sewage Treatment Plant is addressed under Section 8.7.3.

8.7.3 Soil Exposure and Air Pathways

8.7.3.1 Physical Conditions

No soil borings were installed to confirm the composition of unconsolidated and bedrock deposits at the CR site as part of this project. The George Road Sewage Treatment Plant is located within Hiram Till glacial deposits. The soil type found at the CR site is the Mahoning silt loam, 2-6% slopes

(MgB) (USDA 2010). The inferred bedrock formation in the vicinity of the George Road Sewage Treatment Plant is the Pennsylvanian-age Pottsville Formation, Sharon Sandstone member, informally referred to as the Sharon Conglomerate (Winslow et al. 1966). The Sharon Conglomerate bedrock interface at the George Road Sewage Treatment Plant is estimated to be 950 ft amsl, based on ODNR bedrock topography maps (Figure 1-3). Descriptions of the soil type and the Sharon Conglomerate are presented in Section 1.4.

8.7.3.2 Soil and Air Targets

Current potential soil targets include human and ecological (animal and plant) receptors that may come into contact with surface or subsurface soil, if contaminants are present within or adjacent to the former George Road Sewage Treatment Plant. Likewise, future human exposure to potential soil contaminants associated with the AOC could occur with active use of the AOC (e.g., training activities). Ecological receptors present in the AOC vicinity may also be exposed to potential soil contaminants in the future.

Airborne contamination (e.g., windblown dust) is not considered a viable migration or exposure pathway at this CR site. The reported mercury spill at the George Road Sewage Treatment Plant was to a closed piping system and likely discharged into soil or sludge drying beds, the contents of which were later removed. The estimated timeframe of any releases would result in attenuation of the contaminant in soil. The George Road Sewage Treatment Plant area is currently well vegetated. RVAAP is located in a humid climate, and soil moisture content is typically high, which reduces the potential for dust generation.

8.7.3.3 Soil Exposure and Air Pathway Conclusions

No soil samples were collected as part of this project. Potential contaminants in soil may represent a direct exposure pathway for human receptors under current and future land use. Surface and subsurface soil at the CR site may represent a potential secondary source of contamination. Environmental sampling is recommended to confirm the presence or absence of any potential soil contamination.

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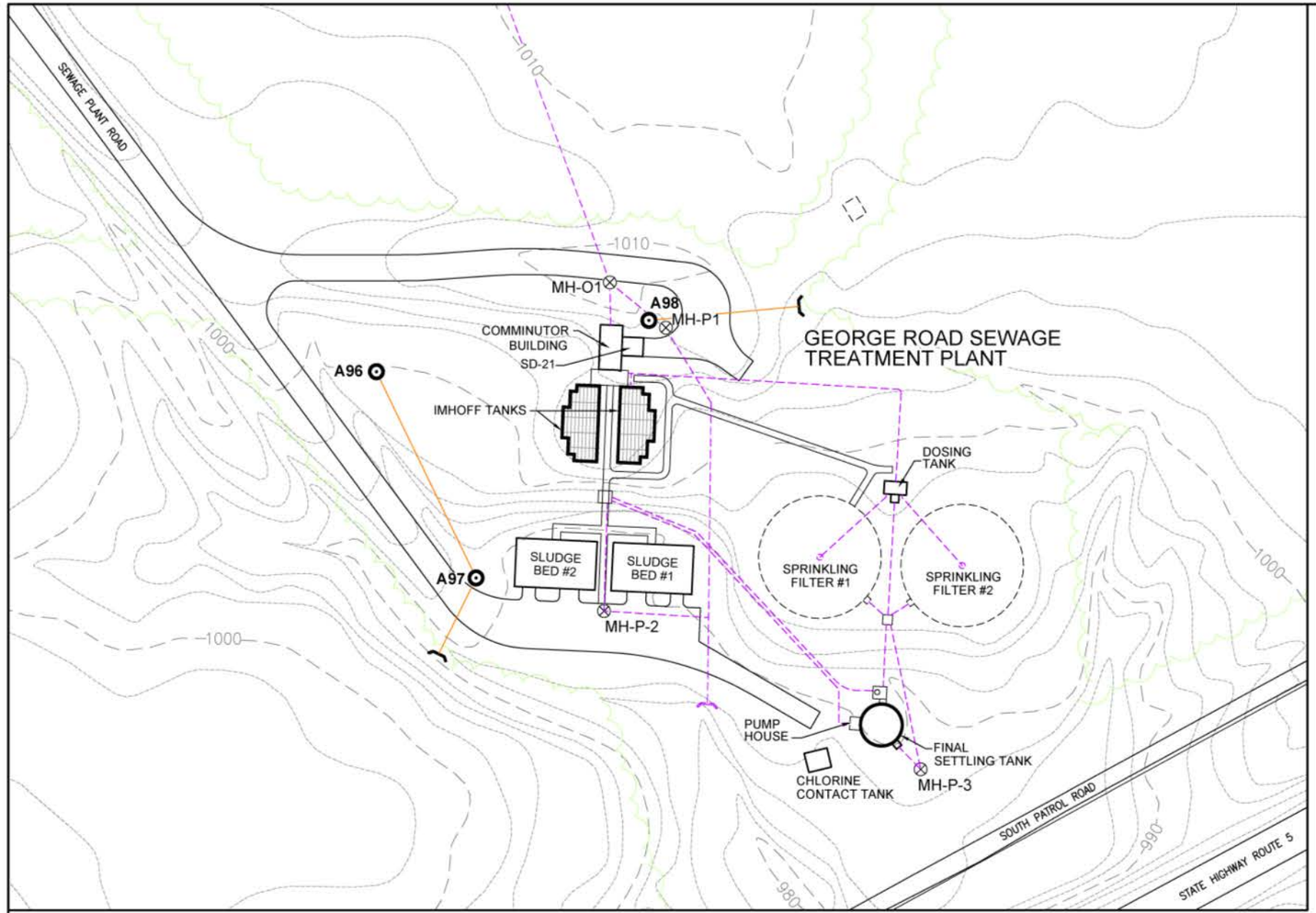


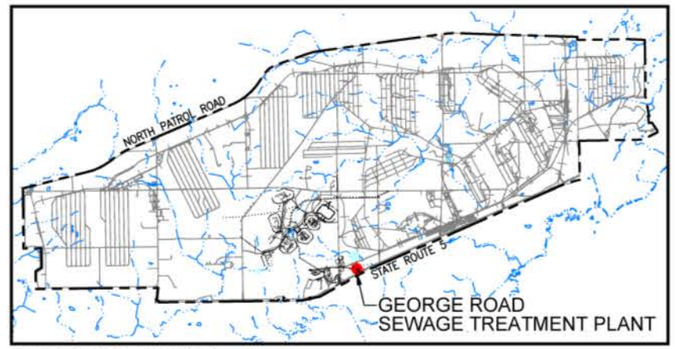
CC-RVAAP-75: GEORGE ROAD SEWAGE TREATMENT PLANT

0 40 80 160

SCALE: 1" = 80'

LEGEND:

- EXISTING BUILDING
- DEMOLISHED BUILDING
- ASPHALT ROAD
- GRAVEL ROAD
- RAILROAD TRACKS
- FENCE LINE
- VEGETATION
- GROUND CONTOUR (10-FT INTERVAL)
- GROUND CONTOUR (2-FT INTERVAL)
- B-4 STORM CATCH BASIN/DROP INLET
- MH-220 SANITARY MANHOLE
- STORM SEWER LINES
- SANITARY SEWER LINES



RVAAP KEY MAP

0 1.25 2.5

SCALE:1"=2.5 MILES

GEORGE ROAD SEWAGE TREATMENT PLANT MAIN BUILDING

OHIO STATE PLANE (NAD 83)

US Army Corps of Engineers Louisville District

SAIC. From Science to Solutions

COMPLIANCE RESTORATION SITES
RAVENNA ARMY AMMUNITION PLANT - RAVENNA, OHIO

DRAWN BY:	REV. NO./DATE:	CAD FILE:
P. HOLM	1/12-20-11	/08042/DWGS/K72-CRS75

Figure 8-1. George Road Sewage Treatment Plant Map and Site Features

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9.0 CC-RVAAP-76: DEPOT AREA

This section presents a description of the CC-RVAAP-76: Depot Area CR site, including a description of the property, summary of previous investigations, an evaluation of documents reviewed during the historical records review search, and a pathway and environmental hazard assessment. Appendix A provides a description of all reference sources and records reviewed during the course of this evaluation. Conclusions and a recommendation for NFA or further investigation are presented in Section 11.0 of this report.

9.1 PROPERTY DESCRIPTION, ACREAGE, AND LAND USE

The Depot Area consists of several historical support buildings used by the U.S. Army, including:

- Fueling stations;
- Locomotive repair shop;
- Motor repair building;
- Petroleum, Oil, and Lubricant (POL) storage building;
- Solid waste incinerator;
- Demilitarization activities at Building U-10;
- Service stations; and
- An AST associated with Building U-5 (RVAAP-24).

9.1.1 Location

The Depot Area is located in the western portion of RVAAP, mainly along State Route 80/Freedom Road, south of Newton Falls Road, and north of Patrol Road (Figure 9-1).

9.1.2 Land Use and Ownership History

Based on available documentation and interviews, some of the functions conducted in the area included fueling stations, service stations, a locomotive repair shop, POL storage building, solid waste incinerator, and a motor repair building. The Depot Area supported a potable groundwater system consisting of sand filtration and chlorination until the 1950s. The treatment facility and groundwater pump house were located adjacent to one another on the west side of Route 80 along Depot Water Works Rd. Munitions demilitarization activities occurred in Building U-10 (Section 9.2.2.1). The Depot Area is now used for military training purposes.

Block B is located west of the Depot Area and was used for munitions storage. Block C is located to the north/northeast of the Depot Area and was also used for munitions storage. The area to the south of the Depot Area mainly consists of wooded vacant land.

The Depot Area was operated as part of the former activities associated with RVAAP. The AOC has been transferred to NGB who licenses the use of the facility to the OHARNG for military training and operations. Currently, this AOC is used by the OHARNG for military training purposes. A description of the population demographics for RVAAP is provided in Section 1.3.

9.1.3 Physical Property Characteristics

The topography of the AOC is generally sloping from west to east toward Hinkley Creek, which lies along the east boundary of the Depot Area. Overall surface water drainage patterns are toward Hinkley Creek along constructed ditches, natural conveyances, and through the existing storm sewer network. Wetland areas exist to the east along the Hinkley Creek floodplain, west of Building U-7, and south of the former Depot Area Sewage Treatment Plant. Various support buildings have existed at the Depot Area, including (Figure 9-1):

- Building 1W-1 – Warehouse Inert Storage;
- Building 1W-2 – Warehouse Inert Storage;
- Building 1W-3 – Warehouse Inert Storage;
- Building A-1 – Telephone Building/Bolton Milk House;
- Building A-2 – Motor Repair Building;
- Building A-3 – Service Garage/Tool Crib;
- Building A-4 and 4A – Water Softener Plant;
- Building A-6 – Gasoline Filling Station;
- Building A-7 – Elevated Water Tank;
- Building A-9 – Field Office;
- Building T-2601 – Lumber Storage Shed;
- Building T-2602 – Lumber Storage Shed;
- Area 11 – Lumber Storage Area;
- Building U-2 – Paint Shop;
- Building U-3 – Filling Station;
- Building U-4 – Material Handling Equipment (MHE) Repair Shop;
- Building U-5 – Equipment Repair Building;
- Building U-6 – Diesel Fuel Filling Station;
- Building U-7 – Equipment Repair Shop;
- Building U-8 – Equipment Shop;
- Building U-9 – Paint Storage;
- Building U-10 – Box Repair Shop;
- Building U-12 – Office;
- Building U-13 – Boiler House;
- Building U-14 – Dunnage Building;
- Building U-15 – Dormitory;
- Building U-19 – Depot Area Sewage Treatment Plant;
- Building U-19A – Depot Area Sewage Treatment Plant;

- Building U-20 – Incinerator;
- Building U-21 – Substation;
- Building EE-101 – Administration Building; and
- Building EE-100 Substation.

All building numbers and names were obtained from circa 1941 map drawings and the REIMS building structure database. Footers and slabs for multiple former buildings and some staging areas exist north of the Telephone Exchange Building. Potable water, hydrant water supply, and sanitary sewer utility systems, remain intact but inactive. A storm sewer system remains intact and functional with several outlets to conveyances draining to Hinkley Creek.

9.2 HISTORICAL PROPERTY SUMMARY

9.2.1 Chronological Property Summary

The Depot Area was constructed as part of the original RVAAP facility. Prior to the purchase of the property in August 1940, the Depot Area consisted of the Bolton Farm. The U.S. Army continued to use some of the buildings from the Bolton Farm. The Depot Administration Area Telephone Building is the last remaining building of the former Bolton Farm that existed prior to construction of RVAAP. Operations at the Depot Area began during World War II (circa 1941) and continued through the Vietnam War era. The area is currently used by the OHARNG for storage and military training purposes.

9.2.2 Military Operations

Historical records indicate demilitarization activities were conducted at Building U-10 (date unknown; Appendix G). Numerous operations and facilities involving HTRW also existed within the Depot Area in support of military missions as discussed below.

9.2.2.1 Operations Involving Military Munitions

The demilitarization activities reportedly consisted of reconditioning fin assemblies, the AN-M106A1 track vehicle, and the F/250-lb bomb. Building U-10 was also used for debanding 8-inch high explosive (HE) projectiles, and storing M103 tank maintenance parts assemblies. No other information was found with respect to demilitarization activities and military munitions in the Depot Area.

9.2.2.2 Operations Involving HTRW

An AST used to store waste oil (RVAAP-24) was located next to the motor oil storage shed. The tank has been removed; however the concrete supports still exist. The RVAAP-24 Waste Oil Tank is included in the RVAAP IRP and is in response complete because it is not eligible for IRP funding. No

visual evidence of impacts (e.g., stained soil, stressed vegetation) was observed at the former waste oil tank during the property visit.

One interviewee noted a historical spill from a "Buffalo Tank" containing waste oil, which was cleaned up within a day. No documentation was found regarding this "Buffalo Tank" and the associated spill (Appendix J).

A spill report was found documenting the discovery of 12 "paint cans" (estimated 5-gallon cans) during the search for a UST near the former Bolton Mansion (EE-102). The cans were removed in June 1991. A log book entry documented that the paint cans contained a dry silicone-type substance. Samples were taken of the material and analyzed for toxicity characteristic leaching procedure (TCLP) metals, VOCs, and flash point. The results were below regulatory levels. No documentation of soil sampling from the excavation area was found.

Various maintenance activities occurred at multiple locations and buildings throughout the Depot Area, as noted in Section 9.1.3, which may have caused spills or releases of HTRW to the environment. However, no documentation on any specific spills or releases was found during the historical records review.

Eleven USTs were known to have been located within the Depot Area. These USTs are evaluated as part of CC-RVAAP-72. Table 5-1 lists all former USTs located within the Depot Area, including details such as content, size, and date of removal (Section 5.0).

Building U-5, the equipment repair shop, was a facility used to repair locomotives. According to the *Support Service Operation Report – Locomotive Maintenance* (USACE 2005), typical chemicals/products used during locomotive maintenance activities may have included engine washing chemicals, valve oil, electrolytes (battery maintenance), locomotive black paint, solvents for parts degreasing, lubrication oil, metal preservatives, Carbolineum, Creosote, and cold patch asphalt.

9.2.3 Map Analysis

Original design drawings for several of the buildings within the Depot Area were found during the historical records review; these drawings are contained in Appendix I. An original design drawing showing a coal storage bin was found for Building U-14, the Dunnage Building.

9.2.4 Aerial Photographic Interpretation

Representative aerial photographs taken in 1952 and 2006 were evaluated during the historical records review and are included in Appendix R. The historical aerial photographs were analyzed to identify past waste management practices, the relationship between the CR site and the surrounding areas, and the chronological development of the AOC. No areas of interest were found during the analysis of the aerial photographs.

9.3 PREVIOUS INVESTIGATIONS

The Depot Sewage Treatment Plant (RVAAP-21) was included in the *Preliminary Assessment for the Characterization of Areas of Contamination* (USACE 1996). The Preliminary Assessment concluded that the Depot Sewage Treatment Plant was not a high-priority AOC.

USACE conducted soil sampling immediately adjacent to former Building U-10 in April 2010 (USACE 2010b). Samples were collected around the building slab near floor drain outfalls. Soil samples were analyzed for explosives, propellants, SVOCs, PCBs, pesticides, VOCs, and TAL metals, including mercury and hexavalent chromium. Detections of all chemicals were found; however, evaluation of nature and extent and risk assessments was not performed. Additional evaluation of the data will be incorporated into the Phase I RI for the 9 CR Sites.

A CERCLA investigation of the Depot Area sanitary and storm sewer system is currently being conducted under the RVAAP PBA08. This effort includes collection of sediment and water samples from within the piping systems and at selected sewer system outfalls. A CERCLA RI report for the sewer system investigation is pending.

9.4 EVALUATION OF PRESENCE OF MILITARY MUNITIONS AND TECHNICAL DATA

Section 9.2.2.1 describes demilitarization activities conducted at Building U-10. No other information was found with respect to demilitarization activities and military munitions in the Depot Area.

9.5 EVALUATION OF HTRW PRESENCE AND AREAS

As described in Section 9.2.2.2, several instances were noted throughout the historical records review with respect to spills or releases at the Depot Area. No visual evidence of impacts (e.g., stained soil, stressed vegetation, etc.) were noted during the property visits and perimeter surveys. The following areas may require additional investigation:

- Waste oil tank (RVAAP-24) area;
- Building U-4 POL Area;
- Building U-5 Locomotive Repair Shop;
- Building U-20 Incinerator;
- Building U-10 Demilitarization Operations (as necessary to define nature and extent);
- Building A-3 Service Garage;
- Building A-2 Motor Repair Building;
- Bolton Barn – Tank maintenance activities;
- Bolton Mansion – Buried paint cans; and
- Ditch lines/drainage conveyances receiving runoff from key operational areas.

Unvalidated data from the sampling conducted at Building U-10 was compared against background screening levels to gauge any potential impacts to the area. There were background exceedances of

arsenic, chromium, cobalt (metals), and benzo(a)pyrene (SVOC) in surface and subsurface soil samples. This screening will need to be completed again once the data has been validated.

Preliminary data from the PBA08 Facility-Wide Sewers RI identified primarily SVOCs and inorganic chemicals (primarily chromium, lead, manganese) as site-related contaminants in Depot Area sewer system sediment and water samples. Explosives were infrequently detected in storm sewer sediment at low, estimated concentrations less than laboratory reporting limits. A CERCLA RI report for the sewer system investigation is pending.

9.6 EVALUATION OF CON/HTRW PRESENCE AND AREAS

No documentation was found with respect to the AST located near the motor oil storage shed. Other ASTs were noted to exist in the Depot Area and include a 3,500-gallon diesel AST located at Building U-4 and two 300-gallon ASTs for gas and diesel also located at Building U-4.

Eleven USTs were known to have been located within the Depot Area. Table 5-1 lists all former USTs located within the Depot Area, including details such as content, size, and date of removal (Section 5.0).

9.7 PATHWAY AND ENVIRONMENTAL HAZARD ASSESSMENT

This section provides a preliminary description of the potential contaminant sources, migration pathways, contaminant discharge points, and potential receptors for the Depot Area, based on operational history and property surveys.

9.7.1 Groundwater Pathway

9.7.1.1 Hydrogeologic Setting

No facility-wide groundwater monitoring wells are present at the Depot Area. The nearest facility-wide groundwater monitoring well is BKGmw-016, located approximately 2,300 ft southeast of the Depot Area. As no monitoring wells exist in the Depot Area, the groundwater elevation cannot be estimated with reasonable accuracy. Based on the inferred facility-wide potentiometric surface within the unconsolidated aquifer (Figure 1-5), the elevation of the groundwater surface ranges from 1,025 to 1,050 ft amsl in the central portions of the Depot Area. No data exists respective to potentiometric elevations in the bedrock aquifer in the western portions of RVAAP (Figure 1-6). The generalized regional flow direction for shallow groundwater in the Depot Area is to the southeast toward Hinkley Creek, consistent with surface water flow directions.

9.7.1.2 Groundwater Targets

Groundwater targets include human receptors that use groundwater for potable water supply, as well as environmental receptors (e.g., livestock, fish farms) and physical targets (e.g., springs) that may be

affected by potential groundwater contamination on or adjacent to the AOC. Section 1.4.4.2 describes groundwater use at RVAAP. There are no public, livestock, or commercial groundwater supply wells within RVAAP. Groundwater in the Depot Area is not currently used by the Army or OHARNG for potable purposes. The OHARNG and Army do not have plans for future groundwater use in the area. The nearest groundwater supply wells utilized by the Army and OHARNG within RVAAP are located in the Administration Area approximately 4 miles to the east of the Depot Area. Accordingly, no human or environmental receptors currently exist respective to groundwater at the AOC. Physical receptors such as springs or other potential groundwater discharge areas to surface water bodies are addressed in Section 9.7.2.2.

9.7.1.3 Groundwater Conclusions

No groundwater samples were collected as part of this project. Leaching of potential soil contaminants to groundwater, with subsequent lateral migration to either surface water discharge or other surface water exposure points, are potential contaminant migration pathways for the CR site which may require further evaluation. Given the scope of historical operations at the Depot Area, groundwater monitoring wells may be warranted to confirm presence or absence of contamination.

9.7.2 Surface Water Pathway

9.7.2.1 Hydrologic Setting

No surface water or wet sediment samples were collected as part of this project. Surface water within the Depot Area occurs intermittently as storm water runoff overland, through constructed roadside ditches, and through the storm sewer network. Sediment within nearby roadside conveyances appears to be dry sediment, as defined by RVAAP guidance, and is not typically inundated for more than seven days at a time. Sediment within the storm and sanitary sewer networks exists but is being investigated under a separate project. Surface water flow is a primary migration pathway for potential contamination to leave the CR site, flowing overland or through natural/manmade conveyances to adjacent wetlands and Hinkley Creek along the eastern boundary. No visual signs of potential contamination were observed within drainage ditches during the property visit.

9.7.2.2 Surface Water Targets

Surface water targets include human receptors that use surface water for potable water supply or recreation, as well as environmental (e.g., streams, wetlands, sensitive aquatic environments) and physical targets (e.g., public or private water distribution system intakes) that may be affected by potential groundwater contamination on or adjacent to the AOC. Current and future land use includes the potential for human receptor exposure to intermittent and perennial surface water contaminants associated with this CR site, and both terrestrial and aquatic ecological receptors are present in the CR site vicinity and in wetland areas to the east along Hinkley Creek.

9.7.2.3 Surface Water Conclusions

Available information indicates the potential for environmental impacts to surface water associated with former operations within the Depot Area. Potential contaminants may exist from unreported spills or leaks from operational facilities and equipment. As spills may or may not have occurred at the Depot Area, there is the potential for contaminants to exist within soil and sediment and to have migrated as described in Section 9.7.2.1. Further evaluation of the sediment within drainage conveyances in the Depot Area and surface water in nearby perennial wetlands and receiving streams (tributaries to Hinkley Creek) is recommended to determine the presence of contamination, if any. Further evaluation of dry sediment within drainage conveyances at the Depot Area is also recommended as part of soil evaluation as discussed in Section 9.7.3.

9.7.3 Soil Exposure and Air Pathways

9.7.3.1 Physical Conditions

No soil borings were installed to confirm the composition of unconsolidated and bedrock deposits at the CR site as part of this project. The Depot Area is located within Lavery Till glacial deposits. The two soil types found at the Depot Area are Wadsworth silt loams (0-2% and 2-6% slopes). The Wadsworth silt loam (WaA) (0-2% slopes) is present in the eastern portion of the CR site, mainly east of Route 80, while the Wadsworth silt loam (WaB) (2-6% slopes) occurs in the western portion of the CR site, primarily west of Route 80 (USDA 2010). The inferred bedrock formation at the Depot Area is the Pennsylvanian-age Pottsville Formation, Mercer member (Winslow et al. 1966). The Mercer Member bedrock interface in the Depot Area is estimated to be 900 ft amsl, based on ODNR bedrock topography maps (Figure 1-3). Complete descriptions of soil types and the Pottsville Formation Mercer Member are presented in Section 1.4.

9.7.3.2 Soil and Air Targets

Current potential soil targets include human and ecological (animal and plant) receptors that may come into contact with surface or subsurface soil, if contaminants are present at the Depot Area. Likewise, future human exposure to potential soil contaminants associated with the AOC could occur with active use of the AOC (e.g., training activities). Ecological receptors present in the Depot Area may also be exposed to potential soil contaminants in the future.

Airborne contamination (e.g., windblown dust) is not considered a viable migration or exposure pathway at this CR site. The likely contaminants associated with Depot Area operations (SVOCs, inorganic chemicals, explosives, and propellants) have low volatility and the estimated timeframe of any releases would result in attenuation of the contaminants in soil. The Depot Area is currently well vegetated. RVAAP is located in a humid climate, and soil moisture content is typically high, which reduces the potential for dust generation.

9.7.3.3 Soil Exposure and Air Pathway Conclusions

No soil samples were collected as part of this project. Potential contaminants in soil may represent a direct exposure pathway for human receptors under current and future land use, as well as ecological receptors. Surface and subsurface soil at the CR site may represent a potential secondary source of contamination to surface water and groundwater. Environmental sampling is recommended to confirm the presence or absence of any soil contamination.

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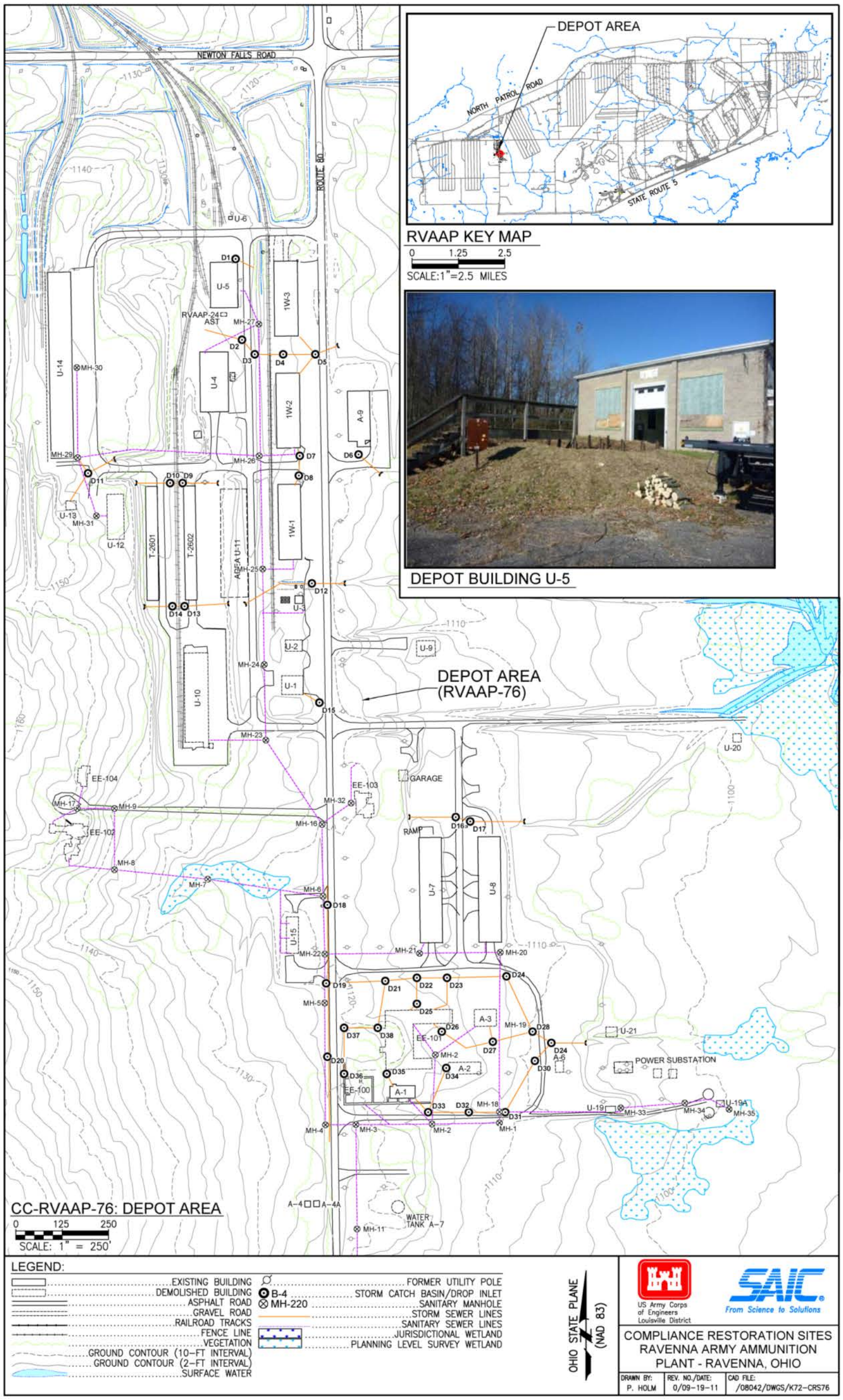

Figure 9-1. Depot Area Map and Site Features

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10.0 CC-RVAAP-77: BUILDING 1037 LAUNDRY WASTE WATER SUMP

This section presents a description of the CC-RVAAP-77: Building 1037 Laundry Waste Water Sump, including a description of the property, summary of previous investigations, an evaluation of documents reviewed during the historical records review search, and a pathway and environmental hazard assessment. Appendix A provides a description of all reference sources and records reviewed during the course of this evaluation. Conclusions and a recommendation for NFA or further investigation at the AOC are presented in Section 11.0.

10.1 PROPERTY DESCRIPTION, ACREAGE, AND LAND USE

The Building 1037 Laundry Waste Water Sump consists of the former concrete sump located on the north side of Building 1037. The former concrete sump was an underground structure used as a settling tank for the discharge of laundry rinse water. The acreage of the CR site is not defined, but is estimated to be less than one acre.

10.1.1 Location

The concrete sump was located on the north side of Building 1037, which is located east of George Road and north of South Service Road in the Administration Area (Figure 10-1).

10.1.2 Land Use and Ownership History

The former laundry building was used to launder workers' overalls which were potentially contaminated with explosive and propellant chemicals used during munitions production. The concrete sump was an underground structure used as a settling tank for the discharge of laundry rinse water. The settling basin was used to capture solids, including potentially explosive-contaminated residues, prior to entering the sanitary sewer (USACE 2010a).

The Building 1037 Laundry Waste Water Sump was located within RVAAP and, as such, was under U.S. Army ownership, as described in Section 1.2. A description of the population demographics for RVAAP is provided in Section 1.3. The CR site is located on property currently operated by the BRAC Division of the Army. Upon completion of the RVAAP IRP, the property currently operated by the BRAC Division will be transferred to NGB.

10.1.3 Physical Property Characteristics

The topography of the AOC is generally flat and surface water runoff drains to the storm sewer system within the Administration Area. The former concrete sump was approximately 13 ft by 16 ft and was approximately 11.5 ft bgs. The concrete sump was located on the north side of Building

1037, which historically was used as a laundry building. Building 1037 is currently used for administrative offices.

10.2 HISTORICAL PROPERTY SUMMARY

10.2.1 Chronological Property Summary

A description of the RVAAP facility operational history is included in Section 1.2. Building 1037 was used from World War II until 1992 as the laundry building for the facility. The concrete sump was removed in 2009 as part of the *Disposal of Discarded Munitions Debris and Components, Demolition of the Laundry Flame Proofing Building and Evaluation and Recommendations for Closure of Clean-Hard Fill Sites* (USACE 2010a).

Building 1037 has been used since 1992 by the BRAC Division as administrative offices.

10.2.2 Military Operations

With the exception of the laundry support services, no documented evidence of historical military operations being performed at Building 1037 was found during the historical records review.

10.2.2.1 Operations Involving Military Munitions

With the exception of the laundry support services, no documented evidence of operations involving military munitions being performed at Building 1037 was found during the historical records review.

10.2.2.2 Operations Involving HTRW

As described in previous sections, the laundry building was used to launder RVAAP production facility workers' overalls that were potentially contaminated with explosive and propellant chemicals. Interviewees indicated the coveralls were treated with flame retardant. Interviewees also indicated that dry cleaning operations were not conducted at the laundry facility and no records of dry cleaning operations were found (Appendix J). The concrete sump was used as a settling tank to remove the solids prior to entering the sanitary sewer. The system included the use of sawdust to trap explosives. Solids were periodically removed from the sump and burned to remove explosive residues. The solids were sent to Winklepeck Burning Grounds for open burning. The filtered water was discharged to the sanitary sewer for treatment at the George Road Sewage Treatment Plant. No other evidence of HTRW operations, spills, or releases of contaminants was discovered during the historical records review.

No documentation of ASTs or USTs associated with Building 1037 Laundry Waste Water Sump was discovered during the historical records review.

10.2.3 Map Analysis

Seven original design drawings of Building 1037 were discovered during the historical records review. One design drawing (1012,402) notes the location and construction of the former concrete sump. The Building 1037 and Concrete Sump drawings are included in Appendix I.

10.2.4 Aerial Photographic Interpretation

Aerial photographs taken in 1952 and 2006 were evaluated during the historical records review and are included in Appendix R. The historical aerial photographs were analyzed to identify past waste management practices, the relationship between the CR site and the surrounding areas, and the chronological development of the CR site. No areas of interest were noted during the analysis of the aerial photographs.

10.3 PREVIOUS INVESTIGATIONS

As described in previous sections, remedial action was performed at the AOC to remove the concrete sump. The demolition was performed in 2009. Samples of the resultant wood, concrete, and soil from the piled debris were collected. All 5X certification sampling results verified no explosive hazards existed with any of the building material. Excavated soil, and soil underlying the floor slab, footer, and basin, was visually inspected by a UXO technician for bulk explosives. No bulk explosives were identified. No samples of excavated soil or soil within excavations were collected for analysis. Excavated AOC soil was used as backfill with about 94.5 tons of additional off-site backfill sampled and approved for use by the Ohio EPA (USACE 2010a).

No other investigations related to the concrete sump were discovered during the historical records review.

10.4 EVALUATION OF PRESENCE OF MILITARY MUNITIONS AND TECHNICAL DATA

No documented evidence of the presence of military munitions at the Building 1037 Laundry Waste Water Sump was found during the historical records review.

10.5 EVALUATION OF HTRW PRESENCE AND AREAS

No documented evidence of a spill or release at the laundry building was found during the historical records review. As described in previous sections, the concrete sump was removed in 2009. Given that no confirmation samples were collected of the excavation pit, potential releases of contaminants to the surrounding soil are not known.

10.6 EVALUATION OF CON/HTRW PRESENCE AND AREAS

No ASTs or USTs were found to be associated with Building 1037.

10.7 PATHWAY AND ENVIRONMENTAL HAZARD ASSESSMENT

This section provides a preliminary description of the potential contaminant sources, migration pathways, contaminant discharge points, and potential receptors for the Building 1037 Laundry Waste Water Sump, based on operational history and property surveys.

10.7.1 Groundwater Pathway

10.7.1.1 Hydrogeologic Setting

Section 1.4 presents the general hydrogeologic setting for RVAAP. No facility-wide groundwater monitoring wells are present at the Administration Area. The nearest facility-wide groundwater monitoring well is LL5mw-004, located over 4,000 ft to the northwest of the Building 1037 Waste Water Laundry Sump. Groundwater potentiometric data in the unconsolidated aquifer is not available within the Administration Area. Due to lack of groundwater monitoring wells in the area, the depth to groundwater cannot be estimated with reasonable accuracy. Based on the inferred facility-wide potentiometric surface within the unconsolidated aquifer (Figure 1-5), the elevation of the groundwater surface ranges from 1,025 to 1,050 ft amsl. The groundwater elevation in the bedrock aquifer within the Administration Area is estimated to be 965 ft amsl, based on well installation logs for groundwater supply wells at Buildings 1067 and 1068. The generalized regional groundwater flow direction in the Administration Area is to the southeast toward a tributary to the west branch of the Mahoning River located southeast of the CR site.

10.7.1.2 Groundwater Targets

Groundwater targets include human receptors that use groundwater for potable water supply, as well as environmental receptors (e.g., livestock, fish farms) and physical targets (e.g., springs) that may be affected by potential groundwater contamination on or adjacent to the AOC. Section 1.4.4.2 describes groundwater use at RVAAP. There are no public, livestock, or commercial groundwater supply wells within RVAAP. The Army and OHARNG currently maintain groundwater supply wells for non-potable sanitary and institutional use in the Administration Area in the vicinity of the AOC. Accordingly, human exposure receptive to potential groundwater contaminants at the AOC could occur if groundwater is used for domestic supply purposes in the future. Physical receptors, such as springs or other potential groundwater discharge areas to surface water bodies are addressed in Section 10.7.2.2.

10.7.1.3 Groundwater Conclusions

No groundwater samples were collected as part of this project. Leaching of potential soil/sump contaminants to groundwater, with subsequent lateral migration to either surface water discharge or other surface water exposure points, are potential contaminant migration pathways for the CR site, which may require further evaluation.

10.7.2 Surface Water Pathway

10.7.2.1 Hydrologic Setting

No surface water or wet sediment samples were collected as part of this project. Surface water within the Administration Area by Building 1037 occurs intermittently as storm water runoff overland, through constructed roadside ditches, and into the storm sewer network. Sediment within nearby roadside conveyances appears to be dry sediment, as defined by RVAAP guidance, and is not typically inundated for more than seven days at a time. Sediment within the storm sewer network may exist but was not confirmed during the AOC property visit. Sediment and surface water within the sewer network is addressed under RVAAP-67 Facility-Wide Sewers project.

There are no perennial surface water features at the CR site. The closest perennial feature to receive drainage from the Administration Area is a tributary to the west branch of the Mahoning River located southeast of the CR site. Surface water flow does not appear to be a migration pathway for potential contamination at the Laundry Sump CR site.

10.7.2.2 Surface Water Targets

Surface water targets include human receptors that use surface water for potable water supply or recreation, as well as environmental (e.g., streams, wetlands, sensitive aquatic environments) and physical targets (e.g., public or private water distribution system intakes) that may be affected by potential groundwater contamination on or adjacent to the AOC. Filtered water discharged to the sanitary sewer system for treatment at the George Road Sewage Treatment Plant and all sump structures have been removed. No perennial streams are located at the Building 1037 former Laundry Waste Water Sump. There are no observed springs or point groundwater discharge points to a surface water body in the immediate vicinity of the AOC. Therefore, there is no direct exposure pathway for human receptors or ecological targets to surface water at the AOC.

10.7.2.3 Surface Water Conclusions

Surface water flow and sediment transport are not migration pathways for potential contamination related to the Building 1037 Laundry Waste Water Sump. There are no perennial surface water streams or wetlands in the immediate vicinity of the AOC. Evaluation of the sediment and surface water environmental media at the AOC is considered complete and does not require further investigation.

10.7.3 Soil Exposure and Air Pathways

10.7.3.1 Physical Conditions

No soil borings were installed to confirm the composition of unconsolidated and bedrock deposits at the CR site as part of this project. The Administration Area is located within Hiram Till glacial

deposit. The soil type found at the CR site is the Mahoning silt loam, 0-2% slopes (MgA). Mahoning silt loam is a gently sloping, poorly drained soil formed in silty clay loam or clay loam glacial till, generally where bedrock is greater than 6 ft bgs. The Mahoning silt loam has low permeability, with rapid runoff and seasonal wetness (USDA 2010). The bedrock formation at the Administration Area based on groundwater well installation logs is the Pennsylvanian-age Pottsville Formation, Sharon Shale member. The elevation of the Sharon Shale member in the Administration Area is 986 to 1,006 ft amsl based on available well installation logs. The Sharon Sandstone member, informally referred to as the Sharon Conglomerate is observed in the eastern portions of the Administration Area (Winslow et al. 1966). Descriptions of soil type and the Sharon Shale are presented in Section 1.4.

10.7.3.2 Soil and Air Targets

Current potential soil targets include human and ecological (animal and plant) receptors that may come into contact with surface or subsurface soil, if contaminants are present within or adjacent to the former Building 1037 Laundry Waste Water Sump. Likewise, future human exposure to potential soil contaminants associated with the AOC could occur with active use of the AOC (e.g., training activities). Terrestrial and aquatic ecological receptors present in the AOC vicinity may also be exposed to potential soil contaminants in the future. Considering the design of the sump, any releases to soil would most likely have been to subsurface soil.

Airborne contamination (e.g., windblown dust) is not considered a viable migration or exposure pathway at this CR site. The likely contaminants associated with the former Building 1037 Laundry Waste Water Sump (explosives, propellants) have low volatility and potential releases of contaminants would likely have been to subsurface soil. The operational areas are paved, gravel covered, or currently well vegetated. RVAAP is located in a humid climate and soil moisture content is typically high, which reduces the potential for dust generation.

10.7.3.3 Soil Exposure and Air Pathway Conclusions

No soil samples were collected as part of this project. Potential contaminants in soil at the CR site may represent a potential secondary source of contamination to groundwater. Subsurface soil sampling is recommended to confirm the presence or absence of any potential contamination.

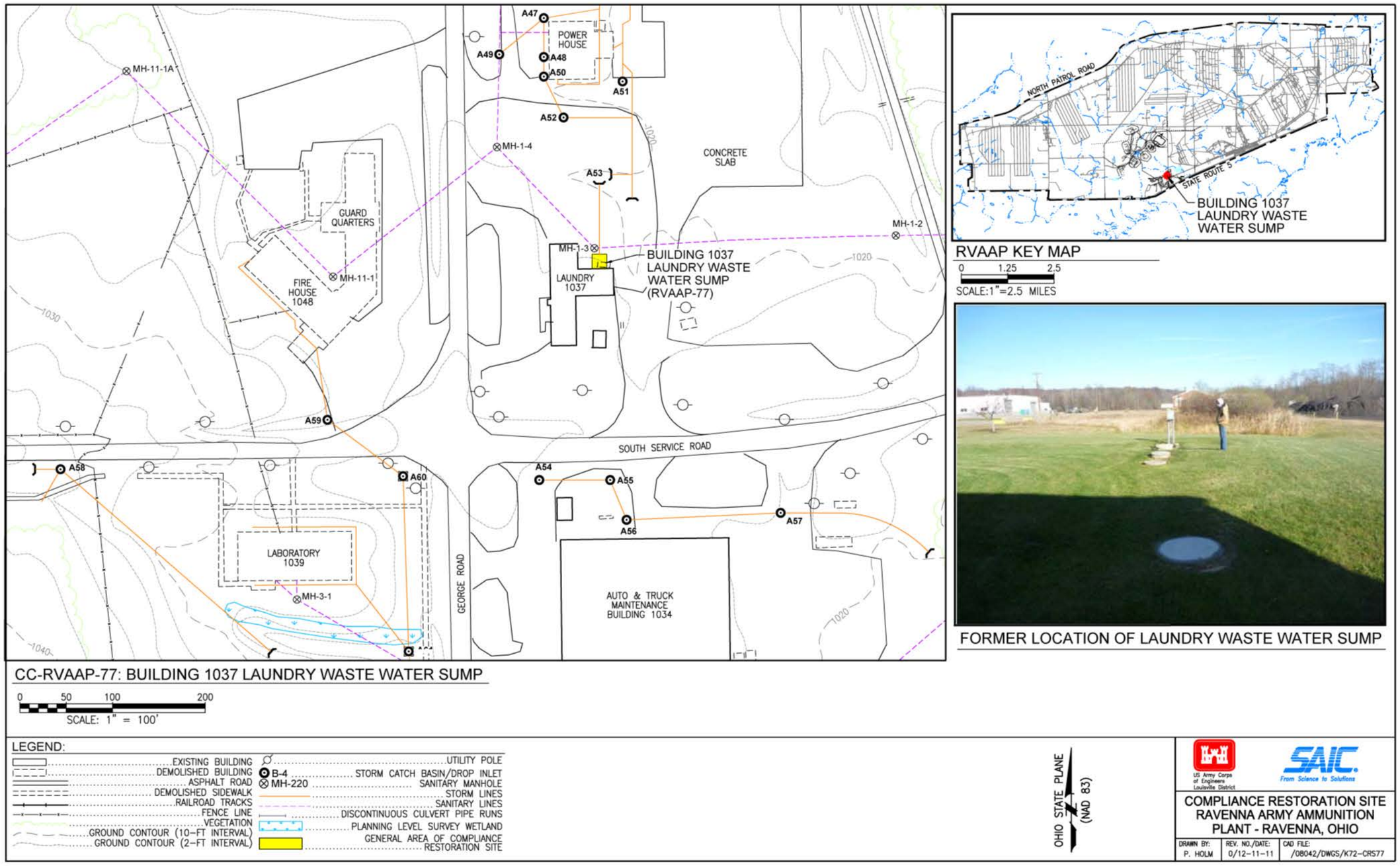

Figure 10-1. Building 1037 - Laundry Waste Water Sump Map and Site Features

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11.0 SUMMARY AND CONCLUSIONS

This section summarizes the findings of the historical records review and provides recommendations for either no further investigation or to proceed to the next step of the CERCLA process, which is a site investigation (SI). The factors and supporting rationale for a recommendation of NFA or investigation are as follows:

1. No historical records documenting uses or releases of potential contaminants were found and visual inspection of the AOC did not indicate evidence of possible contaminant releases (e.g., stained soil, residues, or remaining equipment).

2. Historical documentation was discovered that contaminant sources have been removed and/or AOCs closed in accordance with regulatory requirements (e.g., BUSTR, NPDES).

3. Historical supporting analytical data was discovered that environmental media contaminated by past releases or operations have been removed or mitigated.

The first factor above is considered sufficient on its own to provide rationale for NFA; however, the other factors are noted where information is available to strengthen the rationale. Factors two and three above are used in combination to support a recommendation for NFA.

The factors and rationale for a recommendation of further action or investigation are as follows:

1. Historical records were found documenting activities that used, or may have resulted in releases of, material, reagents, or waste potentially containing contaminants of interest.

2. Visual inspection of the AOC indicated potential sources of contamination may be present (e.g., tanks, remaining equipment, coal residues) or evidence of possible contaminant releases (e.g., stained soil or residues).

3. No records of prior environmental sampling were discovered.

4. Historical evidence of releases and analytical data were discovered, but not all potentially impacted environmental media have been assessed or contamination mitigated.

These four factors are considered individually and in combination to support the rationale for a further action or investigation recommendation.

The summary and recommendations from the historical records review are presented in Tables 11-1 through 11-3. Table 11-1 addresses all of the 9 CR sites, except Facility-Wide USTs and Facility-Wide Coal Storage, which are presented in Tables 11-2 and 11-3, respectively, due to the number of individual units in the CR sites.

The summary tables highlight the specific factors that provide the basis for recommendations. Where possible, specific environmental media and/or receptors are described that may warrant further action or investigation based on the available historical information and operational histories of the CR sites. The summary tables also provide recommended analytical parameters based on historical CR site operations and associated contaminant releases that are known or suspected to have occurred. Quantitative screening of historical analytical data, as outlined in *Facility-Wide Cleanup Goals for the Ravenna Army Ammunition Plant* (USACE 2010b), to identify site-related contaminants and risk-based chemicals of potential concern was not performed as part of the historical records review. The summary tables also highlight any potential MEC concerns at the CR sites based on either their location within currently defined MRSs or discovery of new historical information indicating MEC may be present.

11.1 COMPLIANCE RESTORATION SITES WARRANTING NO FURTHER ACTION

As summarized in Tables 11-2 and 11-3, NFA is warranted for 43 of the 58 USTs in CC-RVAAP-72 and for 15 former coal storage locations in CC-RVAAP-73. For USTs specifically, NFA is recommended based on the following:

- The UST was regulated under BUSTR and documentation was located confirming its removal and closure in accordance with regulatory requirements; or

- The UST was not regulated under BUSTR; however, documentation was located confirming its removal and closure consistent with applicable regulatory requirements.

For former coal storage locations, NFA is recommended if visual inspection of the locations indicated no coal residues are present (e.g., removal of the source). Additional considerations included whether the facilities associated with former coal storage locations have been demolished and the areas re-graded and/or backfilled, thereby removing or dispersing any surficial coal residues.

Fifteen USTs in CC-RVAAP-72, four former coal storage locations in CC-RVAAP-73, and the remaining CR sites have recommendations for further action and are summarized in Section 11.2.

11.2 COMPLIANCE RESTORATION SITES THAT WARRANT FURTHER ACTION

As summarized in Tables 11-1 through 11-3, further investigation or action is warranted at the following CR sites:

- CC-RVAAP-68: Electric Substations (East, West, No. 3);

- CC-RVAAP-69: Building 1048 Fire Station;

- CC-RVAAP-70: East Classification Yard;

- CC-RVAAP-72: Facility-Wide USTs (RV-4, RV-5, RV-41, RV-46, RV-86, RV-87, RV-88, RV-89, CC-RVAAP-72-01, CC-RVAAP-72-02, CC-RVAAP-72-03, CC-RVAAP-72-04, CC-RVAAP-72-05, CC-RVAAP-72-06, and CC-RVAAP-72-08, as noted in Table 11-2);

- CC-RVAAP-73: Facility-Wide Coal Storage (North Line Coal Tipple, Sand Creek Coal Tipple, the undocumented coal storage locations south of the East Classification Yard, and at Building U-16, as noted in Table 11-3);

- CC-RVAAP-74: Building 1034 Motor Pool Hydraulic Lift;

- CC-RVAAP-75: George Road Sewage Treatment Plant;

- CC-RVAAP-76: Depot Area; and

- CC-RVAAP-77: Building 1037 Laundry Waste Water Sump.

The basis and rationale for further action recommendations are contained in the summary tables, along with recommended target locations and analytical parameters where possible based on available historical operational data and current site conditions.

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Table 11-1. Summary and Recommendations for the Historical Records Review of 9 Compliance Restoration Sites

Compliance Restoration Site	Facilities/Operations of Interest	Description/Historical Records Observations	Property Visits/ Perimeter Survey Results	Recommendation and Rationale
CC-RVAAP-68: Electric Substations East, West, and No. 3	East Substation	Operational records indicate use of the East Substation from the early 1940s to 1993. Transformers/electrical equipment oil contained PCBs prior to 1990s when PCB-containing transformer oil was replaced with non-PCB oil. Lead acid batteries for backup power to the switch gear stored in building. Electrical equipment was tested for PCBs beginning in January 1984 when maintenance/annual monitoring program was initiated. No reported spills or releases from electrical equipment or batteries. Cannot confirm that no unreported leaks/spills from electrical equipment occurred during the operational life of the East Substation.	Four rusted 55-gallon drums were observed at the AOC. Three of the drums were noted outside Building 25-27 at the East Substation and one was located inside the building. No visible markings were present and the drums appeared to be empty. Based on historical information, the empty drums were used by salvage contractors after their use of the building and were placed in the building for salvage operations. These drums were not used to store hazardous material. Rusted drums are also used along this road as part of training operations along the Improvised Explosive Device (IED) lane. Therefore, the presence of these rusted drums does not constitute a potential release at this AOC. The transformers and ancillary equipment were demolished and removed. Staining was noted on the concrete floor inside Building 25-27 at the East Substation. Flaking/peeling paint was observed on the inside walls within Building 25-27 at the East Substation. Due to the age of the building, the potential exists that the paint may be lead-based and/or contain PCBs.	Candidate for further investigation based on factors 1 and 3 for further action. Target media = surface and subsurface soil around building entrances and former transformer pads. Dry sediment along drainage ditches receiving runoff from the CR site. Target analytes = TAL metals, PCBs, SVOCs.
	West Substation	Operational records indicate use of the West Substation from the 1940s to 1993. Transformers/electrical equipment oil contained PCBs prior to the 1990s when PCB-containing transformer oil was replaced with non-PCB oil. Interviewee reported that transformer leaked in 1980s. Reportedly remediated, but no records were located to confirm remediation. Electrical equipment was tested for PCBs beginning in January 1984 when maintenance/annual monitoring program was initiated. Oil in transformers changed out with non-PCB oil in early 1990s. Transformer damaged with spill of approximately 1,500 gallons of non-PCB oil in 1997. Remediated with confirmatory sampling documenting clean-up to BUSTR action levels. Cannot confirm that no unreported leaks/spills from electrical equipment occurred during the operational life of the West Substation.	The transformers and ancillary equipment were demolished and removed. No visual evidence of impacts (e.g., stained soil) from historical operations was observed.	Candidate for further investigation based on factors 1, 3, and 4 for further action. BUSTR actions levels used in 1997 may not align with current RVAAP facility-wide cleanup goals or potential remedial action objectives based on current land use. Target media = surface soil and subsurface soil around former transformer pads. Dry sediment in drainage swale immediately southwest of the CR site and along the road side drainage ditch southeast of the CR site. Target analytes = TAL metals, PCBs, SVOCs.

Table 11-1. Summary and Recommendations for the Historical Records Review of 9 Compliance Restoration Sites (continued)

Compliance Restoration Site	Facilities/Operations of Interest	Description/Historical Records Observations	Property Visits/ Perimeter Survey Results	Recommendation and Rationale
CC-RVAAP-68: Electric Substations East, West, and No. 3 (continued)	Substation No. 3	Operational records indicate use of Substation No. 3 from the 1940s to 1993. Transformers/electrical equipment oil contained PCBs prior to 1990s when PCB-containing transformer oil was replaced with non-PCB oil. Electrical equipment was tested for PCBs beginning in January 1984 when maintenance/annual monitoring program was initiated. No documentation on spills or releases from electrical equipment was found. Cannot confirm that no unreported leaks/spills from electrical equipment occurred during the operational life of the substation.	The transformers and ancillary equipment were demolished and removed. No visual evidence of impacts (e.g., stained soil) from historical operations was observed.	Candidate for further investigation based on factors 1 and 3 for further action. Target Media = Surface soil around former transformer and equipment pads. Wet sediment and surface water in wetland and Sand Creek tributary southeast of the CR site. Target analytes = TAL metals, PCBs, SVOCs.
CC-RVAAP-69: Building 1048 Fire Station	Building 1048	Former RVAAP employees indicated during the interviews that past fire extinguisher maintenance practices included discharging carbon tetrachloride outside behind the fire station. Former RVAAP employees indicated a small wood or metal storage shed approximately 8 ft by 8 ft was located behind the fire station. The shed was used to store carbon tetrachloride for the fire extinguishers. The fire station was demolished in 2008 in accordance with applicable regulations. The building site was re-graded as part of the demolition project. The AOC area north/northeast of the building was not re-graded. No reports were found with respect to the building demolition. No documents related to spills or releases were found for this CR site during the historical records review.	The building site was re-graded as part of the demolition project. No visual evidence of impacts (e.g., soil staining, stressed vegetation) was observed at the AOC.	Candidate for further investigation based on factors 1 and 3 for further action. Target media = surface soil in vicinity of former shed and northwest of former fire station. Target analytes = TAL metals, SVOCs, and VOCs.

Table 11-1. Summary and Recommendations for the Historical Records Review of 9 Compliance Restoration Sites (continued)

Compliance Restoration Site	Facilities/Operations of Interest	Description/Historical Records Observations	Property Visits/ Perimeter Survey Results	Recommendation and Rationale
CC-RVAAP-70 East Classification Yard	Fuel Oil Spill - 1986	A spill report documenting a leak of fuel oil from an AST (Tank 65B) from the East Classification Yard was found. The spill report indicates that a broken valve caused the leak. The entire contents of the tank emptied into the bermed containment area. The report indicates the containment area was scarified and the contaminated soil was piled within the containment area. However, no quantities of contaminated soil were noted. The report indicates that approximately 16,632 gallons of fuel oil was salvaged from the containment area and approximately 120 gallons of oil mixed with dirt and straw were to be disposed per Ohio EPA instructions. The report indicates that straw was placed on oil in areas where the equipment could not reach, such as beneath the support structures and by piping. Samples of the contaminated soil were collected to determine if the contaminated soil could be incinerated in accordance with the regulations at that time. The report states that the sample results were acceptable for burning under the regulations at that time. No final report regarding the cleanup was found during the historical records review.	The tanks had since been removed from the AOC and the area was overgrown with vegetation.	Candidate for further investigation based on factors 1 and 3 for further action. Target media = surface/subsurface soil within, and in vicinity of, former tank containment area. Surface soil/dry sediment within any nearby surface water conveyances. Target analytes = SVOCs and VOCs.
	Building 47-40 (Round House)	Building 47-40 (Round House) was used as a locomotive maintenance and repair building. The interior of the building contains a floor pit that was used by personnel to access the undersides of the engines for repair. In addition, an original design drawing notates a storage area. No documented evidence related to spills or releases were found for the Round House building. Building 47-40 contained at least 2 PCB transformers. Interviewees indicated the transformer oil was tested for PCBs.	Staining from past operations was visible on the concrete floor within the building. No other visible evidence of impacts was noted during the property visit/perimeter survey.	Candidate for further investigation based on factors 1 and 3 for further action. Target media = surface soil/dry sediment samples around doors and service bay entrances and in drainage ditches leading from the building to the storm sewer inlets that are located around the building. Target analytes = TAL metals, SVOCs, and PCBs.
	Herbicide Storage	A storage shed used to store herbicides and a track mounted sprayer was located in the East Classification Yard. No documents relating to spills or releases were found for this AOC during the historical records review. No documentation found, but some herbicide applications used petroleum products (e.g., oil, kerosene, diesel fuel) as carrier agents.	There was no visible evidence of impacts (e.g., stained soil, stressed vegetation) from the area of the former herbicide storage shed.	Candidate for further investigation based on factors 1 and 3 for further action. Target media = surface soil/dry sediment in vicinity of former shed and any runoff conveyances. Target analytes = herbicides and SVOCs.

Table 11-1. Summary and Recommendations for the Historical Records Review of 9 Compliance Restoration Sites (continued)

Compliance Restoration Site	Facilities/Operations of Interest	Description/Historical Records Observations	Property Visits/ Perimeter Survey Results	Recommendation and Rationale
CC-RVAAP-70: East Classification Yard (continued)	Outdoor wash rack	Two interviewees noted an outdoor wash rack assumed to wash down the box cars which carried explosives and/or the train engines. The wash rack was outdoors and open with no means of collecting wastewater. No documents related to the wash rack were discovered during the historical records review. Well house #15 was the source of water for the wash rack.	Field personnel noted the potential location of the wash rack just south of the East Classification Yard and north of Butts-Kistler Road. Concrete AST supports were discovered at the location along with old abandoned pipes and valves, assumed to be water pipes from the well house. No visual evidence of impacts (e.g., stained soil, stressed vegetation) from the tank or wash rack activities was observed.	Candidate for further investigation based on factors 1 and 3 for further action. Surface soil/dry sediment in vicinity of former wash rack and any runoff conveyances. Target analytes = explosives, SVOCs, and PCBs.
CC-RVAAP-72: Facility-Wide USTs	*Reference Table 11-2.*			
CC-RVAAP-73: Facility-Wide Coal Storage	*Reference Table 11-3.*			
CC-RVAAP-74: Building 1034 Motor Pool Hydraulic Lift	Hydraulic Lift	The underground hydraulic lift required oil to be added a couple of times per year; however, it is unknown where the hydraulic oil specifically leaked. During a September 2011 property visit, Mr. Jim McGee (Vista Sciences, Inc., RVAAP maintenance and operations contractor) indicated an estimated 300 gallons of oil were added to the lift over a 10-year period. Hydraulic oil was observed entering the oil/water separator sump, which prompted the Army to discontinue operation of the underground hydraulic lift and install a new above-ground lift. Documents from 1992/1993 related to cleaning out the floor drains in the Building 1034 garage were found during the historical data search. The documents were contract documents with Clean Harbors describing the scope of work for the cleanup, analysis of waste samples, and pricing information. No documentation of actual work performed was located (e.g., after-action report, analytical results).	An initial property visit was conducted in November 2010 with Mr. Tom Chanda, a former RVAAP employee. Personnel did not have access to the panels for the below-ground equipment vault to inspect the system at that time. A follow-up property visit was conducted in September 2011 with Mr. Jim McGee (Vista Sciences, Inc., RVAAP maintenance and operations contractor). During the property visit, access panels to the below-ground equipment vault and former oil/water separator sump were located and opened. The equipment vault and oil/water separator sump were visually inspected from the surface using flashlights. Visual inspection of the equipment vault and former oil/water separator sump showed water and potentially oil along the bottom of the equipment vault. The vault was measured and determined to be 12 ft bgs. Visual survey findings for the oil/water separator are presented below.	Candidate for further investigation based on factors 1, 2, and 3 for further action. Target media = subsurface soil. Target analyte = SVOCs.
	Battery Storage	Interviewees indicated Building 1034 was used to store batteries. No documentation relating to spills or releases from the battery storage were found for this AOC during the historical records review.	No visual evidence of impacts (e.g., stained flooring) from the battery storage was noted.	No sampling recommended in conjunction with battery storage based on factor 1 for NFA.

Table 11-1. Summary and Recommendations for the Historical Records Review of 9 Compliance Restoration Sites (continued)

Compliance Restoration Site	Facilities/Operations of Interest	Description/Historical Records Observations	Property Visits/ Perimeter Survey Results	Recommendation and Rationale
CC-RVAAP-74: Building 1034 Motor Pool Hydraulic Lift (continued)	Oil/water separator	Mr. Tom Chanda, former RVAAP employee, indicated there was an oil/water separator located at the AOC which was approximately 30-40 ft below ground surface. No documentation relating to spills or releases from the oil/water separator were found for this AOC during the historical records review. During a September 2011 property visit, Mr. Jim McGee and Mr. Frank Jackson (Vista Sciences, Inc., RVAAP maintenance and operations contractor) indicated an estimated 300 gallons of oil were added over a 10-year period to the lift. Hydraulic oil was observed entering the oil/water separator sump, which prompted the Army to discontinue lift operation and install a new above-ground lift.	An initial property visit was conducted in November 2010 with Mr. Tom Chanda, a former RVAAP employee. Personnel did not have access to the panels for the below-ground equipment vault to inspect the system at that time. A follow-up property visit was conducted in September 2011 with Mr. Jim McGee and Mr. Frank Jackson (Vista Sciences, Inc., RVAAP maintenance and operations contractor). During the property visit, access panels to the below-ground equipment vault and former oil/water separator sump were located and opened. The equipment vault and oil/water separator sump were visually inspected from the surface using flashlights. The depth to the bottom of the oil/water separator sump was measured with a tape measure at 12 below floor level. The sump contained approximately a foot of standing liquid, which appeared to have approximately 6 inches of water on the bottom and 6 inches of oil on the top based on coating of the tape measure. An oil sheen was noted on the top of the water layer.	Candidate for further investigation in conjunction with the hydraulic lift based on factors 1, 2, and 3 for further action. Target media = subsurface soil. Target analyte = SVOCs.
	Degreasing activities	Interviewees noted that degreasing activities occurred at the AOC. No documentation relating to spills or releases from degreasing activities were found for this AOC during the historical records review.	No visual evidence of impacts (e.g., stained flooring) due to degreasing activities was noted.	No sampling recommended in conjunction with degreasing activities based on factor 1 for NFA.
CC-RVAAP-75: George Road Sewage Treatment Plant	Mercury spill	Interviewees noted approximately a one pint jar of elemental liquid mercury was spilled within the comminutor building and went down a floor drain. The spilled mercury was never recovered. The George Road Sewage Treatment Plant was removed from service in 1993 and closed under a NPDES permit. An interviewee noted that during decommissioning activities, the remaining sludge from the treatment plant was spread out along Greenleaf Road as part of a restoration research project. Building schematics show the floor drain leads outside the building and ties into a 15-inch vitrified clay pipe which appears to be channeled back into the treatment system. Line tied back into sanitary at manhole O-1 according to AOC drawings. An interviewee noted that the floor drains likely have a P-trap and therefore, it may be possible that the mercury is still within the P-trap.	No visual evidence of the mercury spill was noted.	Candidate for further investigation based on factors 1 and 4 for further action. Inspect building floor drain pipe and pipe trap, if present, for residual elemental mercury. Target media = surface soil immediately surrounding floor drain pipeline. Sampling of soil/residuals in settling tanks, soil around tanks/basins. Target analyte = mercury.

Table 11-1. Summary and Recommendations for the Historical Records Review of 9 Compliance Restoration Sites (continued)

Compliance Restoration Site	Facilities/Operations of Interest	Description/Historical Records Observations	Property Visits/ Perimeter Survey Results	Recommendation and Rationale
CC-RVAAP-76: Depot Area	Building U-4 Petroleum, Oil, and Lubricant Storage facility and RVAAP-24 Waste Oil Tank	Interviewees noted a rail car/heavy equipment repair facility located near Building U-4. Building U-4 was also noted as a former petroleum, oil, and lubricant (POL) storage area, which included a waste oil AST (further described below). The RVAAP-24 Waste Oil Tank was an AST used to store waste oil from the vehicle maintenance operations of a RVAAP tenant organization location in the Depot Area. This tank may have been referred to by interviewees as a "buffalo" tank. The tank was located next to the motor oil storage shed. Tank was used from 1983 to 1993, after which it was emptied. No documented releases were found for this AOC during the historical records review. The RVAAP-24 Waste Oil Tank is included in the RVAAP Installation Program (IRP) and is in response complete because it is not eligible for IRP funding. Possible spills at waste oil tank may have occurred. No documented releases were found during the historical records review.	No visual evidence of impacts (e.g., stained soil, stressed vegetation) was observed during the property visit.	Building U-4 POL Area is a candidate for further investigation based on factors 1 and 3 for further action. Target media = surface soil in vicinity of storage areas and waste oil AST. Surface soil/dry sediment in adjacent drainage ditches. Target analytes = TAL metals, SVOCs, and VOCs. Specific location of "Buffalo" tank unknown. No sampling recommended in conjunction with "buffalo" tanks based on factor 1 for NFA.
	Building U-5 Locomotive repair shop	Building U-5 was used as a locomotive repair shop. The center of the building appears to have been equipped with a floor pit. No documented releases were found during the historical records review.	No visual evidence of impacts (e.g., stained soil, stressed vegetation) was observed during the property visit.	Building U-5 Locomotive Repair Shop is a candidate for further investigation based on factors 1 and 3 for further action. Target media = surface soil in vicinity of service bay entrances. Surface soil/dry sediment in any adjacent drainage ditches. Target analytes = TAL metals, SVOCs, VOCs, and PCBs.
	Building U-20 Incinerator	An incinerator (former Building U-20) said to burn solid waste was located in this area. No information was discovered for this facility during the historical records review.	No visual evidence of impacts (e.g., stained soil, stressed vegetation) was observed during the property visit.	Building U-20 incinerator is a candidate for further investigation based on factors 1 and 3 for further action. Target media = surface soil/dry sediment in Building U-20 vicinity and any adjacent drainage ditches. Surface water and wet sediment (if present). Target analytes = TAL metals, SVOCs, explosives, propellants, and PCBs.

Table 11-1. Summary and Recommendations for the Historical Records Review of 9 Compliance Restoration Sites (continued)

Compliance Restoration Site	Facilities/Operations of Interest	Description/Historical Records Observations	Property Visits/ Perimeter Survey Results	Recommendation and Rationale
CC-RVAAP-76: Depot Area (continued)	Building U-10 Demilitarization Operations USACE Soil Investigation	USACE conducted soil sampling immediately adjacent to former Building U-10. Samples were collected around the building slab near floor drain outfalls. Soil samples were analyzed for explosives, propellants, SVOCs, PCBs, pesticides, VOCs, and TAL metals, including mercury and hexavalent chromium. Detections of all chemicals were found; however, evaluation of nature and extent and risk was not performed. The unvalidated data was compared to background levels and the unvalidated data indicates exceedances for inorganic chemicals (arsenic, chromium, and cobalt) and one SVOC [benzo(a)pyrene].	No visual evidence of impacts (e.g., stained soil, stressed vegetation) was observed during the property visit.	Building U-10 demilitarization operations is a candidate for further investigation based on factors 1 and 4 for further action. Screen existing data for site-related contaminants and chemicals of potential concern. Target media = additional surface/subsurface soil as necessary to define nature and extent of site-related contaminants from USACE investigation. Target analytes = TAL metals, explosives, and propellants.
	Building A-3 Service Garage/ Tool Crib	Building A-3 was used as a service garage/ tool crib. No documented releases were found during the historical records review.	No visual evidence of impacts (e.g., stained soil, stressed vegetation) was observed during the property visit.	Building A-3 Service Garage is a candidate for further investigation based on factors 1 and 3 for further action. Target media = surface soil in vicinity of service bay entrances. Surface soil/dry sediment in any adjacent drainage ditches. Target analytes = TAL metals, SVOCs and VOCs.
	Building U-3 Filling Station	Building U-3 was a former filling station. Two 12,000 gallon USTs were removed from the AOC; however, it appears a vent pipe remains on the exterior of the building. One previously undocumented UST (kerosene) was discovered at this location. Closure status of undocumented tank is unknown (Table 11-2).	No visual evidence of impacts (e.g., stained soil, stressed vegetation) was observed during the property visit. A tank vent pipe was observed on the northern side of Building U-3.	Building U-3 Service Station: regulated gasoline USTs were closed under BUSTR and NFA documentation exists (Reference Table 11-2). No further investigation is recommended for these two USTs based on factor 2 for NFA. Building U-3 Service Station: Kerosene UST is a candidate for further investigation to ensure UST closure (Reference Table 11-2).
	Building A-2 Motor Repair Facility	Building A-2 was a former motor repair facility. No documented releases were found; however, potential impacts may have occurred near floor pits, floor drains, etc.	No visual evidence of impacts (e.g., stained soil, stressed vegetation) was observed during the property visit.	Building A-2 Motor Repair Facility is a candidate for further investigation based on factors 1 and 3 for further action. Target media = surface soil in vicinity of former service bay entrances. Surface soil/dry sediment in any adjacent drainage ditches. Target analytes = TAL metals, SVOCs and VOCs.

Table 11-1. Summary and Recommendations for the Historical Records Review of 9 Compliance Restoration Sites (continued)

Compliance Restoration Site	Facilities/Operations of Interest	Description/Historical Records Observations	Property Visits/ Perimeter Survey Results	Recommendation and Rationale
CC-RVAAP-76: Depot Area (continued)	Building U-6 Filling Station	Building U-6 was a former filling station. The USTs at the AOC were removed and closed under BUSTR regulations.	No visual evidence of impacts (e.g., stained soil, stressed vegetation) was observed during the property visit.	Building U-6 Service Station: regulated diesel USTs were closed under BUSTR and NFA documentation exists (Reference Table 11-2). No further investigation is recommended based on factor 2 for NFA.
	Building A-6 Filling Station	Building A-6 was a former filling station. The USTs at the AOC were removed and closed under BUSTR.	No visual evidence of impacts (e.g., stained soil, stressed vegetation) was observed during the property visit.	Building A-6 Service Station: regulated gasoline USTs were closed under BUSTR and NFA documentation exists (Reference Table 11-2). No further investigation is recommended based on factor 2 for NFA.
	Tank maintenance activities at Bolton Barn	Tank maintenance activities occurred at the Old Bolton Barn. No documented evidence of spills or releases was found during the historical records review.	No visual evidence of impacts (e.g., stained soil, stressed vegetation) was observed during the property visit.	Tank maintenance activity at Bolton Barn is a candidate for further investigation based on factors 1 and 3 for further action. Target media = surface soil in vicinity of entrances. Surface soil/dry sediment in any adjacent drainage ditches. Target Analytes = TAL metals, SVOCs, VOCs
	Former Depot Sewage Treatment Plant	Former Depot Sewage Treatment Plant located in central west portion of Depot Area (now demolished). *Preliminary Assessment for the Characterization of Areas of Contamination Ravenna Army Ammunition Plant, Ravenna, Ohio* (USACE 1996) indicated the Depot Sewage Treatment Plant was not a high-priority AOC.	No visual evidence of impacts (e.g., stained soil, stressed vegetation) was observed during the property visit.	No sampling recommended for the Former Depot Sewage Treatment Plant based on factors 1 and 2 for NFA. The Former Depot Sewage Treatment Plant treated only domestic sewage, no documentation of spills or releases of chemicals/waste, and was closed under NPDES requirements.
	Spill report documenting discovery of "paint cans" in excavation by former Building EE-102.	A spill report was found documenting the discovery of 12 "paint cans" (est. 5-gallon cans) during an attempt to locate a UST near the Bolton Mansion (EE-102). A log book entry documented that the paint cans contained a dry silicone-type substance. No documentation of UST location, removal, or samples upon supposed removal from EE-102 was found. Samples were taken of the paint can material and analyzed for TCLP metals, VOCs, and flash point. The results were below regulatory levels.	No visual evidence of impacts (e.g., stained soil, stressed vegetation) was observed during the property visit.	Former "paint can" burial site is a candidate for further investigation based on factors 1 and 4 for further action. Historical sampling was limited in scope and may not have addressed all potential contaminants and current cleanup levels. Refine location of former burial site. Target media = surface soil/subsurface soil samples. Target analytes – TAL metals, explosives, propellants, SVOCs, VOCs, and PCBs. Building EE-102 UST: UST is a candidate for further investigation to ensure UST closure (Reference Table 11-2).
	Coal Storage Locations at Buildings U-5 and U-14	Reference CC-RVAAP-73 Facility-Wide Coal Storage Table.	No visual evidence of coal storage piles found during property visit.	No further investigation (Reference Table 11-3).

Table 11-1. Summary and Recommendations for the Historical Records Review of 9 Compliance Restoration Sites (continued)

Compliance Restoration Site	Facilities/Operations of Interest	Description/Historical Records Observations	Property Visits/ Perimeter Survey Results	Recommendation and Rationale
CC-RVAAP-76: Depot Area (continued)	Ditch lines/drainage conveyances receiving overland runoff from key operational areas	Various ditches throughout the Depot Area received overland storm water runoff from former operational areas. Historical soil sampling in the Building U-10 vicinity indicated some inorganic chemicals concentration exceeded RVAAP facility-wide background concentrations. Contaminated soil may act as a secondary source for dry sediment accumulation in ditch lines.	No visual evidence of contamination (e.g., stained soil, stressed vegetation) was noted in overland drainage conveyances during the property visit/perimeter survey	Candidate for further investigation based on factors 1 and 3 for further action, where not addressed under other ongoing investigations. Key drainage ditches that are candidates for sampling include (Figure 9-1): - South-flowing ditch between Buildings U-5 and 1W-3. - Two east-flowing ditches north of Building U-8. - Large east-flowing ditch north of the former garage and extending east to a wetland at Building U-20. - Northeast-flowing ditch located northeast of Building U-8. - East-flowing ditch east of Building U-21 and north of the former Power Substation. Target media = surface soil/dry sediment and surface water and wet sediment (if present). Target analytes = TAL metals, explosives, propellants, SVOCs, VOCs, PCBs, and pesticides.
CC-RVAAP-77: Building 1037 Waste Water Laundry Sump	Waste Water Laundry Sump	A concrete settling basin approximately 13 ft by 16 ft was demolished and removed from north of Building 1037 in 2009. Samples of the resultant wood, concrete, and soil from the piled debris were collected. All 5X certification sampling results verified no explosive hazards existed with any of the sump building material. Excavated soil, and soil underlying the floor slab, footer, and basin, was visually inspected by UXO technician for bulk explosives. No bulk explosives were identified. No samples of excavated soil or soil within excavations were collected for analysis. Excavated AOC soil was used as backfill with about 94.5 tons of additional off-site backfill sampled and approved for use by the Ohio EPA.	No visual evidence of impacts (e.g., stained soil, stressed vegetation) was observed during the property visit.	Candidate for further investigation based on factors 1 and 3 for further action. Target media = subsurface soil around former sump location. Target analytes = explosives and propellants.

AOC = Area of Concern
AST = Aboveground Storage Tank
BUSTR = Bureau of Underground Storage Tank Regulations
CR = Compliance Restoration
NFA = No Further Action
NPDES = National Pollutant Discharge Elimination System
OHARNG = Ohio Army National Guard
Ohio EPA = Ohio Environmental Protection Agency
PCB = Polychlorinated Biphenyl
POL = Petroleum, Oil, and Lubricant
RVAAP = Ravenna Army Ammunition Plant
SVOC = Semi-volatile Organic Compound
TAL = Target Analyte List
TCLP = Toxicity Characteristic Leaching Procedure
USACE = United States Army Corps of Engineers
UST = Underground Storage Tank
UXO = Unexploded Ordnance
VOC = Volatile Organic Compound

Table 11-2. Summary and Recommendations for CC-RVAAP-72 Facility-Wide Underground Storage Tanks

RVAAP UST#	Regulated under BUSTR	Date Removed	Summary of Removal Documentation available from field notes and reports	Available Soil Analytical Data	Location	Building	Size (gal)	Contents/ Purpose	Further Action Recommended	If Regulated, NFA Documentation Available	Basis for Recommendation
RV-1	Yes	November-1991	Closure Report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling.	Data tabulated in closure report (Appendix G)	Administration Area	Building 1055-George Road Gas Station	12,000	Gasoline/ fueling station	No	Yes	Regulatory status = NFA through BUSTR.
RV-2	Yes	November-1991	Closure Report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling.	Data tabulated in closure report (Appendix G)	Administration Area	Building 1055-George Road Gas Station	12,000	Gasoline/ fueling station	No	Yes	Regulatory status = NFA through BUSTR.
RV-3	Yes	July-1996	Closure Report by TolTest dated August 1996 provides all details of tank removal and sampling.	Max BTEX: ND (< 5 ppb) Max TPH: 16.6 ppm	Administration Area	Building 950A	285	Gasoline for back-up generator	No	Yes	Regulatory status = NFA through BUSTR.
RV-4	No	1987	Not regulated by BUSTR <110 gal. RVAAP UST inventory documentation states tank “removed” and two others “not found.”	Unknown	Administration Area	Building 1026-Telephone Exchange	100	Gasoline	Candidate for soil sampling.	Not Applicable	Further action recommended due to lack of data.
RV-5	No	Removed prior to 1990-date unknown	Not regulated by BUSTR <110 gal. RVAAP UST inventory documentation stating tank “removed and scrapped.”	Unknown	Administration Area	Building 1048A	100	Gasoline	Candidate for tank removal verification and soil sampling.	Not Applicable	Further action recommended due to lack of documentation on removal and lack of data.
RV-10	No	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling. BUSTR indicated the UST was not regulated through agency-requested information forwarded to Ohio EPA. No further correspondence provided from Ohio EPA.	Final Excavated Limits: Max BTEX: < 0.2 ppm Max TPH: 27 ppm Lead: ND Chromium: 5.4 ppm	Post #24	Charleston Guard House	500	Fuel Oil	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels.
RV-11	Yes	February-1990	Closure report by R&R International dated April 1990 provides all details of tank removal and soil sampling.	Max BTEX: ND (< 2 ppb) Max TPH: 44 ppm	East Classification Yard	Building 47-59	15,000	Diesel	No	Yes	Regulatory status = NFA through BUSTR.
RV-12	Yes	July-1993	Closure report by Autumn Technical Services (1993) provides all details of tank removal and soil sampling. During closure, further excavation of tank pit was approved by BUSTR due to observed contamination.	Max BTEX: ND < 0.2 ppm Max TPH: 46 ppm	Administration Area	Power House #6	1,000	Diesel	No	Yes	Regulatory status = NFA through BUSTR.
RV-13	Yes	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling.	Data tabulated in closure report	Depot Area	Building U-6, North Tank	12,000	Diesel	No	Yes	Regulatory status = NFA through BUSTR.
RV-14	Yes	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling.	Data tabulated in closure report	Depot Area	Building U-6, South Tank	12,000	Diesel	No	Yes	Regulatory status = NFA through BUSTR.

Table 11-2. Summary of Findings for CC-RVAAP-72 Underground Storage Tanks at RVAAP (continued)

RVAAP UST#	Regulated under BUSTR	Date Removed	Summary of Removal Documentation available from field notes and reports	Available Soil Analytical Data	Location	Building	Size (gal)	Contents/ Purpose	Further Action Recommended	If Regulated, NFA Documentation Available	Basis for Recommendation
RV-15	Yes	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling.	Data tabulated in closure report	Depot Area	Building U-3, South Tank	12,000	Gasoline	No	Yes	Regulatory status = NFA through BUSTR.
RV-16	Yes	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling.	Data tabulated in closure report	Depot Area	Building U-3, North Tank	12,000	Gasoline	No	Yes	Regulatory status = NFA through BUSTR.
RV-17	Yes	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling.	Data tabulated in closure report	Depot Area	Building A-6, North	3,900	Gasoline	No	Yes	Regulatory status = NFA through BUSTR.
RV-18	Yes	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling.	Data tabulated in closure report	Depot Area	Building A-6, Center	3,900	Gasoline	No	Yes	Regulatory status = NFA through BUSTR.
RV-19	Yes	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling.	Data tabulated in closure report	Depot Area	Building A-6 South	3,900	Gasoline	No	Yes	Regulatory status = NFA through BUSTR.
RV-20	No	June-1991	Closure report by Nozzle New (1991) provides details of tank removal and soil sampling. Field notes indicate no visible contamination or field PIDs, tanks appeared in good condition.	BTEX- ND (<2 ppb) TPH: 10-12 ppm Max Pb: 10.1 ppm Max Cr: 15.7 ppm	Load Line 2	Building DB-27 Boiler House	15,000	# 2 Fuel Oil for Load Line steam process heat	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels. Soil at LL2 addressed under Interim CERCLA ROD.
RV-21	No	June-1991	Closure report by Nozzle New (1991) provides details of tank removal and soil sampling. Field notes indicate no visible contamination or field PIDs, tanks appeared in good condition.	BTEX- ND (<2 ppb) TPH: 10 ppm Max Pb: 9.34 ppm Max Cr: 16.5 ppm	Load Line 2	Building DB-27 Boiler House	15,000	# 2 Fuel Oil for Load Line steam process heat	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels. Soil at LL2 addressed under Interim CERCLA ROD.
RV-22	Yes	February-1990	Closure report by R&R International dated April 1990 provides all details of tank removal and soil sampling.	Max BTEX: ND (< 2 ppb) Max TPH: 44 ppm	East Classification Yard	Building 47-59	15,000	Diesel	No	Yes	Regulatory status = NFA through BUSTR.

Table 11-2. Summary of Findings for CC-RVAAP-72 Underground Storage Tanks at RVAAP (continued)

RVAAP UST#	Regulated under BUSTR	Date Removed	Summary of Removal Documentation available from field notes and reports	Available Soil Analytical Data	Location	Building	Size (gal)	Contents/ Purpose	Further Action Recommended	If Regulated, NFA Documentation Available	Basis for Recommendation
RV-23	Yes	February-1990	Closure report by R&R International dated April 1990 provides all details of tank removal and soil sampling.	BTEX- ND (<2 ppb) Max TPH: 394 ppm Max Pb: 37.0 ppm	Administration Area	Building 1045	15,000	Diesel	No	Yes	Regulatory status = NFA through BUSTR.
RV-29	No	August-1993	Closure report by Autumn Technical Services dated September 1993 provides all details of tank removal and soil sampling. No visible or field PID signs of contamination; TPH below site action limit of 904 ppm.	BTEX- ND (<2 ppb) Max TPH: 197ppm PAHs: ND	Load Line 12	Building FE-22	1,000	# 2 Fuel Oil for Change House Building Heat	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels. Soil at LL12 addressed under CERCLA ROD.
RV-33	No	February-1990	Closure report by R&R International dated April 1990 provides details of tank removal and soil sampling. Tank was not regulated through BUSTR- they requested information forwarded to Ohio EPA. No further information provided from Ohio EPA.	BTEX- ND (<2 ppb) Max TPH: 305 ppm	Winklepeck Burning Grounds	Deactivation Furnace Building S-340/T-3401	2,000	Diesel	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels. Soil at WBG addressed under CERCLA ROD.
RV-37	No	February-1990	Closure report by Cardamone Construction (1990) provides details of tank removal and soil sampling. Tank was not regulated through BUSTR- they requested information forwarded to Ohio EPA. No further information provided from Ohio EPA.	BTEX- ND (<2 ppb) Max TPH: 16 ppm Max Pb: ND Max Cr: ND	Depot Area	Building A-1	5,000	Heating Oil	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels.
RV-41	No	June-1993	Tenant Tank (Physics International Co.) UST removal inspection report indicates no visible signs of soil contamination or visible holes in UST upon removal.	Not Available, may not exist	Load Line 6	Building 2F-11	6,000	No. 2 Fuel Oil for Building and Process Heat	Candidate for soil sampling.	Not Applicable	Further action recommended due to lack of data. Note this tank was used by a RVAAP tenant (Physics International).
RV-46	No	1968, as listed in report, cannot verify	Nozzle New's report from December 1991 indicates a 20 ft by 20 ft grid search in potential area of tank. No tank was ever found. No sampling was performed. Interviewees recollect removal of tank from Bolton Mansion.	Not Available, may not exist	Depot Area	Building EE-102 (Bolton Mansion)	1,500	No. 2 Fuel Oil for Steam Boiler	Follow up soil sampling.	Not Applicable	Further action recommended to confirm presence or absence of potential contamination.

Table 11-2. Summary of Findings for CC-RVAAP-72 Underground Storage Tanks at RVAAP (continued)

RVAAP UST#	Regulated under BUSTR	Date Removed	Summary of Removal Documentation available from field notes and reports	Available Soil Analytical Data	Location	Building	Size (gal)	Contents/ Purpose	Further Action Recommended	If Regulated, NFA Documentation Available	Basis for Recommendation
RV-47	No	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling. Tank was not regulated through BUSTR- they requested information forwarded to Ohio EPA. No further information provided from Ohio EPA.	BTEX- ND (<2 ppb) Max TPH: ND Max Total Pb: 23 ppm Max Total Cr: 11 ppm	Post #32	Freedom Gate House at Route 80 and North Patrol Road	500	No. 2 Fuel Oil	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels.
RV-50	No	June-1991	Closure report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling.	BTEX- ND (<2 ppb) Max TPH: 18 ppm Max Total Pb: 4.43 ppm Max Total Cr: 3.90 ppm	Water Works 4	Water Works 4	1,000	No. 2 Fuel Oil for heat purposes	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels.
RV-51	Yes	1993	Supporting documentation for tank removal in addition to NFA was found.	BTEX- ND (<2 ppb) Max TPH: 70 ppm Max PAHs: ND	Water Works 3 and 4	Water Works 3 and 4	550	No. 2 Fuel Oil for generator	No	Yes	Regulatory status = NFA through BUSTR.
RV-52	No	February-1990	Closure report by Cardamone Construction (1990) provides details of tank removal and soil sampling. Tank was not regulated through BUSTR- they requested information forwarded to Ohio EPA. No further information provided from Ohio EPA.	BTEX- ND (<2 ppb) Max TPH: 16 ppm Max Pb: ND Max Cr: 13 ppm	Atlas Scrap Yard	Building T-18	1,000	No. 2 Fuel Oil	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels. Soil at Atlas Scrap Yard to be addressed under separate CERCLA decision.
RV-55	No	October-1991	Closure report by Nozzle New (1991) provides details of tank removal and soil sampling. Field notes indicate no visible contamination or field PIDs, tanks appeared in good condition.	BTEX- ND (<2 ppb) Max TPH: 13 ppm Max Pb: 10.3 ppm Max Cr: 2.07 ppm	Load Line 1	Power House #1; Building CC-1	20,000	No. 5 Heating Oil for Load Line steam process heat	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels. Soil at LL1 addressed under Interim CERCLA ROD.
RV-56	No	October-1991	Closure report by Nozzle New (1991) provides details of tank removal and soil sampling. Field notes indicate no visible contamination or field PIDs, tanks appeared in good condition.	BTEX- ND (<2 ppb) Max TPH: 14 ppm Max Pb: 11.7 ppm Max Cr: 1.95 ppm	Load Line 1	Power House #1; Building CC-1	20,000	No. 5 heating oil for Load Line steam process heat	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels. Soil at LL1 addressed under Interim CERCLA ROD.

Table 11-2. Summary of Findings for CC-RVAAP-72 Underground Storage Tanks at RVAAP (continued)

RVAAP UST#	Regulated under BUSTR	Date Removed	Summary of Removal Documentation available from field notes and reports	Available Soil Analytical Data	Location	Building	Size (gal)	Contents/ Purpose	Further Action Recommended	If Regulated, NFA Documentation Available	Basis for Recommendation
RV-57	No	June-1991	Closure report by Nozzle New (1991) provides details of tank removal and soil sampling. UST excavation looked okay, however a black substance beneath railroad tracks and storm drain were observed; larger area was excavated until no contamination observed.	BTEX- ND (<2 ppb) TPH: 15 ppm Max Pb: 7.58 ppm Max Cr: 14.1 ppm	Load Line 2	Power House #2; Building DC-1	15,000	No. 5 heating oil for Load Line steam process heat	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels. Soil at LL2 addressed under Interim CERCLA ROD.
RV-58	No	June-1991	Closure report by Nozzle New (1991) provides details of tank removal and soil sampling. UST excavation looked okay, however a black substance beneath railroad tracks and storm drain were observed; larger area was excavated until no contamination observed.	BTEX- ND (<2 ppb) TPH: 15 ppm Max Pb: 15.8 ppm Max Cr: 13.2 ppm	Load Line 2	Power House #2; Building DC-1	15,000	No. 5 heating oil for Load Line steam process heat	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels. Soil at LL2 addressed under Interim CERCLA ROD.
RV-59	No	June-1991	Closure report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling. Logbook notes indicate excavated tank pit appears "very clean."	BTEX- ND (<2 ppb) TPH: ND (<10 ppm) Max Pb: 11.6 ppm Max Cr: 6.23 ppm	Fuze and Booster Load Lines Area	Power House #4; Building 52-15	20,000	No. 5 heating oil	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels.
RV-60	No	June-1991	Closure report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling. Logbook notes indicate excavated tank pit appears "very clean."	BTEX- ND (<2 ppb) TPH: ND (<10 ppm) Max Pb: 12.1 ppm Max Cr: 6.69 ppm	Fuze and Booster Load Lines Area	Power House #4; Building 52-15	20,000	No. 5 heating oil	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels.
RV-61	No	October-1991	Closure report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling.	BTEX- ND (<2 ppb) Max TPH: 14 ppm Max Pb: 9.63 ppm Max Cr: 2.27 ppm	Fuze and Booster Load Lines Area	Power House #5; Building 51-25	20,000	No. 5 heating oil	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels.
RV-62	No	October-1991	Closure report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling.	BTEX- ND (<2 ppb) Max TPH: 13 ppm Max Pb: 12.5 ppm Max Cr: 3.96 ppm	Fuze and Booster Load Lines Area	Power House #5; Building 51-25	20,000	No. 5 heating oil	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels.

Table 11-2. Summary of Findings for CC-RVAAP-72 Underground Storage Tanks at RVAAP (continued)

RVAAP UST#	Regulated under BUSTR	Date Removed	Summary of Removal Documentation available from field notes and reports	Available Soil Analytical Data	Location	Building	Size (gal)	Contents/ Purpose	Further Action Recommended	If Regulated, NFA Documentation Available	Basis for Recommendation
RV-63	No	June-1991	Closure report by Nozzle New (1991) provides details of tank removal and soil sampling. Minor visual contamination by train fill vault; area was excavated.	BTEX- ND (<2 ppb) Max TPH: 12 ppm Max Pb: 8.24 ppm Max Cr: 6.75 ppm	Load Line 4	Power House #7 Building G-4	20,000	No. 5 heating oil for Load Line steam process heat	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels. Soil at LL4 addressed under Interim CERCLA ROD.
RV-64	No	June-1991	Closure report by Nozzle New (1991) provides details of tank removal and soil sampling. Minor visual contamination by train fill vault; area was excavated.	BTEX- ND (<2 ppb) Max TPH: 12 ppm Max Pb: 6.90 ppm Max Cr: 6.48 ppm	Load Line 4	Power House #7 Building G-4	20,000	No. 5 heating oil for Load Line steam process heat	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels. Soil at LL4 addressed under Interim CERCLA ROD.
RV-66	No	July-1993	Autumn Technical Services report dated 9/28/93 provides details of tank removal and soil sampling. Report indicated that there were no visible signs of contamination following excavation. TPH below site action limit of 904 ppm.	Max TPH: 36 ppm	Administration Area	Power House # 6	20,000	No. 6 Fuel Oil	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels.
RV-67	No	July-1993	Autumn Technical Services report dated 9/28/93 provides details of tank removal and soil sampling. Report indicated that there were no visible signs of contamination. TPH below site action limit of 904 ppm.	Max TPH: 40 ppm	Administration Area	Power House # 6	20,000	No. 6 Fuel Oil	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels.
RV-73	No	July-1993	Closure report by Autumn Technical Services dated September 1993 provides details of tank removal and soil sampling. No visible or field PID signs of contamination; TPH below site action limit of 904 ppm.	BTEX- ND (<2 ppb) Max TPH: 69 ppm PAHs: ND	Load Line 12	Building T-2501	5,000	No. 2 Fuel Oil for Building and Melt-Out Process Heat	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels. Soil at LL12 addressed under CERCLA ROD.
RV-80	Yes	November-1991	Closure Report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling. In 1968 this tank was abandoned in place and filled with sand. The tank was later removed in 1991.	BTEX- ND (<2 ppb) Max TPH: 42 ppm Max Pb: 24.8 ppm Max Cr: 5.0 ppm	Administration Area	Building 1055-George Road Gas Station	12,000	Leaded Gasoline/ Fueling Station	No	Yes	Regulatory status = NFA through BUSTR.

Table 11-2. Summary of Findings for CC-RVAAP-72 Underground Storage Tanks at RVAAP (continued)

RVAAP UST#	Regulated under BUSTR	Date Removed	Summary of Removal Documentation available from field notes and reports	Available Soil Analytical Data	Location	Building	Size (gal)	Contents/ Purpose	Further Action Recommended	If Regulated, NFA Documentation Available	Basis for Recommendation
RV-81	No	June-1991	Closure Report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling.	BTEX- ND (<2 ppb) Max TPH: 10 ppm Max Pb: 5.4 ppm Max Cr: 6.83 ppm	Administration Area	Building 1047	1,000	Leaded Gasoline/ Fueling Station	No	Not Applicable	Documented removal, not regulated by BUSTR as tank was abandoned prior to regulations taking effect.
RV-82	No	June-1991	Closure Report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling.	BTEX- ND (<2 ppb) Max TPH: 25 ppm Max Pb: 4.56 ppm Max Cr: 6.95 ppm	Administration Area	Building 1047	1,500	Leaded Gasoline/ Fueling Station	No	Not Applicable	Documented removal, not regulated by BUSTR as tank was abandoned prior to regulations taking effect.
RV-83	No	June-1991	Closure Report by Nozzle New dated December 1991 provides all details of tank removal and soil sampling.	BTEX- ND (<2 ppb) Max TPH: 15 ppm Max Pb: 5.33 ppm Max Cr: 7.25 ppm	Administration Area	Building 1047	1,500	Leaded Gasoline/ Fueling Station	No	Not Applicable	Documented removal, not regulated by BUSTR as tank was abandoned prior to regulations taking effect.
RV-86	Unknown	Unknown	Nozzle New's report from December 1991 indicates a 20 ft by 20 ft grid search in potential area of tank. No tank was found. The exact location of the grid search area was not specified. No sampling was performed. A formal NFA status was not provided in the 1991 report. No visual evidence of above grade tank components observed during 2010 property visit.	Not Available	Administration Area	Building 1026 Telephone Building	Unknown	Unknown	Follow up soil sampling.	Not Applicable	Further action recommended to confirm presence or absence of potential contamination.
RV-87	Unknown	Unknown	Nozzle New's report from December 1991 indicates a 20 ft by 20 ft grid search in potential area of tank. No tank was found. The exact location of the grid search area was not specified. No sampling was performed. A formal NFA status was not provided in the 1991 report. No visual evidence of above grade tank components observed during 2010 property visit.	Not Available	Administration Area	Building 1026 Telephone Building	Unknown	Unknown	Follow up soil sampling.	Not Applicable	Further action recommended to confirm presence or absence of potential contamination.

Table 11-2. Summary of Findings for CC-RVAAP-72 Underground Storage Tanks at RVAAP (continued)

RVAAP UST#	Regulated under BUSTR	Date Removed	Summary of Removal Documentation available from field notes and reports	Available Soil Analytical Data	Location	Building	Size (gal)	Contents/ Purpose	Further Action Recommended	If Regulated, NFA Documentation Available	Basis for Recommendation
RV-88	Unknown	Unknown	Nozzle New's report from December 1991 indicates a 20 ft by 20 ft grid search in potential area of tank. No tank was ever found. No sampling was performed. No visual evidence of above grade tank components observed during 2010 property visit.	Not Available	Building 1103	McClintocksburg Gate/Fire Station #2	Unknown	Diesel; for boiler	Follow up soil sampling.	Not Applicable	Further action recommended to confirm presence or absence of potential contamination.
RV-89	Unknown	Unknown	Nozzle New's report from December 1991 indicates a 20 ft by 20 ft grid search in potential area of tank. No tank was ever found. No sampling was performed. No visual evidence of above grade tank components observed during 2010 property visit.	Not Available	South Service Road	George Road Sewage Treatment Plant- 100yd south of South Service Road	Unknown	Support dechlorination system at Sewage Treatment Plant	Follow up soil sampling.	Not Applicable	Further action recommended to confirm presence or absence of potential contamination.
RV-97	No	February-1990	Closure report by Cardamone Construction (1990) provides all details of tank removal and soil sampling.	BTEX: ND (< 5 ppb) TPH: ND Max Pb: ND Max Cr: ND	Depot Area	Building A-6	550	Heating Oil	No	Not Applicable	Documented removal. Sample results less than BUSTR action levels.
CC-RVAAP-72-01	Yes, only if tank is still present	Unknown	Drawing 6698-RU A-10 indicates the presence of a kerosene tank at U-3. Some above grade piping was noticed at the U-3 during the 2010 property visit.	Not Available	Depot Area	Building U-3	Unknown	Kerosene	Potential geophysical investigation to ensure tank was removed. Follow up soil sampling.	Not Applicable	Further action recommended due to lack of documentation on removal and lack of data. May require regulatory closure through BUSTR.
CC-RVAAP-72-02	Yes, only if tank is still present	Unknown	No tank was located during a geophysical survey performed by MKM in 2004. No sampling was performed. No visual evidence of above grade tank components observed during 2010 property visit.	Not Available	Atlas Scrap Yard	Northern Service Station; Building T-15	1,000	Leaded Gasoline; Fueling Station	Follow up soil sampling.	Not Applicable	Further action recommended to confirm presence or absence of potential contamination.

Table 11-2. Summary of Findings for CC-RVAAP-72 Underground Storage Tanks at RVAAP (continued)

RVAAP UST#	Regulated under BUSTR	Date Removed	Summary of Removal Documentation available from field notes and reports	Available Soil Analytical Data	Location	Building	Size (gal)	Contents/ Purpose	Further Action Recommended	If Regulated, NFA Documentation Available	Basis for Recommendation
CC-RVAAP-72-03	Yes, only if tank is still present	Unknown	No tank was located during a geophysical survey performed by MKM in 2004. No sampling was performed. No visual evidence of above grade tank components observed during 2010 property visit.	Not Available	Atlas Scrap Yard	Northern Service Station; Building T-15	1,000	Leaded Gasoline; Fueling Station	Follow up soil sampling.	Not Applicable	Further action recommended to confirm presence or absence of potential contamination.
CC-RVAAP-72-04	Yes, only if tank is still present	Unknown	No tank was located during a geophysical survey performed by MKM in 2004. No sampling was performed. No visual evidence of above grade tank components observed during 2010 property visit.	Not Available	Atlas Scrap Yard	Northern Service Station; Building T-15	1,000	Fuel Oil	Follow up soil sampling.	Not Applicable	Further action recommended to confirm presence or absence of potential contamination.
CC-RVAAP-72-05	Yes, only if tank is still present	Unknown	No tank was located during a geophysical survey performed by MKM in 2004. No sampling was performed. No visual evidence of above grade tank components observed during 2010 property visit.	Not Available	Atlas Scrap Yard	Northern Service Station; Building T-15	2,000	Kerosene	Follow up soil sampling.	Not Applicable	Further action recommended to confirm presence or absence of potential contamination.
CC-RVAAP-72-06	Unknown	Unknown	Map for Water Works #3 indicated the presence of a UST at the AOC. It is unknown whether this UST has been removed.	Not Available	Water Works 3	Water Works 3	280	Fuel Oil	Potential geophysical investigation to ensure tank was removed. Follow up soil sampling.	Not Applicable	Further action recommended due to lack of documentation on removal and lack of data.
CC-RVAAP-72-07	No	November-1968	In 1968 this UST was removed. The adjacent tank, RV-80, was abandoned in place by filling with sand. RV-1 and RV-2 were installed in the same location as the removed CC-RVAAP-72-07.	No records available. RV-1 and RV-2 were in same tank pit and were sampled upon removal.	Administration Area	Building 1055-George Road Gas Station	12,000	Leaded Gasoline/ Fueling Station	No	Not Applicable	Documented removal, RV-1 and RV-2 from same tank pit have documented removal with NFA.

Table 11-2. Summary of Findings for CC-RVAAP-72 Underground Storage Tanks at RVAAP (continued)

RVAAP UST#	Regulated under BUSTR	Date Removed	Summary of Removal Documentation available from field notes and reports	Available Soil Analytical Data	Location	Building	Size (gal)	Contents/ Purpose	Further Action Recommended	If Regulated, NFA Documentation Available	Basis for Recommendation
CC-RVAAP-72-08	No	December 10, 1971	Tank was installed in October 1971. UST was replaced with an AST in December 1971 due to a November malfunction causing a release of 400 gallons of fuel oil.	Not Available	Inert Storage Area 8	Building 848	550	#2 Fuel Oil	Potential soil sampling due to known release to earth and sewers.	Not Applicable	Further action recommended to confirm presence or absence of potential contamination.

AST = Aboveground Storage Tank
BTEX = Benzene, Toluene, Ethylbenzene, and Xylene
BUSTR = Bureau of Underground Storage Tank Regulations
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
Cr= Chromium
LL1 = Load Line 1
LL2 = Load Line 2
LL4 = Load Line 4
LL12 = Load Line 12
ND = Non-Detectable Concentration
NFA = No Further Action
PAH = Polycyclic Aromatic Hydrocarbon
Pb = Lead
ppb = parts per billion
ppm = parts per million
Ohio EPA = Ohio Environmental Protection Agency
PID = Photoionization Detector
ROD = Record of Decision
RVAAP = Ravenna Army Ammunition Plant
TPH = Total Petroleum Hydrocarbon
UST = Underground Storage Tank
WBG = Winklepeck Burning Ground

Table 11-3. Summary and Recommendations for the Historical Records Review of CC-RVAAP-73 Facility-Wide Coal Storage

Location	Description/Historical Records Observations	Property Visits/ Perimeter Survey Results	Recommendation
North Line Road Coal Tipple Area	Coal tipple observed in 1952 aerial photograph.	Observed several pieces/areas of coal strewn over the ground surface at this AOC during the 2010 property survey.	Candidate for further investigation. Target media = surface soil/dry sediment. Wet sediment/surface water in adjacent Sand Creek tributary. Target analyte = TAL metals.
Depot Area – Building U-5	Potential coal storage area near Building U-5.	No visual evidence of coal storage observed at the AOC.	NFA.
Depot Area – Building U-14	Potential coal storage area near Building U-14.	No visual evidence of coal storage observed at the AOC.	NFA.
Building F-15	Coal piles observed by USACE at building immediately south of warehouse building in 1952 aerial photograph.	No visual evidence of coal storage observed at the AOC. Building demolition activities/ground disturbance occurred in this area.	NFA. Soil at F-15 being addressed under separate CERCLA decision.
Building F-16	Coal piles observed by USACE at building immediately south of warehouse building in 1952 aerial photograph.	No visual evidence of coal storage observed at the AOC. Building demolition activities/ground disturbance occurred in this area.	NFA. Soil at F-16 being addressed under separate CERCLA decision.
Building 51-25 (Power House No. 5)	Potential coal storage area adjacent to Power House No. 5.	No visual evidence of coal storage observed at the AOC. Building demolition activities/ground disturbance occurred in this area.	NFA.
Building 52-15 (Power House No. 4)	Potential coal storage area adjacent to Power House No. 4.	No visual evidence of coal storage observed at the AOC. Building demolition activities/ground disturbance occurred in this area.	NFA.
Inert Storage 2F-21	Potential coal storage area next to Inert Storage Building 2F-21.	No visual evidence of coal storage observed at the AOC.	NFA.
Sand Creek Coal Tipple	Coal tipple observed in 1952 aerial photograph.	Observed pieces of coal at the location during the 2010 property survey. Also observed a rusted out 55-gallon drum.	Candidate for further investigation. Target media = surface soil/dry sediment. Wet sediment/surface water in adjacent Sand Creek channel. Target analyte = TAL metals.
Load Line No. 1 (LL1) (Power House No. 1)	USACE noted potential coal storage pile noted adjacent to former Power House building (CC-1) in 1952 aerial photograph.	No visual evidence of coal storage observed at the AOC. Building demolition activities/ground disturbance occurred in this area.	NFA. Soil at LL1 addressed under separate CERCLA action.

Table 11-3. Summary and Recommendations for the Historical Records Review of CC-RVAAP-73 Facility-Wide Coal Storage (continued)

Location	Description/Historical Records Observations	Property Visits/ Perimeter Survey Results	Recommendation
Load Line No. 2 (LL2) (Power House No. 2)	USACE noted potential coal storage pile noted adjacent to former Power House building (DC-1) in 1952 aerial photograph.	No visual evidence of coal storage observed at the AOC. Building demolition activities/ground disturbance occurred in this area.	NFA. Soil at LL2 addressed under separate CERCLA action.
Load Line No. 4 (LL4) (Power House No. 7)	No noticeable coal storage piles observed in aerial photographs around former Power House No. 7 (Building G-4).	No visual evidence of coal storage observed at the AOC. Building demolition activities/ground disturbance occurred in this area.	NFA. Soil at LL4 addressed under separate CERCLA action.
Load Line No. 12 (LL12) (Power House No. 3)	At two boiler houses FE-17 in Load Line 12, coal was direct fed from rail cars to an underground conveyor into storage silos adjacent to the boiler houses (from Coal Usage Sites at RVAAP document - prepared 06-Jun-04).	No visual evidence of coal storage observed at the AOC. Building demolition activities/ground disturbance occurred in this area.	NFA. Soil at LL12 addressed under separate CERCLA action.
Administration Area	Potential coal storage area next to former Power House No. 6.	No visual evidence of coal storage observed at the AOC. Building demolition activities/ground disturbance occurred in this area.	NFA.
East Classification Yard (Power House No. 8)	Potential coal storage located to the northwest of the Round House adjacent to former Power House No. 8.	No visual evidence of coal storage observed at the AOC.	NFA.
South of East Classification Yard	During property visit, field personnel observed coal on the ground surface just north of Butts-Kistler Road. Drawing of East Classification Yard noting “coal track” located during records review	Observed pieces of coal south of the East Classification Yard just north of Butts-Kistler Road.	Candidate for further investigation. Target media = surface soil/dry sediment. Target analyte = TAL metals.
Atlas Scrap Yard (ASY)	Areas of stained soil identified by USACE in 1952 aerial photograph. Coal piles observed at boiler houses in early 1940s photograph.	No visual evidence of coal storage observed at the AOC.	NFA. Soil at ASY being addressed under separate CERCLA action.
Area 6 – Inert Storage	Possible small coal pile observed on north end of building by railroad track in 1966 aerial photograph.	No visual evidence of coal storage observed at the AOC.	NFA.
Building U-16 Boiler House	Drawings of Building U-16 indicated a coal storage bin. No evidence of coal storage on aerial photographs was identified.	During property visit trace coal was visually observed on the ground at the AOC. No stressed vegetation was observed	Candidate for further investigation. Target media = surface soil/dry sediment. Target analyte = TAL metals.

Decision Rules for Preliminary Recommendation:
1. If no observed coal residues in known or suspected former storage area, NFA recommended.
2. If coal residues observed in known or suspected former coal storage area, surface soil investigation recommended.

NFA = No Further Action
TAL = Target Analyte List
CERLCA = Comprehensive Environmental Response, Compensation, and Liability Act
USACE = United States Army Corps of Engineers

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