ENVIRONMENTAL BASELINE SURVEY
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

FINAL REPORT

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EXECUTIVE SUMMARY

The Ravenna Army Ammunition Plant occupies 21,419 acres and is located in northeast Ohio in Trumbull and Portage Counties. The site is approximately 35 miles southeast of Cleveland, Ohio. In 1997, the Headquarters Industrial Operations Command determined that the Ravenna Army Ammunition Plant was no longer required to support the Army's replenishment requirements. The Industrial Operations Command declared Ravenna Army Ammunition Plant excess. As a result of the declaration of excess, an Environmental Baseline Survey must be prepared and made a part of the Report of Excess. The Environmental Baseline Survey is conducted to fulfill requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, section 120(h), as amended by the Community Environmental Response Facilitation Act of 1992. In accordance with Department of Defense policy, the purpose of the Environmental Baseline Survey is to determine, discover, and document the obviousness or likely presence of a release of any hazardous substance or petroleum product within the subject property boundaries.

Ravenna Army Ammunition Plant is an inactive facility currently under modified caretaker status. Mason and Hanger is under contract by the US Army to manage Ravenna Army Ammunition Plant. Mason and Hanger provides facility support and has been the installation operating contractor since 1993. Facility support activities at Ravenna Army Ammunition Plant have included, but were not limited to, a wide range of activities that supported the manufacturing of large and medium caliber artillery ammunition, bombs, mines fuzes, boosters, primers, and percussion elements, as well as finished ammunition and ammunition components. Many, if not all, of the sites designated as Areas of Concern (sites where the presence of, or potential for, contamination exists) are the result of these activities. Section Three describes the facility support activities identified through the course of this investigation and additionally discusses all Areas of Concern associated with these activities.

Ravenna Army Ammunition Plant supports several tenant organizations: the Ohio Army National Guard, the Air Force Reserve, the Defense Logistics Agency and the Bureau of Alcohol, Tobacco and Firearms. Tenants and their activities are discussed in Section Three.

Section Five presents the categorization of Ravenna Army Ammunition Plant property in accordance with the criteria established in Community Environmental Response Facilitation Act of 1992 guidance and the Department of Defense Base Realignment and Closure Guidebook of 1995. The environmental conditions of the installation property were documented and a site map depicting the environmental condition was developed, based on the Categories listed in Table 5-0. Areas that are designated as Category 1, 2, 3, or 4 are suitable for transfer or lease, subject to qualifiers. Areas that are currently designated as Category 5, 6, or 7 are not suitable for transfer, but may be suitable for lease. **All areas at Ravenna Army Ammunition Plant are designated as Category 1, 2, 4, 5, 6, or 7.** Areas containing non-Comprehensive Environmental Response,

Compensation and Liability Act contamination substances are delineated as Qualified Parcels.

Based on a review of installation documents: Federal, State and local records, a site inspection, employee interviews, and visual inspections of the property and adjacent properties, Vista Technologies divided Ravenna Army Ammunition Plan into parcels that represent the environmental condition of the property area. Parcels and the resulting categorizations are identified in Table 5-1. Figure 5-1, Ravenna Army Ammunition Plant Categorization Map, depicts the categorization of the Site with appropriate color codes..

Of the 21, 419 acres comprising the Ravenna Army Ammunition Plant,

17,509 acres are designated as Category 1,
37 acres are designated as Category 2,
5.25 acres are designated as Category 3,
10.5 acres are designated as Category 4,
[redacted] acres are designated as Category 5,
[redacted] acres are designated as Category 6, and
[redacted] acres are designated as Category 7.

Additionally, [redacted] acres are designated as qualified parcels.

LIST OF ACRONYMS

ACRONYM	DEFINITION
2,4-D	2,4-Dichlorophenoxyacetic acid
2,4,5-T	2,4,5-Trichlorophenoxyacetic acid
ACM	Asbestos Containing Material
ACBM	Asbestos Containing Building Material
AEHA	Army Environmental Hygiene Agency
AFR	Air Force Reserve
AOC	Area of Concern
AP	Action Plan
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
ATF	Bureau of Alcohol, Tobacco and Firearms
BCP	BRAC Cleanup Plan
BGS	Below Ground Surface
BRAC	Base Realignment and Closure
CDETS	Consent Decree Tracking System
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act,
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CERFA	Community Environmental Response Facilitation Act
CFR	Code of Federal Regulations
COC	Contaminants of Concern
CONRAIL	Consolidated Railroad
CORRACTS	RCRA Violators List
DA	Department of the Army
DDT	4,4-dichlorodiphenotrichloroethane
DOCKET	Enforcement Docket System
DoD	Department of Defense
DOT	Department of Transportation
DLA	Defense Logistics Agency
EBS	Environmental Baseline Survey
EC	Environmental Coordinator
EPA	U.S. Environmental Protection Agency
ERNS	Emergency Response Notification System
°F	Degrees Fahrenheit
FEDFAC	Federal Facilities
FBI	Federal Bureau of Investigation
FINDS	Facility Index System
FORSCOM	U.S. Army Forces Command
FY	Fiscal Year
gpd	Gallons Per Day

GOCO	Government Owned/Contractor Operated
GIS	Geographic Information System
HE	High Explosive
HMX	Octahydro 1,3,5,7-tetranitro 1,3,5,7-tetrazocine
HR	Hazardous Substance Release or Disposal
HS	Hazardous Substance Storage
HUD	U.S. Department of Housing and Urban Development
HVAC	Heating, Ventilation, and Air Conditioning
HW	Hazardous Waste
IAP	Installation Action Plan
IAW	In Accordance With
IOC	Industrial Operations Command
IRP	Installation Restoration Program
kg	Kilogram
LAP	Load, Pack and Assemble
LBP	Lead-Based Paint
L	Liter
LTM	Long Term Monitoring
LUST	Leaking Underground Storage Tank
µg	Micrograms
mg	Milligrams
ml	Milliliters
mm	Millimeters
NACA	National Advisory Committee for Aeronautics
NASA	National Aeronautics and Space Administration
NFA	No Further Action
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OB	Open Burning
OB/OD	Open Burning/Open Detonation
OD	Open Detonation
OHARNG	Ohio Army National Guard
OSHA	Occupational Safety and Health Act
OSWER	Office of Solid Waste and Emergency Response
OWS	Oil/water Separator
PA	Preliminary Assessment
PAH	Polyaromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PL	Public Law
POC	Point of Contact
POL	Petroleum, Oil, and Lubricants
PPE	Personal Protective Equipment
ppm	Parts Per Million
PR	Petroleum Release or Disposal
PS	Petroleum Storage
PVC	Polyvinyl chloride

QP	Qualified Parcel
RA	Remedial Action
RD	Remedial Design
RC	Response Complete
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
RD	Radionuclides
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
RI	Remedial Investigation
ROD	Record of Decision
ROE	Record of Excess
RQ	EPA Reportable Quantity for Hazardous Substances
RVAAP	Ravenna Army Ammunitions Plant
SAIC	Science Applications International Corporation
SI	Site Inspection (or Investigation)
TNT	Trinitrotoluene
TSCA	Toxic Substances Control Act
TSD	Treatment, Storage, and Disposal
USACE	U.S. Army Corps of Engineers
USAEHA	U.S. Army Environmental Hygiene Agency
USATHAMA	U.S. Army Toxic and Hazardous materials Agency
USGS	U.S. Geological Survey
UST	Underground Storage Tank
UTES	Unit Training Equipment Site
UXO	Unexploded Ordnance

1 INTRODUCTION

1.1 Purpose

This Environmental Baseline Survey (EBS) was prepared for Ravenna Army Ammunition Plant (RVAAP), located in Portage and Trumbull Counties in northeast Ohio. This section describes the purpose of the task and the scope of work in preparing this EBS.

In 1997, the Industrial Operations Command (IOC) Headquarters determined that RVAAP was no longer required to support the Army's replenishment requirements, and therefore declared RVAAP in excess. As a result of the declaration of excess, an EBS must be prepared and made a part of the Report of Excess (ROE). The ROE, along with the EBS, will be forwarded to the Department of the Army (DA) for final approval.

1.2 Scope of the Environmental Baseline Survey

The EBS is conducted to fulfill requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, section 120(h), as amended by the Community Environmental Response Facilitation Act (CERFA) of 1992. In accordance with (IAW) Department of Defense (DoD) policy, the purpose of the EBS is to determine, discover, and document the obviousness or likely presence of a release of any hazardous substance or petroleum product within the subject property boundaries. Potential for future releases based on the current practices are additionally addressed in the EBS.

The primary purpose of this EBS is to identify the current environmental conditions of all real property on RVAAP. Specifically, the EBS will determine if hazardous substances, petroleum, or its derivatives, were stored for one year or more, released into the environment or structures, or disposed of on the installation property.

The secondary purpose of the EBS is to classify discrete areas of RVAAP into one of seven standard environmental condition of property area types, as defined by CERFA guidance. This is achieved by:

- Identifying, characterizing, and documenting the obviousness of the presence or likely presence of a release or threatened release of a hazardous substance or petroleum product associated with the historical or current use of RVAAP facilities.
- Identifying, characterizing, and documenting the obviousness of the presence or likely presence of a release or threatened release of a hazardous substance or petroleum product from any adjacent property that is likely to cause or contribute to contamination within the property bounds of RVAAP.

IAW DoD policy, an EBS has been prepared to expedite the evaluation of property to be transferred by deed or lease. This EBS is based on existing environmental information on current and past activities on RVAAP and adjacent properties related to the:

- treatment of hazardous substances or petroleum products on the property
- storage of hazardous substances or petroleum products on the property
- disposal of hazardous substances or petroleum products on the property
- release of hazardous substances or petroleum products on the property

1.3 Survey Methodology

The EBS was accomplished through an environmental review process that included at a minimum the following tasks:

- A detailed search and review of available information, documentation, and records in the possession of the RVAAP contractor and/or the US Army and any applicable records generated by other Federal agencies.
- Analysis of aerial photographs, which were in the possession of RVAAP contractor or the Army, that reflects prior use of RVAAP.
- Interviews with current employees involved in the operations on RVAAP.

- Visual inspections of RVAAP buildings and other structures, equipment, pipe, pipeline or other improvements.
- Site (physical) inspections were required only when there was reason to believe or suspect that hazardous substances were stored, released, or disposed of on RVAAP. The following were critically reviewed: sewer lines, run-off drainage patterns, evidence of environmental impacts (e.g., stained soil, stressed vegetation, dead, or ill wildlife), or any other indications that an actual or potential release of hazardous substances or petroleum products has occurred.
- Sources of contamination on RVAAP as well as sources of contamination on adjacent properties which could migrate to RVAAP were identified.
- On going or past response actions that have been conducted at, or adjacent to RVAAP, were reviewed.
- The environmental conditions of RVAAP were documented and a site map depicting these conditions was developed based on the Standard Classification of D5746-95 Environmental Condition of Property Types, American Society for Testing and Materials (ASTM):

  Category 1: An area or parcel of real property where no release or disposal of hazardous substances or petroleum products or their derivatives has occurred (including no migration of these substances from adjacent properties).

  Category 2: An area or parcel of real property where only the storage of hazardous substances or petroleum products or their derivatives has occurred (but no release, disposal or migration from adjacent properties has occurred).

  Category 3: An area or parcel of real property where storage and release, release, disposal, or migration, or some combination thereof, of hazardous substances or petroleum products or their derivatives has occurred, but at concentrations that do not require a removal or remedial action.

  Category 4: An area or parcel of real property where storage and release, release, disposal, or migration, or some combination thereof, of hazardous substances or petroleum products or their derivatives has occurred, and all

remedial actions necessary to protect human health and the environment have been taken.

Category 5: An area or parcel of real property where storage and release, release, disposal, or migration, or some combination thereof, of hazardous substances or petroleum products or their derivatives has occurred and removal or remedial actions, or both are underway, but all required actions have not yet been taken.

Category 6: An area or parcel of real property where storage and release, release, disposal, or migration, or some combination thereof, of hazardous substances or petroleum products or their derivatives has occurred but required actions have not yet been initiated.

Category 7: An area or parcel of real property that is unevaluated or requires additional evaluation.

1.4 Definitions

- Adjacent Properties: Those properties contiguous to or nearby the property boundaries being surveyed.
- Parcel: An area that can be segregated from its surrounding areas based on the environmental condition of the area.
- Environmental Condition of Property Area Type: Any of the seven standard environmental conditions of property area types (categories) as defined in the CERFA guidance.
- Hazardous Materials: Materials listed in 40 and 49 Code of Federal Regulations (CFR).
- Non-CERCLA Contaminant: Environmental contaminants addressed under other regulatory programs such as the Toxic Substances Control Act (TSCA), the Office of Solid Waste and Emergency Response (OSWER), the Occupational Safety and Health Act (OSHA), or the US Department of Housing and Urban Development (HUD), when not present as a result of disposal or accidental or deliberate release inconsistent with the product's use.
- Not suitable for Transfer: Parcels that are currently designated as Category 5, 6, or 7, which are not suitable for transfer, but may be suitable for lease.
- Parcel Labels: Each parcel has been given a number to which appropriate descriptive labels are attached. The numbers consist of a unique parcel identification number and an environmental condition of property category number. The labels consist of a designation describing the type of contamination or storage, if applicable. The following designations are used to indicate the type of contamination or storage present in a parcel.

PS = Petroleum storage
PR = Petroleum release or disposal
HS = Hazardous substance storage
HR = Hazardous substance release or disposal

For example2(1) indicates that the second parcel is designated as a Category 1 parcel.

- Petroleum: Any petroleum product or its derivatives, including aviation fuel and motor oil.
- Qualified Parcels (QP): Areas containing or suspected of containing contamination by substances not defined by CERCLA that may limit or preclude the transfer or lease of the property for unrestricted use. These parcels are delineated separately and are labeled with the letters "QP" for "qualified. The QP labels are identified with the following designator, as applicable:
  - Suitable for Transfer: Parcels that are designated as Category 1, 2, 3, or 4 are suitable for transfer or lease, subject to consideration of the non-CERCLA qualifiers.

    A = Asbestos-containing material (ACM)

    L = Lead-based paint (LBP)

    P = Polychlorinated biphenyls (PCBs)

    R = Radon

    X = Unexploded ordnance (UXO) and/or ordnance fragments

    RD = Radionuclides

1.5 Limitations

Although this EBS was performed with a high degree of professionalism by qualified environmental professionals, no investigation may be considered so comprehensive as to guarantee complete information regarding the possible presence of materials on the installation that currently, or in the future, may be considered hazardous.

The conclusions presented in this report are based on information that was reasonably available from the designated installation contacts and other public sources at the time the EBS was conducted. In addition, information obtained from the records review and the interviews has been assumed to be correct and complete, unless contradictory information exists and was unavailable for review.

1.6 General Geographic And Environmental Settings

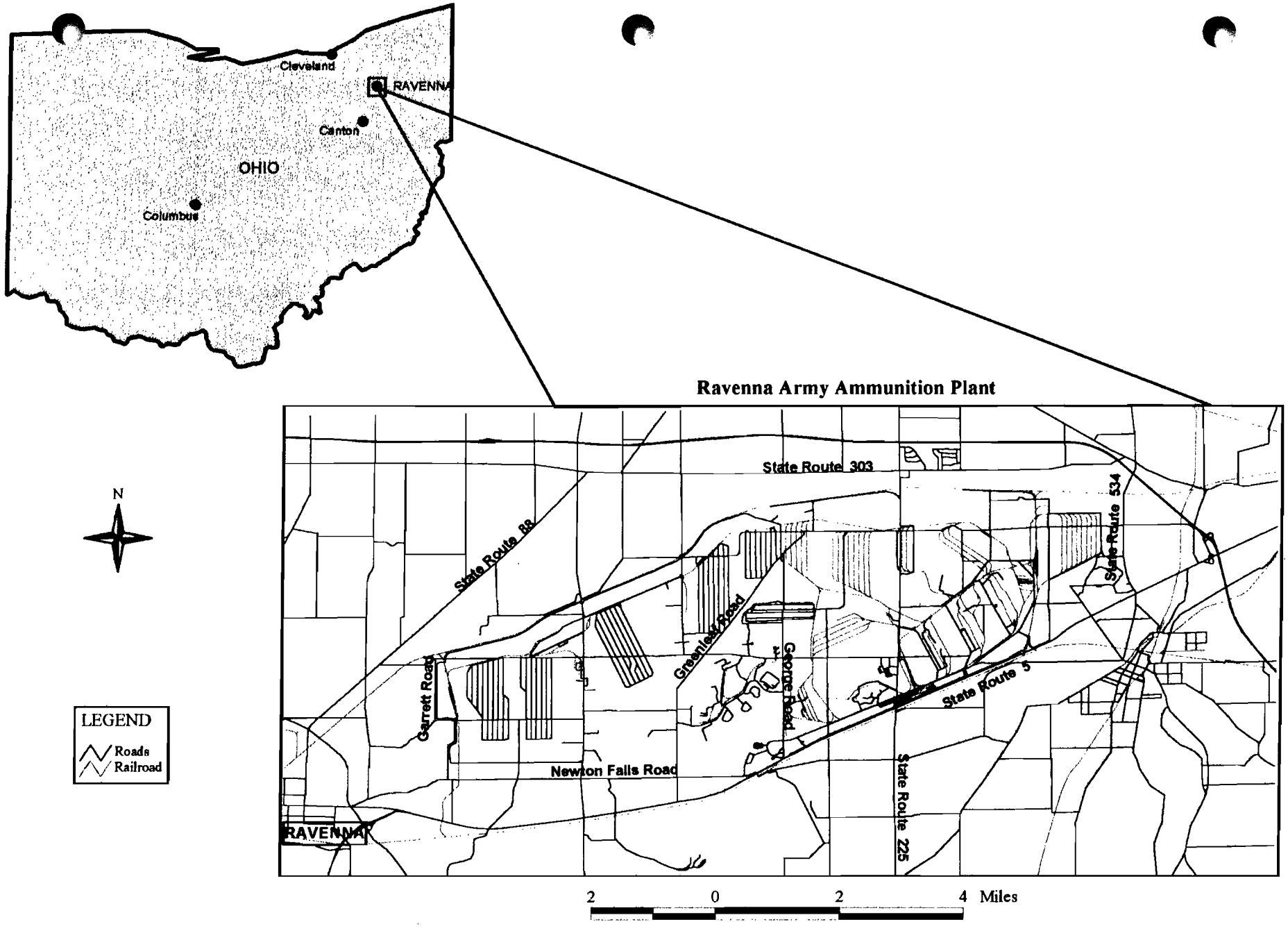
RVAAP is located in Portage and Trumball Counties in northeastern Ohio, approximately 35 miles southeast of Cleveland and 23 miles east of Akron. RVAAP is contained within an 11 mile long by 3.5 mile wide tract of land and consists of 21,419 acres. The facility is bounded by Consolidated Railroad (CONRAIL) to the north, State Route 5 to the south, State Route 534 to the east, and Garretsville and Berry Road to the west.

Figure 1.6-1 shows the location general location and orientation of RVAAP relative to the state of Ohio and the surrounding area in general. Figure 1.6-2, RVAAP Facility Map shows the facility boundaries and the locations of primary areas of concern on the installation, and will be referred to often throughout the text. Table 1-6 contains the RVAAP facility map legend.

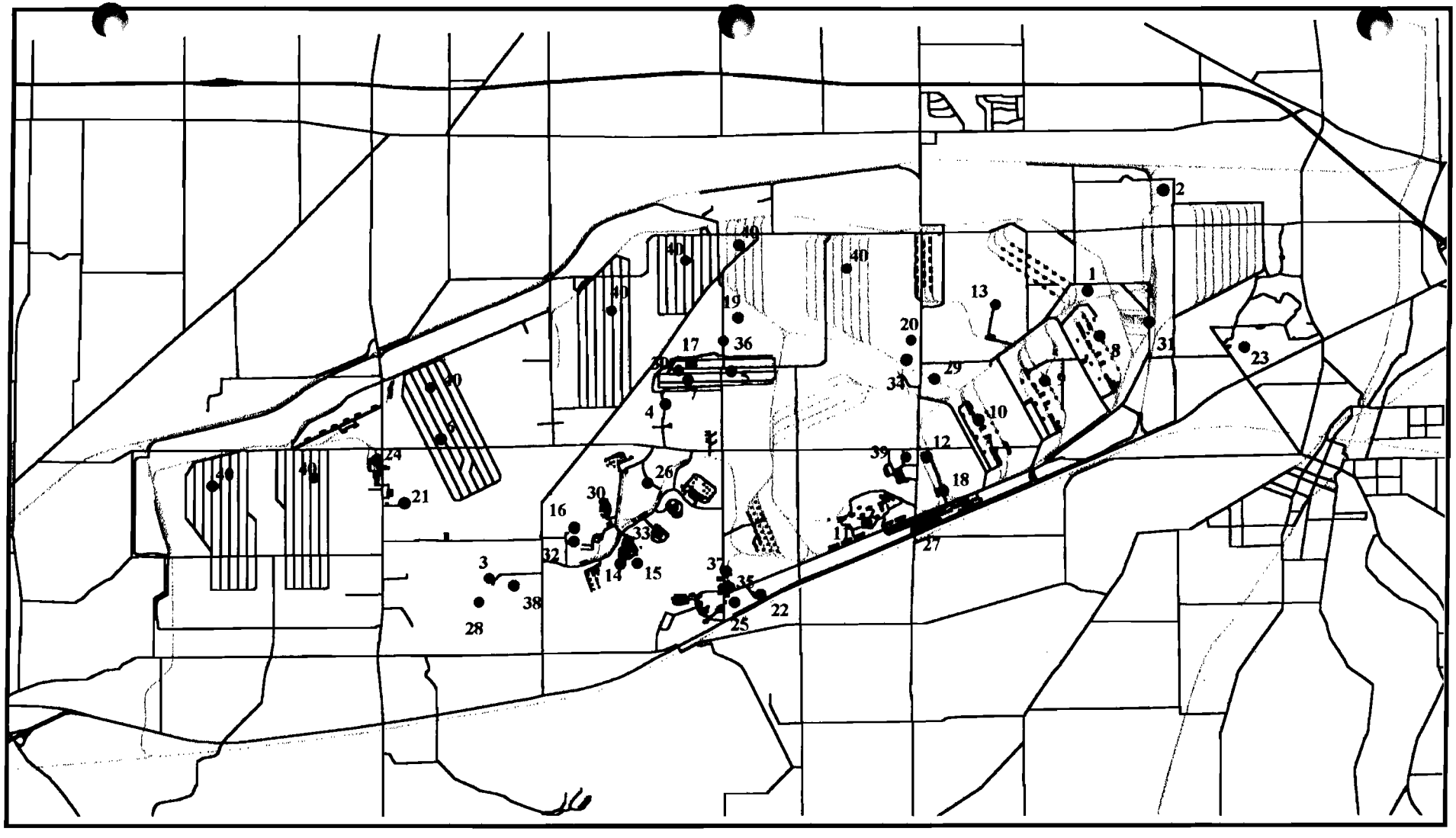
1.6.1 Demographics

According to the 1990 census, the combined population of Portage and Trumball counties was 370,398. The two population centers in closest proximity to RVAAP are City of Ravenna (population 12,069), located approximately 2 miles from the west of the facility, and City of Newton Falls (population 4,692), located approximately 1 mile southeast of the facility.

The area surrounding RVAAP is generally rural, with small communities located in proximity to the northern, southern and eastern boundaries. In addition to the towns of Ravenna and Newton Falls, the smaller towns of Windham and Charlestown lie to the north and south, respectively. The West Branch Reservoir, also known as the Michael J. Kirwan Reservoir is the primary recreational area in the vicinity, and is located south of the facility.



Vista Technologies **1919 Oakwell Farms Pkwy.** **Suite 100** **San Antonio, TX 78218**	**Figure 1.6-1. General Location and Orientation of Ravenna Army Amunition Plant.**



Vista Technologies **1919 Oakwell Farms Pkwy.** **Suite 100** **San Antonio, TX 78218**	**Figure 1.6-2. RVAAP Facility Map.**

Table 1-6 RVAAP Facility Map Legend

RVAAP/AREA	FACILITY
1	Ramsdell Quarry Landfill
2	Erie Burning Grounds
3	Demolition Area 1
4	Demolition Area 2
5	Winklepeck Burning Grounds
6	C Block Quarry
7	Building 1601 Hazardous Waste Storage
8	Load Line 1 and Dilution/Settling Pond
9	Load Line 2 and Dilution/Settling Pond
10	Load Line 3 and Dilution/Settling Pond
11	Load Line 4 and Dilution/Settling Pond
12	Load Line 12 and Dilution/Settling Pond
13	Building 1200 and Dilution/Settling
14	Load Line 6, Evaporation Unit
15	Load Line 6, Treatment Plant
16	Quarry Landfill/Former Fuze & Booster
17	Deactivation Furnace
18	Load Line 12 Pink Waste Water
19	Landfill North of Winklepeck Burning
20	Sand Creek Sewage Treatment Plant
21	Depot Sewage Treatment Plant
22	George Road Sewage Treatment Plant
23	Unit Training Site Waste Oil Tank
24	Reserve Unit Maintenance Area Waste
25	Building 1034 Motor Pool Waste Oil
26	Fuze & Booster Area Settling Tanks
27	Building 854 - PCB Storage
28	Mustard Agent Burial Site
29	Upper and Lower Cobbs Pond Complex
30	Load Line 7 Pink Water Treatment Plant
31	Ore Pile Retention Plant
32	40 and 60 mm Firing Range
33	Firestone Test Facility
34	Sand Creek Disposal Road Landfill
35	1037 Building Laundry Wastewater
36	Pistol Range
37	Pesticide Building S-4452
38	NACA Test Area

1.6.2 Physical Setting

RVAAP is located between latitude 41°09' and 41°14' North and longitude 80°58' and 80°12' West. The area is included on the Ravenna, Windham, and Newton Falls US Geological Survey (USGS) 7-1/2-minute quadrangle maps. Elevations range from 1,220 feet above mean sea level in the west part of the facility to 930 feet above mean sea level in the east.

1.6.3 Climatology

The climate of RVAAP is continental, characterized by fluctuating temperatures throughout the year. The average daily maximum temperature for the year is 60.9° F, the average daily minimum is 37.5° F. Total annual rainfall at RVAAP is approximately 37 inches (USGS, 1997).

1.6.4 Surface Hydrology

RVAAP is located within the Ohio River Basin. The West Branch of the Mahoning River represents the major surface stream in the RVAAP area. This stream flows south, adjacent to the west end of the facility, before entering the West Branch Reservoir. The western and northern portions of RVAAP lands 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 contains abundant marshy areas and flowing and intermittent streams, whose headwaters are located in the small hills on the facility. Three major creeks drain RVAAP: the South Fork of Eagle Creek, Sand Creek, and Hinkley Creek. All of these water courses have many associated tributaries.

Approximately fifty ponds are scattered throughout the installation. Many were originally built within natural drainage patterns to function as settling ponds or basins for process effluent and run off. Others are natural in origin, resulting from glacial action or beaver activity. All water bodies at RVAAP support an abundance of aquatic vegetation,

as identified during the site investigation, and are well stocked with fish. None of the ponds within the boundaries of the installation are currently used as water supply sources.

1.6.5 Geology and Soils

Two glacial advances during the Pleistocene resulted in the deposition of glacial till over the entire RVAAP installation. The first glacial advance deposited the Kent Till over the facility, consisting primarily of sand and silt. The Kent Till averages 20 to 40 feet below ground surface (BGS) in depth. The second glacial advance deposited the Hiram Till over the eastern two-thirds of the facility. The Hiram Till primarily consists of clay minerals, silt, and minor sand, and ranges in depth from 5 to 15 feet BGS. A buried glacial valley is located in the central western portion of the facility. This valley is filled with glacial outwash consisting of poorly sorted clay, till, gravel, and silty sand. Depths of unconsolidated sediments in the valley range from 100 to 200 feet BGS.

The bedrock geology at RVAAP consists of Carboniferous Age sedimentary rocks that lie stratigraphically beneath the glacial deposits of the Kent and Hiram Tills. The Cuyahoga, which outcrops in the far northeastern corner of the facility, generally consists of a blue-gray silty shale with interbedded sandstone. The regional dip of the Cuyahoga strata is between 5 and 10 feet per mile to the south. The remainder of the facility is underlain by bedrock associated with the Pottsville Formation. The regional dip of the Pottsville Formation strata is between 5 and 10 feet per mile to the south.

1.6.6 Hydrogeology

The largest groundwater supplies within Portage County come from buried glacial valleys that underlie the immediate area and surrounding townships. The sand and gravel within these buried valleys receive recharge from surface streams and surface infiltration. Wells that penetrate these aquifers can yield up to 1,600 gallons per minute. The major bedrock sources of groundwater in the vicinity of RVAAP are the sandstone and conglomerate members of the Pottsville Formation. These aquifers represent some of the most important bedrock sources of groundwater in Northeastern Ohio.

2 SOURCES OF INFORMATION

This section describes the sources of information that were used to support the determination of the environmental condition of the property at RVAAP.

2.1 Installation Property

Relevant information and documents used to conduct this EBS at RVAAP are identified in the following sections. This information includes environmental studies such as Preliminary Assessments (PAs), Remedial Investigations (RIs), and Action Plans (APs); Federal, State and local regulatory records; and interviews with present installation personnel. After reviewing all relevant information, visual inspections of selected areas on the installation and adjacent properties were conducted for verification purposes.

2.1.1 Existing Documents

Existing documents were reviewed to evaluate the environmental conditions at RVAAP. The documents presented below are used as primary documents in the preparation of this EBS.. These documents provide the primary evidence for the resulting categorization of RVAAP property into the seven property types. A complete list of references is included in Section 6.

Table 2-1-1 Primary Documents

DOCUMENT TITLE	AUTHOR	DATE
Phase I-Remedial Investigation Report for the Areas of Concern at RVAAP- Vol. 1	SAIC, Oak Ridge Tennessee	Feb 1998
Preliminary Assessment for the Characterization of Areas of Contamination at RVAAP	SAIC, Oak Ridge Tennessee	Feb 1996
Action Plan for the Ravenna AAP	SAIC, Oak Ridge Tennessee	Mar 1996
Installation Action Plan for Ravenna AAP	Mason & Hanger Corporation	Feb 1998
RVAAP, Ohio Resource Conservation and Recovery Act Draft RR/VSI Report	Jacobs Engineering Group, Inc.	Oct 1989

2.1.2 Federal, State and Local Government Regulatory Records

A search of reasonably obtainable Federal, State and local records pertaining to both RVAAP and adjacent properties was performed. These sources include, but are not limited to, the databases listed in Table 2-2-2, below. **The minimum search distance of one-half mile,** as specified in the **Standard Practice For Conducting Environmental Baseline Surveys, D 6008 - 96, ASTM,** was followed when determining the properties

with environmental concerns adjacent to RVAAP. A list of these properties is presented in Table 4-3, Section 4.

Table 2-2-2 Environmental Databases

DATABASE	CONTENTS
National Priorities List (NPL)	The NPL lists Superfund sites, which are sites that are determined by the US Environmental Protection Agency (EPA) to pose an immediate public health hazard requiring immediate cleanup response.
Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS)	The EPA CERCLIS database contains information on CERCLA sites, and is updated periodically.
Emergency Response Notification System (ERNS)	EPA maintains ERNS, which is a repository for information on hazardous spills nationwide. This information is based on reports filed by local agencies (e.g., municipal fire, police, or environmental departments), county agencies, state entities, and federal agencies (e.g., US Coast Guard, National Response Center, and EPA).
Resource Conservation and Recovery Act (RCRA) Facilities Database	Facilities listed in this EPA database are RCRA facilities for which a Corrective Action has been issued to address waste handling problems.
Resource Conservation and Recovery Information System (RCRIS)	This database contains information on all RCRA facilities. The facility types include: large quantity generators; small quantity generators; conditionally exempt facilities; transporter facilities; and treatment, storage, and disposal (TSD) facilities. Large quantity generators generate over 1,000 kilograms (kg) hazardous waste/month, or greater than 1 kg acutely hazardous waste as defined by RCRA. Small quantity generators generate more than 100 and less than 1,000 kg of hazardous waste during any calendar month.
Facility Index System (FINDS)	EPA references any facility or event that has been issued an EPA identification number; the EPA program office that issued the identification number is also listed. These listings do not necessarily reflect releases.
Regional Office Leaking Underground Storage Tank (LUST) Site List	This database lists LUSTs in the northeast region of Ohio that are known to the state of Ohio to be leaking.

2.1.2.1 Permits and Permit Applications

Review of the environmental database revealed that the following permits existed for one or more locations at RVAAP:

- RCRA Small Generator — Permit ID # OH5210490517
- RCRA Small Generator — Permit ID # OH5210020736
- RCRA Treatment, Storage & Disposal — Permit ID # OH520020736XS
- EPA Toxic Substances Control Act-PCBs — Permit ID # OH5210020736
- EPA Air Emissions — Permit ID # OH5210020736

• EPA Pesticides	Permit ID # OH5210020736
• EPA Insecticide, Fungicides, Rodenticide	Permit ID #s OH5210020736 and OH0000368639
• Stormwater	Permit ID # 3GR00112

Currently, Load Line 12 Pink Water Treatment Plant (RVAAP-18) has an active National Pollutant Discharge Emissions (NPDES) permit. The permit number for this plant is # 31000000GD and the discharge number is 006 (Patterson, 1998).

2.1.2.2 Inspection Reports and Enforcement Actions

A history of Federal and State EPA enforcement actions at RVAAP is provided below:

- 11/25/86 Written Informal Administrative Action
- 04/15/87 Written Informal Administrative Action
- 08/21/87 State Referral to EPA
- 10/21/87 Written Informal Administrative Action
- 06/30/88 Initial 3008(a) Compliance Order
- 01/10/89 Written Informal Administrative Action
- 10/31/89 Final 3008(a) Compliance Order
- 05/21/90 Written Informal Administrative Action
- 01/31/91 Written Informal Administrative Action
- 03/05/91 Written Informal Administrative Action
- 07/20/92 Written Informal Administrative Action
- 06/7/93 NOV, Ohio EPA
- 06/26/96 NOV, US EPA
- 10/16/97 NOV, US EPA
- 08/13/98 Written Informal Administrative Action

2.1.3 Aerial Photographs

Historical and recent aerial photographs of RVAAP and adjacent properties were analyzed to determine potential impacts of past activities as they relate to the storage and possible spills or other discharge of hazardous substances or petroleum products and their

derivatives. These photographs, including those taken during the years 1941, 1952, 1966, 1970, and 1982, were provided by RVAAP and the USGS.

These aerial photographs (represented at scales between 1:17,000 and 1:24,000) show features that are comparable between each year of imagery, including: major facility areas, buildings and associated structures, ground scarring, surface drainage, munitions storage areas, roads, and railways. With the exception of the 1941 aerial photograph, taken shortly after the time of original construction activities, the 1952 imagery shows the most ground scarring, with successive years showing revegetation in many areas of RVAAP. In general, the most activity, including ground scarring and open storage of munitions occurred during operational peaks associated with World War II and the Korean and Vietnam conflicts.

Aerial photographs of property adjacent to RVAAP throughout all years shows woodlands, agricultural areas, and sparse residential development. Other features noted appear to be routine operational activities. There were no indications of any environmental concerns identified during the review of these aerial photographs.

2.1.4 Property Maps

Topographic maps obtained from the USGS and several US Army maps provided information regarding boundaries of training areas, firing ranges, ammunition loading, packing and assembly areas, and other potential impact areas. Table below lists the topographic maps reviewed. Area of detail of the maps is RVAAP.

Table 2-1-4 Topographic Maps Reviewed

TITLE	DATE	SOURCE
Ravenna Army Ammunition Plant Plot Plans	1970 and 1971	US Army District Corps of Engineers
U.S Geological Survey. 1994. 7.5 minute Topographic map, Ravenna, Ohio Quadrangle	1994	US Geological Survey
U.S Geological Survey. 1994. 7.5 minute Topographic map, Windham, Ohio Quadrangle	1994	US Geological Survey
U.S Geological Survey. 1994. 7.5 minute Topographic map, Newton Falls, Ohio Quadrangle	1994	US Geological Survey
U.S Geological Survey. 1994. 7.5 minute Topographic map, Southington, Ohio Quadrangle	1994	US Geological Survey
U.S Geological Survey. 1994. 7.5 minute Topographic map, Mantua, Ohio Quadrangle	1994	US Geological Survey
U.S Geological Survey. 1994. 7.5 minute Topographic map, Atwater, Ohio Quadrangle	1994	US Geological Survey
U.S Geological Survey. 1994. 7.5 minute Topographic map, Garrettsville, Ohio Quadrangle	1994	US Geological Survey
U.S Geological Survey. 1994. 7.5 minute Topographic map, Deerfield, Ohio Quadrangle	1994	US Geological Survey

2.2 Interviews

To facilitate the review of RVAAP's environmental history and practices, interviews of current employees involved in operations were conducted. The purpose of these interviews was to support the determination and subsequent categorization of RVAAP.

At the present time, RVAAP is in modified caretaker status, and as such, the Government Owned, Contractor Operated (GOCO) facility is maintained by both civil servants and contractor personnel. Four civil servants and twenty five Mason and Hanger (M&H) employees are currently employed at RVAAP. Five employees were identified to be interviewed.

2.2.1 RVAAP Personnel Interviewed

- Mark Patterson, the Environmental Coordinator (EC) at RVAAP, was the primary point of contact (POC) and chief source of information regarding the location of relevant documents and other installation details. During the interview, Mr. Patterson provided information on groundwater monitoring wells, injection wells, firing ranges, various studies (including asbestos and radiation), construction activities, remedial actions, and details on installation sites and their regulatory status.
- Tim Morgan, the Natural Resources Manager at RVAAP, provided information regarding the specific locations of sites on RVAAP. Mr. Morgan was responsible for preparing the updated installation map that was critical in providing information for this report. Mr. Morgan was interviewed to gather information on storage and natural resource management practices.

2.2.2 Mason and Hanger Personnel Interviewed

- Mr. Jim McGee, the M&H Site Manager, was also interviewed to gather information on drinking water.
- Mr. Larry Boggs with Storage and Transportation, has worked at RVAAP since 1965. He provided detailed historical and current information of the installation. Mr. Boggs primarily provided information on storage facilities and described past and present operations in relation to the storage, transportation, and handling of explosives on RVAAP.
- Ms. Susan McCauslin, M&H Environmental Consultant, was also interviewed. She provided general environmental information on regulatory issues at RVAAP including stormwater management practices, NPDES permits, RCRA and other hazardous waste requirements, and the status of underground storage tank (UST) and aboveground storage tanks (ASTs).
- Rick Bauman, the Security Advisor for M&H, was also interviewed. Mr. Bauman provided information on Fire Training activities at RVAAP.

2.3 Visual Inspections

A visual inspection of selected areas at RVAAP and adjacent properties was performed. The on-site visual inspections of RVAAP and the adjacent properties was performed from

13 July through 17 July 1998. Inspection observations were made through physical inspection.

2.4 Title Documents

A review of the recorded chain of title documents regarding the real property was conducted. For this EBS, tract maps and title and transfer documents were reviewed to identify the previous owners prior to 1940, the time at which the property was purchased by the US Government. The purpose of this review was to identify previous ownership by any known industrial operation facility that may have used the property for hazardous material disposal, potentially creating an environmental concern prior to 1940.

Information reviewed revealed that all RVAAP property currently owned by the US Army was acquired in 1940. Prior to US Government appropriation, the chain of title for the property indicated that it was owned by various individuals. People present on the property prior to and during the early construction phase in September 1940 were referred to as farmers (Gray & Pape, 1995). Although the ownership of the subject property does not specifically indicate total land usage, no reference was made in the title to ownership by any known industrial corporation which may have used the property for hazardous material disposal, that would have potentially created an environmental concern.

3 SUMMARY OF DATA - RVAAP PROPERTY

3.1 Property Overview

This section presents an overview of past and current operations at RVAAP and a discussion of potential environmental contamination associated with installation operations. It provides a description of the installation facilities and addresses past and current waste management practices at RVAAP.

Information was collected through record searches, interviews, visual inspections, and map reviews. In addition, this section contains a general description of facilities within the installation, as described through existing documentation or site visits.

3.2 Installation History and Mission

RVAAP is a GOCO, IOC, US Army Materiel Command facility. It was constructed primarily as a site for loading medium and major caliber artillery ammunition, bombs, mines, fuze and boosters, primers, and percussion elements, as well as finished ammunition and ammunition components. Over the years, however, RVAAP has handled and stored strategic and critical materials for various government agencies and received, stored, maintained, transported, and demilitarized military ammunition and explosive items.

Although inactive since 1992, RVAAP maintained until 1993 the capability to load, assemble, and pack military ammunition. As part of the RVAAP mission, the inactive facilities were maintained in a standby status by keeping equipment in a condition to permit resumption of production within the prescribed time limitations.

In September of 1993, RVAAP was placed in inactive modified caretaker status, and subsequently changed to modified caretaker status. The load lines and associated real estate were determined to be excess to the US Army. The excess area included approximately 5,000 acres of land and 362 buildings in Load Lines 1 through 12 (excluding 7 and 11), and Area 4, and Area 8. Since 1993, Mason & Hanger Corporation (M&H) is the modified caretaker contractor of RVAAP.

Currently, the mission of RVAAP is the storage of explosives and the restoration and management of the environment. Normal Operations on RVAAP are overseen by about

29 people, most of whom are employed by the security contractor. As part of its mission to restore and manage the environment, the US Army is involved in and committed to the cleanup of 38 potentially contaminated areas of concern (AOCs) on RVAAP. **(The official number of AOCs stood at 38 during the EBS. However, by October 31, 1998 RVAAP/IOC will be reviewing approximately 13 more for inclusion on the official list.)**

3.3 Description of Major Facilities

Facilities at RVAAP can be placed into six categories: administration and support, storage, former manufacturing, former testing and firing ranges, open burning/open demolition and demilitarization, and landfill/sewage treatment. **At the present time, the only RVAAP facilities that remain active are those required to maintain its GOCO status, which include the administrative area and motor pool, Load Line 12 Pink Water Treatment Plant (RVAAP-18), and several storage areas.** Appendix B summarizes the Major Facilities at RVAAP.

3.4 Current Tenant Activities

Currently, RVAAP supports several tenant organizations, including the Ohio National Guard (OHARNG), the Air Force Reserve (AFR), the Defense Logistics Agency (DLA), and the Bureau of Alcohol, Tobacco, and Firearms (ATF).

- The OHARNG uses Areas A, B, C, D, E, F, and G, for training. These areas are located in the eastern and southwestern portions of the installation (see Appendix C - CERFA Map).
- The AFR uses an area referred to as the "drop zone" (Area J) for parachuting exercises, located in the north-central portion of RVAAP.
- The DLA utilizes several Aboveground storage tank (AST) areas, or "tank farms", located near route 80, North Line Road and Load Line 3, for the storage of ore reserves and other naturally occurring materials, including asbestos, ferro-chromium ore, manganese, antimony, sulfides, and talc. The DLA also utilizes certain buildings in the Inert Storage Area (Area 8) for storage of strategic materials. The large ore piles located in the eastern part of the installation near RVAAP-31 are also the property of the DLA. Here, bulk piles of ferro-chromium and manganese ore lie in reserve.
- The ATF stores various contraband, including different types of explosive devices and fireworks, mainly in the Explosive Underground Magazine Storage (C-Block Area) at RVAAP.

3.5 Facility Support Activities and Associated AOCs

Facility support activities at RVAAP have included, but were not limited to, a wide range of activities that supported the production, transportation, storage, and disposal or demolition of explosive materials, including munitions. Many, if not all, of the sites designated as AOCs (sites where the presence of or potential for contamination exists), are the result of these activities. This section describes the facility support activities identified through the course of this investigation and additionally discusses in detail all AOCs, (RVAAP-1thru RVAAP-38), associated with these activities.

Those AOCs which cannot be feasibly grouped within a facility support activity are discussed under a separate heading, as are those remaining sites (Area-39 thru Area-44) which require discussion but are not identified as AOCs.

3.5.1 Firing Ranges and Test Areas

Two firing ranges and two test areas at RVAAP are designated as AOCs. A third test area that is not an AOC is the Prototype Testing Range, which is located within Demolition Area 2 (RVAAP-04). Unexploded ordnance (UXO) concerns commonly exist at firing ranges and test areas.

3.5.1.1 Pistol Range (RVAAP-36)

The Pistol Range is located in the north-central part of the installation, due north of Winklepeck Burning Grounds (RVAAP-5) on a small unnamed tributary to Sand Creek. The Pistol Range occupies approximately 1.2 acres and is currently inactive. In the past, this site was used by the installation security force for pistol qualification and was occasionally used by other outside agencies (M&H, 1998). Small rounds were fired north from a small clearing into an old creek bank. Trees in this area show damage from small arms fire. Lead is considered a potential contaminant at this site (M&H, 1998), although a magnetometer search performed during the EBS site visit did not reveal an abundance of lead bullets. The Pistol Range is regulated under CERCLA. **Future Installation Restoration Program (IRP) phases include a Phase I/II Remedial Investigation (RI), and Remedial Action (RA) (M&H, 1998).**

3.5.1.2 40 and 60 mm Firing Range (RVAAP-32)

The 40 and 60mm Firing Range is located south of the Quarry Landfill/Former Fuze and Booster Burning Pits (RVAAP-16) and covers approximately 12 acres. This area, although currently inactive, was once used as a test firing range for 40mm and 60mm projectiles during the 1940s and 1950s. The area was heavily overgrown with brush and trees at the time of the site visit, which prevented a thorough inspection of the area. **Heavy metals are the potential contaminants at this site (**M&H, 1998), although none are documented to occur. The 40 and 60mm Firing Range is regulated under CERCLA. Future IRP Phases include a Phase I/II RI, Remedial Design (RD), and RA.

3.5.1.3 Firestone Test Facility (RVAAP-33).

The Firestone Test Facility is also known as Load Line 6 in the Fuze and Booster Area. The actual size of this area in unknown. The area consisted of a pond that was used as an underwater test chamber and several buildings (M&H, 1998). There was also an above ground test chamber located at this site (SAIC, 1996b). Tube-Launched Optically-Tracked Wire-Guided (TOW) Missiles, Dragon Missiles, and shape charges are reported to have been the subject of research conducted at the Firestone Testing Facility (Patterson, 1998). Firestone Tire and Rubber Company performed experiments on weapons at this site, but due to the classified nature of these activities, the details of work performed at this facility is unknown, as are the dates of operation (SAIC, 1996a). Explosives and metals are the potential contaminants of concern at this site (M&H, 1998). The Firestone Test Facility is regulated under CERCLA. Future IRP Phases include a Phase I/II RI, RD, RA, and Long Term Monitoring (LTM) (M&H, 1998).

Government Inspector AT LL 6 77-80 J. Cicero current Cmdr Rep Never Interviewed for This Report??

3.5.1.4 NACA Test Area (RVAAP-38)

The National Advisory Committee for Aeronautics (NACA) Test Area is located north and northeast of Demolition Area 2 (RVAAP-03) in the southwest portion of RVAAP in the area currently used by the OHARNG, specifically in Training Area G. The area occupies a narrow strip of land, approximately 40 acres in size. NACA, the organization preceding National Aeronautics Space Administration (NASA), used this area as a test-crash site while working to develop explosion-proof aircraft components, including fuel and fuel tanks. **Airplanes are reported to have landed on an old clay runway and were**

then taxied to the eastern portion of the test site. They were then connected to a conveyor belt and crashed into a barrier. Partially buried remains of some of these aircraft were visible on the ground surface at this site during the EBS site investigation, as some areas were used to dispose of refuse that accumulated as a result of activities at the site. The parking of airplanes can clearly be seen in some of the historical aerial photographs. Potential contaminants at this site include petroleum and other petroleum-related unknown constituents (M&H, 1998). Future IRP Phases include a Phase I/II RI, RD, and RA.

3.5.1.5 Hazardous Materials/Waste Management

Since WW II, hazardous materials were used intermittently during the manufacture and assembly of artillery, ammunition, bombs, mines, fuzes, primers, boosters, and percussion elements. Currently, the only reported hazardous materials or hazardous waste at RVAAP are principally materials associated with storage of explosives .

RVAAP historically handled hazardous materials and subsequently operated several waste management sites in support of its operations. Potentially hazardous materials were treated, stored, and disposed of in landfills, burned on site, or more recently are stored in drums awaiting appropriate disposal IAW the RCRA requirements.

3.5.1.6 Building 1601 Hazardous Waste Storage (RVAAP-07)

Building 1601, Hazardous Waste Storage, is a RCRA Waste storage facility located on Pallet Road B-West in the southwest part of Winklepeck Burning Grounds (RVAAP-05). It is a 20 by 22-foot concrete igloo, 16 feet in height. The site had been used since 1980 for the storage of solid ash residue and spent activated carbon, but is no longer in use. Wastes stored in this facility were containerized in 55-gallon Department of Transportation (DOT) drums. An application for a RCRA Part B Permit #OH5210020736 was submitted and subsequently withdrawn in 1993. The closure plan is under review by the Ohio EPA. The IRP status is Response Complete (M&H, 1998).

3.5.1.7 Deactivation Furnace (RVAAP-17)

The Deactivation Furnace was in operation from the 1960's to 1983. The unit consisted of an oil-fired rotary retort fed by a conveyor belt with the purpose of deactivating fuzes, boosters and small munitions items. After ignition and burning of explosives, the metal was removed and salvaged as scrap. This unit is currently undergoing RCRA closure under Ohio EPA guidelines. Under the closure plan, sampling was conducted and metals were detected in soil surrounding the unit. The closure plan also calls for removal of contaminated soil associated with the unit. **Contaminants of concern are metals in soil and groundwater.** A preliminary assessment/site investigation (PA/SI) was conducted under the IRP. Current IRP status is Response Complete (M&H, 1998).

3.5.1.8 Mustard Gas Burial Site (RVAAP-28)

This AOC is a possible Mustard Agent Burial Site. Former employees have revealed that mustard agent may have been disposed of in barrels and buried on site, reportedly before 1969. Records indicate that in 1969, excavation of the site revealed the presence of seven empty cans and a 55-gallon drum. It is also reported that previous excavation attempts encountered glass vials that resembled "mustard gas test kits". During the site inspection a magnetometer survey revealed anomalies probably attributable to barb wire and broken chain-link fence surrounding the area. The actual presence of Mustard Gas agent has never been confirmed at this site. Completed IRP Phase is PA/SI. Future IRP Phases scheduled are Phase I/II RI, RD, RA, and LTM.

3.5.2 Solid Waste/Landfill Management

RVAAP has maintained several landfill sites during the course of the plant's operating history. These landfills varied in size from 0.5 to 10 acres. All of the sites were unlined and received explosive waste which, at some of the sites, was thermally treated on-site prior to disposal.

The practice of open-burning (OB) was used primarily to desensitize and destroy waste explosive materials. These materials ranged from raw explosives to those items that were contaminated with explosives (rags, cardboard, etc.). Prior to 1980, waste explosives were burned directly on the ground surface. Since 1980, waste explosives and explosive munitions were burned in metal trays or in the deactivation furnace with ash residue

being collected, containerized, and placed in Building 1601, Hazardous Waste Storage (RVAAP 07), pending proper disposal IAW the guidelines established by RCRA.

3.5.2.1 Ramsdell Quarry Landfill (RVAAP-01)

Ramsdell Quarry Landfill is located in the eastern section of the RVAAP facility. It is a 10-acre unlined landfill in the bottom of an abandoned quarry. The soil covering is only a few feet thick. A pool of water was observed at the bottom of the quarry at the time of the EBS site inspection. Ramsdell Quarry Landfill was used from 1941 to 1989. From 1946 to 1950, the site was used as a land-surface burning site to thermally treat napalm and waste explosives from Load Line 1. From 1976 to 1989, the site was used strictly as a non-hazardous solid waste landfill. No historical information from 1950 to 1976 was available for review. The landfill ceased operation in September 1989.

A series of five monitoring wells were installed in 1987 (Ohio Drilling Company, 1988). Closure of the landfill was completed in May 1990 under State of Ohio Solid Waste Regulations. Currently, post-closure monitoring continues, the results of which were not available for review. Land-filled materials included domestic, commercial, industrial, and solid wastes including, but not limited to, explosives Trinitrotoluene(TNT), Composition B), napalm, gasoline, acid dip liquor, annealing residue, sulfuric acid, shell casings, sodium ortho silicate, chromic acid and alkali, aluminum chloride, and inert materials. The volume of landfilled material is unknown (Jacobs Engineering, 1989). The site is regulated by the Ohio EPA. The IRP Phase is Response Complete (M&H, 1998).

3.5.2.2 Erie Burning Grounds ([redacted]AAP-02)

Erie Burning Grounds are located in the northeastern section of the facility and cover approximately 35 acres. This site was used from 1941 to 1951 as a site for open burning of explosives and related items. Bulk, obsolete, non specification propellants, and conventional explosives from throughout the installation were treated at this location. Unspecified large metal items were also treated to remove explosive residue before being salvaged and processed as scrap (Jacobs Engineering, 1989).

Estimates regarding waste quantity burned have reached as high as a million pounds. This estimate, however, has been identified as an approximation of total wastes destroyed at all the burning grounds. The ash residues from the burning of explosive waste material

containing hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), TNT, and propellants, were left on site (Halliburton NUS, 1992). The ash residues may contain small amounts of explosives and some heavy metals. Potential contaminants include explosives and metals (M&H, 1998). The site is regulated by CERCLA. Future IRP Phases include a Phase I/II RI, RD, RA, and LTM (M&H, 1998).

3.5.2.3 Demolition Area 1 (RVAAP-03)

Demolition Area 1 is located adjacent to and south of the NACA Test Area (RVAAP-38) in the southwestern part of the facility. It is approximately 1.5 acres in size. This site was previously used for the thermal treatment of munitions by open burning and open detonation (OB/OD), and was active from 1941 through 1949 (Jacobs Engineering, 1989). The area was used to stage aircraft during the 1950's for the NACA test facility. The site is now inactive and consists of a 1-foot circular berm surrounding a grass area, which can be identified in both past and recent aerial photographs. Around the perimeter of the berm are areas of bare ground approximately 100 to 150 square feet in area. Munitions fragments, including scrap metal, small arms primers, and fuzes, lie on the ground surface outside the bermed area. Waste types include unknown quantities of shrapnel and other metallic munitions, and possibly explosive compounds (Jacobs Engineering, 1989). Explosives are the potential contaminants at this site, which is regulated under the requirements of CERCLA. Future IRP Phases include a Phase I/II RI, RD, and RA (M&H, 1998).

3.5.2.4 Demolition Area 2 (RVAAP-04)

Demolition Area 2 is an elongated, horseshoe-shaped cleared area approximately 20 acres in size. The site is currently active and has been used since 1948 to demilitarize through detonation large caliber munitions and "off-spec" bulk explosives that could not be deactivated or demilitarized by any other means of destruction (Halliburton NUS, 1992). Within the boundaries of this site, there are five distinct areas:

- Open Detonation Area: An area in which detonation was accomplished in a backhoe pit with a minimum depth of 4 feet. After detonation, metal parts were typically picked up and removed from the site and the pit backfilled, mulched, and reseeded.

- **[redacted] Burning Area!** An area of approximately 0.25 acre where the sludge from Load Line 6 Evaporation Unit from 1981 to 1986 was thermally destroyed at this location.
- Prototype Testing Range: An area where projectiles were fired into targets.
- Burial Site: An area where possible scrap bombs have been buried. This site is approximately 10 feet wide, 200 feet long and 4 feet deep. The area lies along a swale in the northwest corner of the Demolition Area.
- Past Disposal Area: An area that is posted "Off Limits, Dangerous Material" and is located along a 70-foot embankment overlooking Sand Creek.

Potential waste types at this site are unexploded ordnance, shrapnel, white phosphorus, explosive residues, and heavy metals. Explosives have been detected in soil samples collected from a trench, although analytical data was not available for review. A RCRA permit application covering the 1.5 acres used for open burning and detonation was withdrawn on April 11, 1994. Areas outside the RCRA area will be closed under CERCLA. Closure plans are being prepared for the area defined in the permit application (Jacobs Engineering, 1989).

Demolition Area 2 contains contaminants in concentrations that clearly exceed risk-based screening levels. Explosives and several metals, including cadmium, lead, and mercury, were detected in both surface and subsurface soils, and occur predominately in the southern portions of the site and at the old open detonation area (SAIC, 1998). A PA/SI and Phase I RI have been completed under the IRP. Future IRP Phases include a Phase II RI, RD, and RA (M&H, 1998).

3.5.2.5 Winklepeck Burning Grounds (RVAAP-05)

Winklepeck Burning Grounds, located near the center of RVAAP, consists of approximately 200 acres and have been in operation since 1941. **Present activities are limited to an area of about 15 acres.** Prior to 1980, the burning was carried out in four pits, on pads, and sometimes on the roads. The pits consisted of areas bermed on three sides, approximately 50 by 75 feet in size. Of the four pits, Pit #1 was used most frequently. The pads consisted of 20 by 40-foot areas without berms. Burning was

conducted on bare ground, and the ash was abandoned on site. Scrap metal was reclaimed and taken to the Landfill North of Winklepeck (RVAAP-19). It is not known how many pads were contained within this 200 acre unit. A train of projectiles up to 2,000 feet long would sometimes be placed in a ditch parallel to the road. The fire would cause the explosives to melt and flow out of the projectile and be burned. Some of the projectiles would explode and be ejected into the nearby area as far as 500 to 600 feet, usually to the north side of the ditch. Many of the further flung projectiles are still in the field where they landed. In some instances, high energy material such as black powder and explosives were also laid out in a string along a road and burned (US Army Toxic and Hazardous Materials Agency [USATHAMA], 1978).

Prior to 1980, explosive waste disposal included the burning of RDX, antimony sulfide, Composition B, lead oxide, TNT, propellant, black powder, sludge from load lines, and domestic wastes. Small amounts of laboratory chemicals were also routinely disposed of during production periods. Shrapnel and other metallic munitions fragments were allowed to remain on-site after detonation. Waste oil generally consisting of hydraulic oils from machines and lubrication oils from vehicles was disposed in the northeast corner of the burning ground until 1973. Procedures were not in place to collect ash from these areas (Jacobs Engineering, 1989).

Since 1980, burns have been conducted in metal, refractory lined trays (with subsequent ash collection), set on top of a bed of slag. These areas are also known as pads. The trays initially consisted of 1/4-inch boiler plate 4 feet by 60 feet by 10 inches which were refractory-lined. The trays were set on a pad of crushed slag in an area approximately 100 by 100 feet in size. Ash residues were drummed and stored in RVAAP-07 (Building 1601 Hazardous Waste Storage) until tested for waste determination. In 1994, four ground-water monitoring wells were installed near the active portions of the burning grounds, (Jacobs Engineering, 1989). A closure plan is being proposed for the area defined in the RCRA permit application.

Confirmed contaminants at Winklepeck Burning Grounds include explosives, metals, and organic compounds. TNT has been detected in soil samples at concentrations as high as 3,800 mg/kg. Cadmium, lead, manganese, and silver have been detected in soil samples at concentrations commonly exceeding background criteria, and other metals in the soil were found to exceed the USGS Ohio reference (SAIC, 1998). Winklepeck Burning Grounds are regulated under CERCLA. With the exception of the open burning area, a Phase I RI is in process. Future IRP Phases include RD, RA, and LTM metals (M&H, 1998).

3.5.2.6 C-Block Quarry (RVAAP-06)

C-Block Quarry, located within Block C Underground Storage Area, is an abandoned, unlined borrow pit, approximately 0.3 acres in size. The site was used as a disposal area for annealing process wastes for a short time during the 1950s. Liquid wastes were reported to have been openly disposed in the pit bottom. Spent pickle liquor (containing lead, mercury, chromium, and sulfuric acid) from a brass finishing operation is also documented to have been disposed of at this site. The site is now heavily forested with trees at least 1-foot in diameter or larger. The potential contaminants at this site are metals (M&H, 1998). Soil sampled in 1986 indicated a presence of metals, but not above EP toxic levels. No other information was available concerning this soil investigation. The site is regulated under CERCLA. There is not a current IRP Phase in place at this time. Future IRP Phases include a Phase I and II RI, RD, and RA.

3.5.2.7 Quarry Landfill/Former Fuze and Booster Burning Pits (RVAAP-16)

This site, located west of the Fuze and Booster Area, consists of three elongated ponds situated end to end in an abandoned rock quarry. The ponds are 15 to 20 feet deep and are separated by earthen berms. The total combined area of the three ponds is approximately 1 acre. From 1945 to 1949, the quarry site was used as an open burning area for sawdust waste derived from Load Lines 6 and 11. The site was also used as a landfill, where spent brine regenerate and sand filtration backwash from the groundwater treatment plant, fuze and booster assemblies, projectiles, residual ash, and sanitary wastes have all been disposed. In 1976, the existing debris was removed from the quarry bottom and transferred to either Ramsdell Quarry (RVAAP-01) or one of the burning grounds

(Jacobs Engineering, 1989). The ponds were originally constructed to receive filter backwash from the potable water system (groundwater pumped from a well and treated at Water Works 3). Outputs averaged 3,000 to 5,000 gallons per day and were permitted by Ohio NPDES Permit #31000000BD (US Army Environmental Hygiene Agency [AEHA], 1988). The ponds were operational from 1987 to 1993. This site is regulated under CERCLA. Potential contaminants include explosives and metals (M&H, 1998). Future IRP Phases include a Phase I/II RI, RD, RA, and LTM.

3.5.2.8 Landfill North of Winklepeck Burning Ground (RVAAP-19)

This site, located due north of Winklepeck Burning Grounds, is an unlined 10-acre landfill used for general refuse from 1969 to 1976. The general appearance of the site suggests a trench and fill method of operation. An unknown quantity of material was landfilled at this site, including booster cups, aluminum liners, sanitary wastes, and possibly explosive and munitions waste and ash (Jacobs Engineering, 1989). Potential contaminants include explosives and metals (M&H, 1998). The site is regulated under CERCLA. Future IRP Phases are Phase I/II RI, RD, RA, and LTM (M&H, 1998).

3.5.2.9 Sand Creek Disposal Road Landfill (RVAAP-34)

This site was a construction landfill located due south of the Sand Creek Sewage Treatment Plant (RVAAP-20) and is reported to have contained concrete, wood, several tons of asbestos, and spent fluorescent light bulbs. The dates of operation are unknown. Potential contaminants include asbestos and metals (M&H, 1998). It is regulated under CERCLA and Future IRP Phases include a Phase I/II RI, RD, RA, and LTM.

3.5.3 Waste Water and Wastewater Treatment

Several different types of wastewater have been generated at RVAAP, consequently a number of wastewater treatment units have been employed at RVAAP. Settling ponds, sumps, and evaporation units were used to collect wastewater from load line operations. Wastewater treatment units were used to treat domestic influent, and treatment facilities were used to treat pink water generated from load line operations.

Surface water impoundments began operation in 1948 and continued throughout the operational history of the facility. These sites were utilized to collect and act as a dilution media for effluent coming from load line sawdust filtration processes. The dilution/settling ponds were used in conjunction with storm water run off to minimize the effect of pink water generated by the photochemical reaction of TNT-contaminated wastewater. These ponds are unlined and most have a receiving stream that drains the settling ponds, some of which discharges off the installation.

Source of pinkwater / steam

Fifteen concrete basins, also referred to as settling tanks, are scattered throughout the load lines at RVAAP and served as sawdust filters or holding receptacles for explosive waste solutions. They range in capacity from 400 to 4,800 gallons. These concrete basins (RVAAP-26) are located within their associated load line facility that produced explosive waste. During production schedules, these tanks served as settling basins for explosive compound mixtures poured into the tanks. At designated frequencies, the settled sludge was drawn off and taken to one of the two burning grounds for treatment. These tanks have all been covered and abandoned in place.

3.5.3.1 Load Line 1 and Dilution/Settling Pond (RVAAP-08)

The Load Line 1 and the associated Dilution/Settling Pond was in operation from 1941 to 1971. Explosive residue that collected on the walls and floors during assembly operations was periodically washed and wastewater, or pink water, from the plant was collected in concrete sumps located throughout the line area. The wastewater was then pumped to the sawdust filtration unit for chlorination and removal of nitro-compounds prior to discharge. The sawdust filtration unit consisted of a set of three parallel 10 by 30 by 3-foot concrete settling tanks and a set of three 5 by 15 by 3-foot filter blocks, located in the bottom of the filtration tanks. Plant effluent introduced into the top of one end of the unit was ditched to a settling pond, known as Griggy's Pond. The settling pond at Load Line 1 was an unlined earthen impoundment approximately 1 acre in size. The discharge from the impoundment was sent to a surface stream (Sand Creek) that exited the installation. The sawdust from the filtration unit was then disposed by open burning at Winklepeck Burning Grounds (RVAAP-05) (Halliburton NUS, 1992).

Elevated concentrations of explosives, exceeding 5,000 mg/kg in areas surrounding the melt-pour buildings, have been detected in soils from Load Line 1 (SAIC, 1998). All metals, except silver, were detected in the soil at concentrations exceeding the background criteria, and all, except for aluminum, also exceeded the upper range of USGS reference values (SAIC, 1998). Elevated levels of explosives and metals were also reported from sediment samples at the site (SAIC, 1998). Potential contaminants include explosives and metals, including arsenic (M&H, 1998). The site is regulated under CERCLA. A PA/SI and Phase I RI has been completed. Future IRP Phases include a Phase II RI, RD, RA, and LTM.

3.5.3.2 Load Line 2 and Dilution/Settling Pond (RVAAP-09)

Similar in process, Load Line 2 was used to melt and load TNT and Composition B into large caliber shells and bombs. Pink water generated from cleaning the walls and equipment was collected in concrete sumps connected to Building DB-4. After settling, the supernatant water was pumped by low-pressure steam ejectors to two detonation tanks, approximately 6,900-gallons capacity, for cooling. When the water cooled to 80 degrees Fahrenheit (F), the water was pumped through an overhead pipe to a sawdust filter with a 140 cubic foot capacity. The sawdust filtration unit consisted of a set of two parallel 10 by 30 by 3-foot concrete settling tanks and a set of three 1.5 by 5 by 15 by 3-foot filtration tanks. Filtration through the sawdust caused clarification and removal of nitro-compounds prior to discharge into the drainage system. The top 2-inches of sawdust was removed periodically and the entire filter contents replaced weekly until laboratory analysis showed longer runs could be made by careful filter operation. The water was supplied to the filter at approximately 20-gallons per minute and the daily average volume treated was 5,000-gallons for two shift operations at Building DB-4. Sludge was periodically removed from the sumps and disposed/treated at Winklepeck Burning Grounds. The effluent from the sawdust filtration units was discharged into Kelly's Pond, a triangular shaped, unlined earthen settling impoundment, approximately 2 acres in size and 6 to 8 feet deep. The discharge from the impoundment was channeled to Sand Creek, a surface stream that exits the installation (Halliburton NUS, 1992).

Load Line 2 operated for 30 years (1941 to 1971). Approximately 20,264 pounds of Composition B and over 221,760 gallons of pink water per month were generated when the facility was at full capacity (Jacobs Engineering, 1989). Chromic acid waste (625 ppm hexavalent chromium) was also discharged from Building 802 (inert storage warehouse) into a ditch that empties into the West Branch of the Mahoning River (APCO, Ohio 1951). More than 144 million cubic feet of scrap, sludge, and dust was produced each month. Bulk brick explosives were brought to the buildings, screened and broken up. The explosives were put into kettles and melted. The grinding and pouring allowed explosive particulate matter to escape and settle on the walls and floors of the buildings. Although the air inside the buildings was continuously vacuumed, the walls and floors had to be washed down on a weekly basis. The water was collected in drains running along the interior of the building and transferred to an approximately 15-foot deep sump on the first floor. This water was then pumped to the sawdust filtration units (Jacobs Engineering, 1989).

TNT and RDX were detected in sediment samples collected from the ditch receiving the discharge from the sawdust filtration unit. Concentrations ranging from 0.60 µg/ml TNT to 1.75 µg/ml RDX have been detected (AEHA, 1988). Elevated concentrations of TNT and other explosives, inorganics, and organics including polycyclic aromatic hydrocarbons (PAHs) and PCBs in soils were reported in soil from the central portion of the load line complex, particularly around the doorways, drains, and vacuum pumps associated with the melt/pour buildings. The maximum concentration of TNT was 12,000 mg/kg. Several metals were also detected above background concentrations from this area (SAIC, 1998).

The Load Line 2 and Dilution/Settling Pond AOC is regulated under CERCLA. A PA/SI and Phase I RI has been completed. Future IRP Phases include a Phase II RI, RD, RA, and LTM.

3.5.3.3 Load Line 3 and Dilution/Settling Pond (RVAAP-10)

The washdown and steam decontamination of equipment generated pink waste water from this load line that was collected in concrete sumps located throughout the load line

area. After settling, the wastewater was pumped to a set of three parallel 10 by 30 by 3-foot settling tanks via steam ejectors. After slight cooling, wastewater was sent to three 5 by 15 by 3-foot sawdust filtration units, in which sawdust was placed on top of vitreous clay filter blocks. The sawdust and the settled sludge was periodically removed to Winklepeck Burning Grounds. The effluent from the sawdust filtration unit was discharged via a ditch into a settling pond that emptied into Upper Cobbs Pond and (RVAAP-29) ultimately Lower Cobbs Pond (Jacobs Engineering, 1989).

Load Line 3 operated from 1941 to 1971. Over 20,000 lbs of scrap and sludge and 80,000 gallons of pink water was generated per month when the facility was operating at full capacity. The wastes consisted of TNT, octahydro 1, 3, 5, 7 - tetranitro 1, 3, 5, 7 - tetrazocine (HMX), Composition B, lead, chromium, mercury, and arsenic (Jacobs Engineering, 1989).

RDX at a concentration of 1.6 µg/ml was detected in a sediment sample collected from Upper Cobbs Pond (Mogul Corporation, 1982). Since Load Lines 3 and 12 both discharged into Cobbs Pond, it is unknown if this contamination originated from Load Line 3 (Jacobs Engineering, 1989). Elevated concentrations of TNT and other explosives, inorganics, and organics Polyaromatic Hydrocarbons (PAHs) and PCBs were reported to occur in soil around the doorways, drains, and vacuum pumps associated with the melt-pour buildings (SAIC, 1998). The maximum concentration of TNT was 390,000mg/kg. Several metals were detected at concentrations in excess of site-related background criteria and USGS reference values at this area (SAIC, 1998).

Load Line 3 Dilution/Settling Pond is regulated under CERCLA. A PA/SI and Phase I RI has been completed. Future IRP Phases include a Phase II RI, RD, RA, and LTM.

3.5.3.4 Load Line 4 and Dilution/Settling Pond (RVAAP-11)

The Load Line 4 Wastewater Treatment System was in operation from 1941 to 1971. Washdown and steam decontamination of equipment generated pink wastewater from the plant which collected in concrete sumps located throughout the line area. The wastewater was then pumped to a sawdust filtration unit, which consisted of a set of three parallel 10

by 30 by 3-foot concrete settling tanks and a set of three 5 by 15 by 3-foot filtration tanks. Sawdust was placed on top of vitreous clay filter blocks in the bottom of the filtration tanks. After passing through the settling tanks, plant effluent was introduced into the top of one end of the filter tanks and then discharged to a surface ditch from the bottom of the other end of the filter tanks. Effluent from the sawdust filtration unit was diverted via drainage ditches to a 2-acre settling pond within the Load Line 4 area. Sludge and spent sawdust was periodically removed and treated/disposed of at Winklepeck Burning Grounds by thermal destruction (Jacobs Engineering, 1989).

Approximately 26,300 pounds of scrap, sludge, and over 417 million cubic feet of dust and 894,000 gallons of pink water were generated per month when the facility was operating at full capacity. The wastes consisted of TNT, RDX, Composition B, lead, chromium, mercury and some unknown constituents. Previous characterization data indicated that RDX was detected at a concentration of 0.54 µg/ml, while TNT was detected at a concentration of 0.06 µg/ml in samples collected from the drainage ditch (Jacobs Engineering, 1989). More recently, explosives concentrations from soils sampled in this area were below 2.2 mg/kg (SAIC, 1998). Elevated concentrations of metals (above background criteria) were also detected from this area. Metals appear to be the most prevalent of confirmed contaminants at this site.

Load Line 4 Dilution/Settling Pond is regulated under CERCLA. A PA/SI and Phase I RI has been completed. Future IRP Phases include a Phase II RI, RD, RA, and LTM.

3.5.3.5 Load Line 12 and Dilution/Settling Pond (RVAAP-12)

Load Line 12 was primarily used for the demilitarization of munitions. The projectile and fuse assemblies were removed from the bomb casing and the projectile was placed in a double-jacketed steam canister. Explosives were liquefied into a tray, knocked out of the tray, packed, and shipped out. The building area was washed down weekly and the water was diverted through a pipe into a series of two stainless-steel tanks. One tank was used for settling and one for filtration. Prior to 1981, the tank effluent was ditched (from Building FJ-904) to a holding pond, where ultimately the water drained to Upper Cobbs and then Lower Cobbs Pond (RVAAP-29) (Jacobs Engineering, 1989).

The Silas Mason Company of Shreveport, Louisiana, was awarded a contract in 1946 to rehabilitate the ammonium plant and produce fertilizer grade ammonium nitrate to fulfill the US Government's commitment for aid in rehabilitation of occupied foreign countries. A total of 518,264 tons of ammonium nitrate was produced until the contract was terminated in January 1950.

Approximately 85,536 gallons of pink water was generated per month when the plant was fully operational during the 1950s. The effluent contained TNT, Octahydro 1,3,5,7,-tetranitro 1,3,5,7-tetrazocine (HMX), Composition B, Ammatol (a mixture of ammonium nitrate and TNT), lead, chromium, mercury, and other explosives. The facility was housed in a steel girder, transite-sided building approximately 100 by 60-feet [redacted] NUS, 1992). Sediment samples from Cobb Ponds Complex have been found to be contaminated with RDX at a concentration of 1.16 µg/ml and TNT at a concentration of 0.17 µg/ml. In the past, contaminated wastewater was allowed to drain into the environment. Overflow could have potentially gone into a drainage ditch located approximately 100-feet east of this unit.

Further analytical data collected from this site indicates that explosives at concentrations up to 19,000 mg/kg exist in the three main areas within the AOC (SAIC, 1998). Inorganics, including cadmium, chromium, lead, and mercury, were detected in soil from the site at concentrations above the Ohio USGS reference levels (SAIC, 1998).

Load Line 12 Dilution/Settling Pond is regulated under CERCLA. A PA/SI and Phase I RI has been completed. Future IRP Phases include a Phase II RI, RD, RA, and LTM.

3.5.3.6 Building 1200 and Dilution/Settling Pond (RVAAP-13)

Building 1200, the Ammunition Sectioning Area, is half concrete, half transite-sided building approximately 30 by 20-feet with a 12-foot peak. Building 1200 was used from 1941 to 1971 for ammunition demilitarization. Munitions rounds were checked for flaws, steam cleaned, and the wastewater drained via a pipe through a crushed slag gravel bed

into a ditch and finally into a 0.5-acre sedimentation pond (Jacobs Engineering, 1989). Currently the building area is inactive.

Effluent from the facility contained explosive-contaminated wastewater. The water may have contained small amounts of TNT, HMX, Composition B, or other explosives as well as heavy metals such as lead, chromium, and mercury (Jacobs Engineering, 1989). Potential contaminants at this site include explosives, metals, and organics (including PAHs and pesticides). Although metals were not detected above background values and no explosives were detected in soil, PAHs were detected at concentration up to 0.160 mg/kg and the pesticides alpha chlordane and gamma chlordane were detected at concentrations of 0.240 mg/kg and 0.230 mg/kg respectively (SAIC, 1998).

Building 1200 is regulated under CERCLA. A PA/SI and Phase I RI has been completed. Future IRP Phases include a Phase II RI, RD, RA, and LTM.

3.5.3.7 Load Line 6 Evaporation Unit (RVAAP-14)

The Load Line 6 Evaporation Unit is an 18 by 14 by 4-foot concrete tank with two compartments measuring 5 by 14-foot and 13 by 14-foot. Carbon filters were enclosed in a 20 by 20-foot prefabricated metal building having welded plate structural members, straight walls, and a clearspan shell (AEHA), 1988, though the building is not longer in place.

The site was operational from 1981 to 1987 by Physics International, the operations contractor, and was used to collect wastewater (containing TNT and RDX residue) from Load Line 6 during research and development experiments. Wastewater containing explosives from washdown was evaporated in the larger of the two concrete compartments. Residuals from the tank were removed and transferred to (RVAAP-04) Demolition Area 2 for thermal destruction (AEHA, 1988). In 1985, an inspector from the Ohio EPA noted hairline cracks in the tank, which was lined with Polyvinyl Chloride (PVC). In 1989, the tank was emptied, cleaned of explosive residues, and was issued a RCRA Closure letter. Soil sampling conducted after removal of soil confirmed clean

closure of this unit. This site is regulated under RCRA. Installation Restoration Program (IRP) Phase status is Response Complete.

3.5.3.8 Load Line 6 Treatment Plant (RVAAP-15)

Load Line 6 Treatment Plant consisted of dual activated carbon units intended for pink water filtration. Two 167-pound carbon units were enclosed in a 20 by 20-foot steel girder, metal-sided building, set on a concrete pad. Plant effluent was stored in a 900-gallon stainless-steel holding tank. The effluent was pumped through a Cuno filter to remove particulate matter. After the effluent was filtered, it was pumped through two activated carbon units; 30 minutes of carbon bed contact time was maintained for each treatment cycle. The liquid was then pumped to one of two 500-gallon holding tanks. The treated water was then sampled and discharged to George Road Sewage Treatment Plant or retreated. The spent carbon was stored in Building 1601 (RVAAP-07) until transported off site for ultimate disposal (Halliburton NUS, 1992).

Load Line 6 Treatment Plant was operational from 1987 to 1993. The site was regulated as an internal monitoring point under NPDES Permit #31000000BD. The permit specified that the site may discharge a maximum allowable concentration of 0.14 ppm TNT, RDX, and HMX (Jacobs Engineering, 1989). Waste constituents at this site include TNT, RDX, and HMX. Potential contaminants are therefore explosives. A PA/SI has been completed at this site. Future IRP Phases include a Phase I RI.

3.5.3.9 Load Line 12 Pink Waste Water Treatment Plant (RVAAP-18)

Load Line 12 Pink Water Treatment Plant consists of a dual mode activated carbon filtration system for filtering pink water. Twin 2,000-pound carbon units are enclosed in a 20 by 40-foot steel girder, metal-sided building on a concrete slab. [redacted] stored in Building 1601 (RVAAP-07) until transported off site for ultimate disposal (Jacobs Engineering, 1989).

This wastewater treatment plant was built in 1981, within the confines of Load Line 12. During operation, effluent was pumped through a bag pre-filter that removed the particulate matter. The effluent was then pumped through a series of two activated

carbon units to another holding tank. Approximately 30 minutes of carbon bed contact time was maintained during the treatment process (Jacobs Engineering, 1989).

The site was designed to treat 20 gallons of wastewater per minute and averaged 5,000 gallons per day (Jacobs Engineering, 1989). The site operates under the State of Ohio NPDES Permit #31000000BD. Potential contaminants at this site are explosive compounds. A PA/SI and Phase I RI have been completed here. There are no future IRP Phases scheduled, as the status of this site is Response Complete (M&H, 1998).

3.5.3.10 Sand Creek Sewage Treatment Plant (RVAAP-20)

The Sand Creek Sewage Treatment Plant consisted of two Imhoff tanks, two trickling filters, and a final clarifier. Sludge was dried in two beds contained within a "greenhouse" type structure and spread over land (location unknown). The design flow capacity was 350,000 gallons per day. Flows ranged between 150,000 to 200,000 gallons per day (AEHA, 1988).

This site operated intermittently from 1969 to 1993. The waste handled at this site was exclusively domestic sewage. The effluent from this treatment plant discharged to Sand Creek. The unit operated under NPDES Permit #31000000BD until 1993 when the site ceased operations (Jacobs Engineering, 1989). The site has been completely cleared of all tanks and water treatment related equipment. This site was closed in 1993 IAW EPA requirements (M&H, 1998). A PA has been completed, but there are no future IRP Phases scheduled for this site as it is in Response Complete status (M&H, 1998).

3.5.3.11 Depot Sewage Treatment Plant (RVAAP-21)

Depot Sewage Treatment Plant is very similar in design to (RVAAP-20) Sand Creek Sewage Treatment Plant. This unit, which was gravity fed, consisted of two Imhoff tanks, two small trickling filters (only one is functional), and a chlorinator. The design capacity was about 65,000 gallons per day. The flow rates were about 10,000 to 20,000 gallons per day (Jacobs Engineering, 1989).

This unit was active from 1941-1993 and was permitted under Ohio NPDES Permit #31000000BD to handle only NPDES regulated wastewater. Sludge generated here was transported to the George Road Sewage Treatment Plant (RVAAP-22) for disposal and the effluent was discharged to Hinkley Creek (Jacobs Engineering, 1989). [redacted] A PA/SI has been completed and there are no future IRP Phases scheduled, as the site is in Response Complete IRP status (M&H, 1998).

3.5.3.12 George Road Sewage Treatment Plant (RVAAP-22)

George Road Sewage Treatment Plant is a gravity fed plant that consisted of two Imhoff tanks, two trickling filters, and a clarifier,. Sludge was dried in a greenhouse structure and spread over the ground surface. Historical information does not indicate where the sludge was spread, or if it was tested prior to being spread. There are, however, effluent limitations specified in the NPDES permit. The design capacity was 350,000 gallons per day. Normal discharge was between 150,000 to 200,000 gallons per day. Approximately 1,200 cubic feet of sludge was spread every three years (Jacobs Engineering, 1989). The site where the sludge was spread is unknown.

The waste handled at this site was domestic sewage and discharge from RVAAP-15 and RVAAP-30. Effluent from this treatment plant was discharged to a receiving stream. The site did maintain Ohio NPDES permit #31000000BD until 1993, when the facility ceased operations (Jacobs Engineering, 1989). The plant was closed in 1993 IAW EPA requirements (M&H, 1998). A PA/SI has been completed and there are no future IRP Phases scheduled, as the IRP status at this AOC is Response Complete (M&H, 1998).

3.5.3.13 Fuze and Booster Area Settling Tanks (RVAAP-26)

RVAAP-26 (Fuze and Booster Area Settling Tanks) consisted of 15 concrete tanks located throughout Load Lines 5, 7, 9, 10 and 11. A summary of the settling tanks at each load line follows:

- Load Line 5: One tank 8 by 8-feet; 3,840 gallon capacity.
- Load Line 7: One underground tank 10 by 6 by 3-feet; 1,350 gallon capacity. This tank was removed in 1988.

- Load Line 9: Two tanks, one 10 by 8 by 8-feet; 4,800 gallon capacity and one 8 by 8 by 6-feet; 2,880 gallon capacity.
- Load Line 10: Nine tanks, seven 8 by 8 by 8 feet; 3,480 gallon capacity, one 3 by 6-feet; 405 gallon capacity, and one above ground tank with unknown dimensions.
- Load Line 11: Three tanks each 8 by 8 by 8-feet, 3,829 gallon capacity (Jacobs Engineering, 1989).

All of the tanks were used as settling basins for the explosive-contaminated wastewater during the production processes at the load line facilities (5,7,9,10, and 11) from 1941 to 1971. The settled sludge was periodically collected from the tanks (every 1 to 3 months) and transferred to one of the burning grounds for thermal destruction. The disposition of the water from the tanks is not positively known. It may have been pumped onto the ground or into the sewer systems (USAEHA, 1988). The soil surrounding the process buildings sourcing the effluent to the settling tanks may also be of concern because building washout operations historically resulted in the release of wastewater on the ground. In 1971, all of these tanks were emptied, cleaned, and covered. They have not been used since but remain in place with the exception of the Load Line 7 tank (Halliburton NUS, 1992).

Waste contaminants at these tanks included TNT, RDX, black powder, lead, lead azide, mercury, lead styphnate, and some unknown compounds (Jacobs Engineering, 1989). Potential contaminants are explosives and metals. The AOC is regulated under CERCLA. Completed IRP Phases include PA/SI. A Phase I/II RI is the only future IRP Phase scheduled at this time.

3.5.3.14 Upper and Lower Cobb Ponds (RVAAP-29)

The Upper and Lower Cobbs Pond complex was active from 1941 to 1971, serving as sedimentation basins for explosive wastewater. The complex consisted of two unlined ponds that received effluent from Load Line 3 (RVAAP-10) and Load Line 12 (RVAAP-12) sawdust filtration units and storm and surface water runoff. Overflow from Upper Cobbs Pond discharged to Lower Cobbs Pond and then to a receiving stream prior to

exiting the facility (Jacobs Engineering, 1989). Upper Cobbs Pond is approximately 5-acres in size and Lower Cobbs Pond is approximately 3 to 4-acres in size. Both ponds have been used for recreational purposes and support abundant fish and wildlife. A ponded area approximately 1-acre in size known as the "backwater area", created by beavers, presently exists south of Upper Cobbs Pond. This area was not present during plant operations. It also supports abundant fish and wildlife.

In 1966, a large fish kill occurred at Cobbs Pond. The fish kill was attributed to the improper handling of aluminum chloride during the manufacturing operations at (RVAAP-12) Load Line 12. The bulk of the aluminum chloride was collected and disposed of at Ramsdell Quarry Landfill (RVAAP-01), (Jacobs Engineering, 1989).

Several metals, including lead, chromium, copper, mercury, and selenium have been detected above background values in sediments from both ponds, primarily in the center of each pond (SAIC, 1998). A single detection of explosives, specifically nitrobenzene, occurred with a reported concentration of 0.380 mg/kg in sediment sample collected during a recent investigation (SAIC, 1998). Previously acquired analytical data from investigations performed at this site further support that contamination exists in the form of explosives at this site (Mogul Corporation, 1982). Organics, including eight PAHs, were reported to have occurred at concentrations ranging from 0.19 mg/kg to 0.56 mg/kg (SAIC, 1998). Aluminum chloride is also a potential contaminant at the Upper and Lower Cobbs Pond AOC (M&H, 1998). This site is regulated under CERCLA. Completed IRP Phases to date include PA/SI and Phase I RI. Future IRP Phases are a Phase II RI and RA.

3.5.3.15 Load Line 7 Pink Water Treatment Plant (RVAAP-30)

This site consists of dual activated carbon units for filtration of pink water from Load Line 7. Twin 167-pound carbon units are enclosed within a metal sided building which sits on a concrete floor. Plant effluent was stored in a 900 gallon stainless steel holding tank. A batch treatment process was used, treating 500-gallons per batch. The effluent was pumped through a Cuno filter that removes particulate matter. Subsequent to the Cuno filter, the effluent was pumped through a series of two activated carbon units to

another holding tank. Approximately 30 minutes of carbon bed contact time was maintained for each treatment cycle. The treated water was pumped to one of two 500 gallon holding tanks, sampled and discharged to George Road Sewage Treatment Plant. The floors of the enclosed building slope to a sump that also discharged to George Road Sewage Treatment Plant. Spent carbon was stored in Building 1601 (RVAAP-07) until being transported off-site for ultimate disposal (Jacobs Engineering, 1989). Potential contaminants at this AOC are explosives (M&H, 1998). Completed IRP Phases to date are a PA/SI. No future IRP Phases are scheduled, as the IRP status is Response Complete (M&H, 1998).

3.5.3.16 Building 1037, Laundry Wastewater Sump (RVAAP-35)

Building 1037 served as the laundry facility for the plant. Each day, the scrubs the load line workers wore while working were laundered. Wastewater from the laundry facility discharged to a sump behind Building 1037. The sump may contain TNT, RDX, or other explosive residue from load lines. Other sections of Building 1037 are currently the Military Headquarters for RVAAP. Potential contaminants at this site are explosives and metals (M&H, 1998). A PA/SI has been completed under the IRP. Future IRP Phases include a Phase I/II RI, RD, RA, and LTM.

3.5.3.17 Ore Pile Retention Pond (RVAAP-31)

RVAAP-31 is an small, unlined surface impoundment constructed during the 1950s to abate runoff from the manganese and ferro-chromium ore piles and is currently still active. Waste types associated with this site include, but are not limited to, manganese, chromium an[redacted]. Estimates regarding the volume of wastes associated with this pond are not available (SAIC, 1996b).

RDX and TNT were detected in soil surrounding the ore piles (Mogul Corporation, 1982). Subsequent sampling at the facility detected no manganese contamination (SAIC, 1996b). The site was once monitored through an NPDES Permit. A PA/SI was completed and LTM is the only future IRP Phase scheduled (M&H, 1998).

3.5.4 Underground and Aboveground Storage Tanks

3.5.4.1 Underground Storage Tanks

Currently, there are no USTs at RVAAP. All USTs have been removed and are considered closed by the Ohio EPA (Susan McClausin, 1998). Most of the former USTs were pulled in the late 1980's and early 1990's. Although all USTs are considered closed with the Ohio EPA, there are no documented final closure notices on file for these actions (Mark Patterson, 1998).

There were a total of 50 USTs installed at RVAAP between 1941 and 1982. Table below summarizes available information on all USTs known to have been in place at RVAAP.

Table 3-5-4-1 Former USTs at RVAAP

Tank Number	Location	Contents	Capacity (Gallons)	Date of Installation
RV-1	George Rd. Gas Station	Gasoline	12000	1968
RV-2	George Rd. Gas Station	Gasoline	12000	1968
RV-3	Post #1 Generator	Gasoline	285	1941
RV-10	Post 24 Bldg. F-4	Inhibitor/Water	500	1941
RV-11	RR Yard	#2 Fuel Oil	15000	1941
RV-12	PH #6	#2 Fuel Oil	1000	1974
RV-13	Bldg. U-6(N) Depot	Inhibitor/Water	12000	1941
RV-14	Bldg. U-6(S) Depot	Inhibitor/Water	12000	1941
RV-15	Bldg. U-3(S) Depot	Inhibitor/Water	12000	1941
RV-16	Bldg. U-3(N) Depot	Inhibitor/Water	12000	1941
RV-17	Bldg. A-6(N) Depot	Inhibitor/Water	3900	1941
RV-18	Bldg. A-6(C) Depot	Inhibitor/Water	3900	1941
RV-19	Bldg. A-6(S) Depot	Inhibitor/Water	3900	1941
RV-20	Bldg. DB-27 LL #2	#2 Fuel Oil	15000	1969
RV-21	Bldg. DB-27 LL #2	#2 Fuel Oil	15000	1969
RV-22	RR Yard	#2 Fuel Oil	15000	1941
RV-23	Bldg. 1045 (Admin.)	Diesel	15000	1941
RV-29	Bldg. FE-22 LL #12	#2 Fuel Oil	1000	1941
RV-33	Deactivation Furnace	#2 Fuel Oil	2000	1968
RV-37	Bldg. A-1 Depot	Inhibitor/Water	5000	1941
RV-41	Bldg. 2F-11 LL #6	#2 Fuel Oil	6000	1982
RV-46	EE-102 (Bolton HSE)	#2 Fuel Oil	1500	1941
RV-47	Post 32 (Freedom)	Inhibitor/Water	500	1941
RV-50	WW #4 - Heat	#2 Fuel Oil	1000	1976
RV-51	WW #4 - Gen	Diesel	550	1976
RV-52	Old ATLAS - Bldg. T-18	#2 Fuel Oil	1000	1941
RV-55	PH #1	#5 Fuel Oil	20000	1941
RV-56	PH #1	#5 Fuel Oil	20000	1941
RV-57	PH #2	#5 Fuel Oil	15000	1941
RV-58	PH #2	#5 Fuel Oil	15000	1941
RV-59	PH #4	#5 Fuel Oil	20000	1941
RV-60	PH #4	#5 Fuel Oil	20000	1941
RV-61	PH #5	#5 Fuel Oil	20000	1941
RV-62	PH #5	#5 Fuel Oil	20000	1941
RV-63	PH #7	#5 Fuel Oil	20000	1941
RV-64	PH #7	#5 Fuel Oil	20000	1941
RV-66	PH #6	#6 Fuel Oil	20000	1974
RV-67	PH #6	#6 Fuel Oil	20000	1974
RV-73	Bldg. T-2501	#2 Fuel Oil	5000	1981
RV-80	George Rd. Gas Station	Leaded Gasoline	12000	1941

Tank Number	Location	Contents	Capacity (Gallons)	Date of Installation
RV-81	Bldg. 1047	Gasoline	10000	1941
RV-82	Bldg. 1047	Gasoline	10000	1941
RV-83	Bldg. 1047	Gasoline	10000	1941
RV-86	Tele. Bldg. (100' N)	Unknown	Unknown	Unknown
RV-87	Tele Bldg. (NE)	Unknown	Unknown	Unknown
RV-88	Fire Station #2	#2 Fuel Oil	Unknown	1941
RV-89	George Rd. STP (S @ SS Rd.)	Unknown	Unknown	Unknown
RV-91	UTES - West Maint. Bldg.	#2 Fuel Oil	3000	1969
RV-92	UTES - West Maint. Bldg.	Used Motor Oil	3000	1970
RV-95	UTES - East Maint. Bldg.	#2 Fuel Oil	3000	1969

3.5.4.1.1 Unit Training Equipment Site Waste Oil Tank (RVAAP-23)

The Unit Training Equipment Site (UTES) Waste Oil Tank (RVAAP-23) is the only UST-related AOC at RVAAP. This UST was a 1,000 gallon underground waste oil tank. Adjacent to this UST was another tank that stored Fuel Oil No. 2. Both tanks were located outside the rear of Building T-102, which is a maintenance shop. The exact age of the tank is unknown, but is estimated to be at least 20-years old. These tanks were located within 15 feet of the water supply well for the maintenance shop and were removed in 1989. The waste oil tank had been inactive since 1988 (SAIC, 1996a). The tank, and any associated contaminated soil, was removed in 1989 (M&H, 1998). Potential contaminants are waste oil, although the IRP Status is Response Complete (M&H, 1998). A PA/SI has been performed at the site, which is regulated under CERCLA.

3.5.4.2 Aboveground Storage Tanks

As of April 1998, four fuel-containing ASTs (Tanks #s 108, 109, 110, and 111) remained active at RVAAP. Tank #s 108, 109 and 110 are located at Building 1034, Tank # 111 is located at Building 1037. Table below summarizes the details regarding active fuel containing ASTs at RVAAP.

Table 3-5-4-2 Active ASTs at RVAAP

Tank #	Building Location	Secondary Containment	Contents
108	1034	Yes	Gasoline/ Fuel Oil
109	1034	No	Kerosene
110	1034	No	Propane
111	1037	No	Propane

There were approximately 50 ASTs utilized at one time at RVAAP. Most of these tanks have been removed and scrapped or sold, but some remain in place and are empty. Contents of these tanks included gasoline, diesel, kerosene, and inhibitor/water, but most contained #2 Fuel Oil.

3.5.4.2.1 Reserve Unit Maintenance Waste Oil Tank (RVAAP-24)

The Reserve Unit Maintenance Waste Oil Tank is the only AST-related AOC at RVAAP. This AST has been operational since 1983. This AST, which did not have secondary containment, was used to contain waste oil from the motor pool area was stored in the waste oil tank. In 1993, the contents of the tank were emptied and it has remained inactive since this time.

3.5.4.2.2 Building 1034 Motor Pool Waste Oil Tank (RVAAP-25)

Building 1034 Motor Pool Waste Oil Tank was in operation from 1974-1993. In 1993, the contents were emptied and it remains inactive. Three other ASTs are presently in use at the Motor Pool. Reportedly, they are inspected by Mason & Hanger every two months for integrity. The contents of these three tanks are: gasoline/fuel oil, kerosene and propane. Potential contaminants of concern are petroleum hydrocarbons and other compounds associated with waste oil. There is no documented release from this unit.

3.5.4.2.3 Defense Logistics Agency (DLA) ASTs

In addition to the active fuel-containing ASTs at RVAAP, the DLA utilizes a number of ASTs, referred to as "Tank Farms", for the bulk storage of materials, including antimony, asbestos (amosite and chrysotile), and talc. These tank farms are located at Load Line 3, Inert Storage Area 8, and route 80 at North Line Road. Table below lists the materials being stored by the DLA, the number of tanks used for this purpose, and the total number of tons of each material. This information is current as of July 1998.

Table 3-5-4-2-3 DLA AST Material Storage

Material	Number of Tanks	Total Tonnage
Antimony	17	3389
Asbestos (Amosite)	8	2849
Asbestos (Chrysotile)	1	212
Talc (Powdered)	1	660

3.5.5 Storage Magazines

3.5.5.1 Earth-Covered Magazines

There are approximately 700 earth-covered magazines or igloos at RVAAP, most of which are currently being used for indefinite storage of explosives and other materials. Historically, the earth-covered magazines were used for the storage of black powder and propellants. All of the black powder has either been destroyed or previously shipped out. Currently, the Category 1.1 High Explosives being stored in the earth-covered magazines are Composition B and Nitroguanadine. The Composition B is in flake form and resembles TNT in appearance. Appendix A lists the types and amounts of explosives currently stored at RVAAP.

The earth-covered magazines each have a 250,000 pound maximum storage capacity and are either 60, 80, or 100 feet long. There is a heavy gauge steel door on the front of the magazine with a vent that may be closed in case of fire. The concrete floors of the magazines are slightly bowed, allowing any water that may have entered the structure to flow to one of the two drains that run lengthwise along the floor of each magazine. These drains have a steel cap that may be cleaned-out. The drains empty to stormwater-drainage ditches outside the magazine. There is an additional vent on the top of the structure to prevent heat buildup, as well as a grounded lightning rod to prevent strikes during an electrical storm. In the past there were no strict guidelines for cleaning out the igloos. They were generally swept-out before loading, but were not generally swept-out after unloading for shipping. Visible spills were most likely cleaned up (Larry Boggs, 1998).

3.5.5.2 Aboveground Magazines

Aboveground magazines located at RVAAP consist of the following:

- Group 2 Storage Area - this area is currently being used to store approximately 2500 pounds of 155mm M483 projectiles and over 78,000 pounds of "bottom support"
- Area 3 (Smokeless Powder Area) - Currently empty
- Area 4 (Fuze and Booster Storage) - Currently empty
- Area 6 (Inert Storage Area) - All of this area is under license with the OHARNG.

- Area 8 - The DLA leases some of the buildings in this area for Strategic Materials Storage, Five buildings in the easternmost part of this area are under license with the OHARNG.
- Standard Magazine Area (Explosive Storage) - Currently empty.

3.5.6 Injection Wells

Currently, there are no injection wells on RVAAP property (Patterson, 1998). However, there are three injection wells located approximately 1,000 yards east of the property and down gradient of RVAAP. These injection wells are north of the intersection of State Route 5 and Newton Falls Road, State Route 534. These injection wells are used to store brine or salt water collected from other locations. There is no potential for environmental concern due to this activity.

3.5.7 Drinking Water Management

There are two drinking water wells at RVAAP. One is located across the street from the Building 1034. This well, which was installed in 1993 by Olin Corporation, supplies water to Building 1037, and is referred to as the Government Well. The other well, installed in 1994, is located between George Road and the parking lot for Building 1034. This is the M&H well. This is the only water service at RVAAP since the water treatment plant was closed. The Ohio Health Department samples those wells quarterly [illegible] coli bacteria under the Ohio Wetland provisions.

3.5.8 Stormwater Management

All stormwater run off at RVAAP is carried by open ditches and creeks to discharge points off the installation. Records of effluent analyses during production years are not available. During past operations at RVAAP, efforts were made to retard the migration of contaminated wastes off-site by surface routes.

In addition to improvements made in 1949 to reduce nitrate concentrations entering the Mahoning River, other improvements to reduce contamination of stormwater included sawdust filters and settling/retention ponds which were placed in line with natural drainage ways. The holding/retention ponds are unlined and historically retained their water level even during dry periods, indicating that the underlying clay till prevents any significant percolation to the subsurface (AEHA, 1978).

There are 52 surface water exiting points on the installation, which is divided into five drainage basins. Three of these drainage basins are currently being monitored at three sampling locations located at the periphery of the property (Susan McCauslin, 1998). Table below lists the Stormwater sampling stations and general information regarding the drainage basin each represents.

Table 3-5-8 Stormwater Sampling Stations

Stormwater Sample Location ID #	General location and Drainage Basin Description
903	Hinkley Road
907	East Ramsdell Road Erie Burning Grounds DLA Ore Piles
908	Eagle Creek

Stormwater discharges are monitored IAW Ohio EPA Stormwater Permit # 3GR00112, which became effective as of 9 August 1994. Coverage continues under this permit until notified by Ohio EPA to reapply (M&H, 1997)

3.5.9 Electrical Power Generation

RVAAP receives its electrical power from Ohio Edison.

3.5.10 Fire Training

Fire training, in the form of drills and exercises, took place in non-explosive areas (i.e. places where explosives were not manufactured, stored or disposed). This area was referred to as the "George Road Area" which included the administration area and the front gate. Most fire-fighting instruction took place in Building 1032 (Cafeteria) and Building 1060 (Recreation Hall). This fire training was conducted in accordance with Army Regulation 420-90 requirements for structural fire fighting. In addition, NACA Test Site (RVAAP-38) located just east of Demolitions Area 1(RVAAP-03), aircraft were deliberately crashed into a wall and examined after impact. The site is about 12.4 acres in size and is located in the southeastern part of the installation.

3.5.11 Medical Activities

Historically, there have been no medical training activities at RVAAP. Building 1011, the former hospital located west of the installation headquarters, is still in place but has been "gutted" for scrap metal and other recyclable materials. Nurses quarters and a laboratory also exist on RVAAP but are not currently functional.

3.5.12 On-Site Housing

There are 15 vacant military housing units at RVAAP, located in the south-central part of the installation, east of the Headquarters Building 1037. They are 2-story, three and four bedroom staff housing. They are considered simple renditions of the colonial revival style, approximately 2,000 square feet each. These unoccupied houses are currently for sale. There are also seven garage units. Both the garage and housing units contain asbestos. They are designated for off-site use only (Patterson, 1998).

3.5.13 Ordnance

This section describes the results of the inspection of seven RVAAP sites identified during records search to potentially contain UXO. Due to past practices, these areas were visually inspected and surveyed using a hand-held magnetometer for the possible presence of UXO. Table below presents the findings to aid in characterizing sites of concern with respect to former firing ranges or test areas and OB/OD areas, particularly those involving the possible presence of UXO or other buried hazards (i.e. mustard gas).

Table 3-5-13 Sites with Potential UXO Concerns at RVAAP

Name and RVAAP Site Number	Potential UXO Concerns
Demolition Area 1 RVAAP-3	This site has several de-nuded areas, common in former (OB/OD) sites. Several projectile fuzes were found scattered throughout the range. These fuzes must be assumed to be live. A cursory magnetometer search also indicated numerous anomalies just below the surface throughout the entire range area.
Demolition Area 2 RVAAP-4	Numerous fuze components were discovered along Sand Creek in the northeast corner of the site. Numerous fuzes have surfaced due to erosion. These fuzes must be assumed to be live and constitute an endangerment to personnel in the area. Although no burial trenches were found, research of documents suggest that burial trenches are present at this site. This area is currently being used and is not appropriately marked.
Winklepeck Burning Grounds RVAAP-5	In this area, a magnetometer survey of Lane "E" was performed. There were many small anomalies throughout this area indicative of kickouts from previous burns. A cursory magnetometer search was performed in adjacent burn lanes and the results were the same as in Lane "E". In the incinerator area, there were several fuze components, a 50 series mechanical time artillery fuze and a 20-pound fragmentation bomb lying on the surface. The burn trays contained residue from previous burns. The deactivation furnace building next to the incinerator had several live fuzes in good condition that appeared to be 37 mm fuzes. This area is not appropriately marked.
Landfill North of Winklepeck RVAAP-19	The cursory site visit did not indicate any obvious presence of ordnance. However, there were several empty

Name and RVAAP Site Number	Potential UXO Concerns
	aluminum boosters cups found at the surface. According to records search, this area has a strong potential for ordnance and explosive wastes dumping.
Mustard Gas Burial Site RVAAP-28	No specific UXO-related material was found in this area. Anomalies were attributed to barb wire fencing and broken chain link fence which surrounded the suspected burial site.
40 and 60MM Firing Range RVAAP-32	This area was heavily overgrown with brush and trees which prevented a thorough inspection of the area. No file documentation exists for this recently identified site. Contaminants are metals and media of concern are unknown.
Pistol Range RVAAP-36	Trees in this pistol range showed damage from gunfire. A visual search did not reveal an abundance of lead bullets.

3.5.14 Radon

Documents reviewed at the time of the survey did not indicate that a radon survey has been completed at RVAAP. Radon (radon-222), an inert gas under usual environmental conditions, is a naturally occurring decay product of radium-226, the fifth daughter of uranium-238. Both uranium-238 and radium-226 are present in most soils and rocks, although the concentrations vary widely (National Council on Radiation Protection and Measurements, 1984). As radon forms, some atoms leave the soil or rock and enter the surrounding soil or water.

Radon is typically a concern in enclosed areas and in the basements of buildings. Proper ventilation in buildings prevents radon gas from accumulating. As a radon survey has not been completed at RVAAP, definitive conclusions regarding the presence and extent of radon concerns cannot be assessed.

3.5.15 Lead

Lead in paint and drinking water are the documented concerns in older buildings. The use of lead in the manufacture of paint was discontinued in 1978. Lead pipes used in the plumbing in buildings is a potential concern if the water is used for drinking purposes. Typically, buildings built prior to 1978 are considered to pose lead concern.

There are no documented lead-based paint and lead in water surveys conducted at RVAAP, neither is there indication of lead in drinking water.

3.5.16 PCBs

Polychlorinated Biphenols (PCBs) are considered carcinogens and care should be taken about accidental exposure. EPA requires that the following most common PCB items be labeled during their use, service, storage, and disposal:

-PCB containers & Storage Areas
-PCB transformers
-PCB large high-voltage capacitors
-Motors with PCB hydraulic fluid
-Heat transfer systems using PCBs
-PCB storage areas

Most PCBs, PCB articles, and PCB containers must be disposed of in incinerators or in chemical waste landfills which meet certain EPA specifications. Regulations also require that facilities using or storing PCBs and/or PCB items develop and maintain records on the disposition of these materials.

3.5.16.1 Building 854, PCB Storage (RVAAP 27)

Building 854 is located on the southern edge of RVAAP near Area 8, Inert Storage, and is approximately 12,500 square feet in size. This site consists of approximately half the bay area of a wooden frame building with transite and corrugated metal siding. The portion of the building that was used for PCB storage is 50 by 250 feet, with a pitched roof, and a concrete floor. It was originally used for equipment storage. The PCB-laden materials were stored inside the building on wooden pallets or metal trays. They were confined to a 108 by 21-foot section along the north and south wall of the building (US Army Environmental Hygiene Agency, 1988). The site was reported to have been active only until 1992 (SAIC, 1996). Tom Buchan with the Ohio EPA PCB unit verified that the building is empty and was tested clean IAW Ohio EPA criteria for PCBs in 1995. Building 854 is regulated under the Toxic Substances Control Act (TSCA). The IRP status is Response Complete (M&H, 1998).

3.5.17 Asbestos

Asbestos was first used in United States in the early 1900's to insulate steam engines. Until the early 1940's, asbestos was not used extensively. However, after World War II, and for the next thirty years, asbestos and asbestos-containing building materials (ACBM) were extensively used in new building construction and renovation. ACBM was primarily used to fireproof, insulate, soundproof, and for aesthetic purposes. One study estimated that 3,000 different types of commercial products contained asbestos. The amount of asbestos in each product varied as little as one percent to as much as 100 percent. Many older plastics, paper products, brake linings, floor tiles and textile

products contain asbestos, as do many heavy industrial products such as sealant, cement pipe, cement sheets, and insulation. The EPA and OSHA are responsible for regulating environmental exposure and protecting workers from asbestos exposure.

A comprehensive asbestos survey to identify all asbestos in buildings at RVAAP has not been completed. Buildings constructed prior to 1987 are assumed to contain ACBM. There are many buildings at RVAAP that were constructed prior to 1987. Abatement projects have been conducted since 1993 at RVAAP. Known asbestos removal projects are listed in the table below:

Table 3-5-17 Documented Asbestos Removal Projects

Site ID	Year	Asbestos Type	Other Information/Reference
Boilerhouse DB-27B	1993	Sprayed asbestos fireproof coating from inactive package boilerhouse	1383 Report Exhibit 1, Attachment to EPA Form 3500-7
15 Residential Units	1991-92	Wrapping from steam supply lines	Quotation Recap, July 15, 1991
Load line 2, 3, 4, 9 & PS-831	1993	Pipe insulation wrap	Superior Contract Maintenance Inc.
Building 1037	1993	Asbestos from offices, boiler and laundry room	Specification PS-842, 5 March 1993
Railyard	1993	Pipe insulation form the oil tanks at the Railyard	Specification PS-842, 5 March 1993
Powerhouse 6	1993	Pipe insulation	Specification PS-842, 5 March 1993
Waterworks 2 & 3	1993	Pipe insulation	Specification PS-842, 5 March 1993

Many of the key structures were built between 1940 and 1942. Many of the buildings throughout RVAAP exhibit a remarkable similarity to one another, seen in their gable roofs covered with corrugated asbestos and topped with ridge ventilators, tile and/or brick side walls, and steel superstructures.

- The following buildings at the four load lines were constructed of sheet asbestos: Paint and Oil Storage & Mixing Building, TNT Service Building, Assembling and Shipping Building, Line Office Building, Inert Storage and Truck Repair, Service Buildings, Boiler House, Ammonium Nitrate Screening Building, Top Pour Building and TNT Screening. The Time Clock Alley at the load lines contained asbestos shingles.
- The Lunch Room at the Ammonium Nitrate Line Building was constructed of wood and asbestos shingles.
- The Area 8 Storage Facility was constructed of wood and sheet asbestos (Gray & Pape, 1995).

Due to the period of construction, all buildings at RVAAP should be treated as asbestos-containing. Common building materials containing asbestos should be treated as a potential hazard to human health and environment, due to the age and condition of the buildings, and should be removed and disposed according to the applicable regulations.

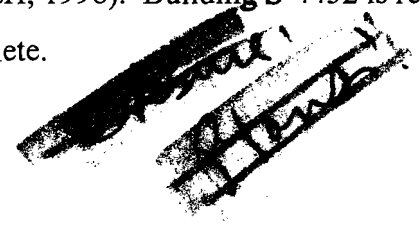
3.5.18 Herbicides, Pesticides and Agricultural Issues

As of 1979 approximately 3,100 pounds of herbicides were used each year at RVAAP, primarily along fences and around buildings. Herbicides applied were 2, 4-D, 2, 4, 5-T, and Bromacil. 2, 4, 5-T application was terminated in July 1979 (USATHAMA, 1978).

The pesticide storage-mixing area was reported to have been well maintained and contained the required safety equipment. The "pest controller" and his supervisor were certified by the Army to handle and apply pesticides. Little insecticide usage occurred at RVAAP. Application of pesticides was mainly limited to malathion and diazinon, which were used against stinging insects on a request basis (USATHAMA, 1978).

3.5.18.1 Pesticide Storage Building S-4452 (RVAAP-37)

This building is located to the north of Building 1037, which currently serves as Headquarters and the RVAAP Environmental Office. It is approximately 800 square feet in size, 240 square feet of which was used as the mixing area (SAIC, 1996b). This facility was used as the pest control shop from the early 1970s until 1993. Small quantities of pesticide were mixed inside the building and vehicle-mounted sprayers were filled and mixed along the western side of the building. A strong odor was detected during the EBS site inspection. Contaminants of concern are synthetic organic compounds (M&H, 1998). Building S-4452 is regulated under RCRA. The IRP Phase is Response Complete.



4 SUMMARY OF DATA - ADJACENT PROPERTIES

This section describes the results of the adjacent property database review and inspection. It summarizes the status of adjacent properties that may be potential sources of contamination migrating to installation property. These findings come from both Federal and State environmental database sources.

4.1 History and Current Uses

The land surrounding RVAAP is mainly farms and forest interspersed with sparse to moderately sparse residential areas. The US Geological Survey (1994) 7.5 minute topographic maps show approximately 300 residences within one-quarter to one-half mile of the installation. This figure does not include residences in the nearby towns of Windham to the north and Newton Falls to the southeast. Because of the inaccessibility of the adjoining forest land and the relatively low potential for environmental impacts from forests, residential and agricultural areas, the visual survey of these areas was restricted to a fence line automobile survey of the installation perimeter. The automobile survey did not reveal obvious environmental concerns. Significant environmental concerns from the adjacent properties, although unlikely, should not be unquestionably ruled out.

4.2 Sources of Potential Contamination from Adjacent Property

The ASTM provides guidelines for minimum search distances for adjacent properties with environmental concerns listed in the State and Federal Databases. Table 4-2 shows the ASTM minimum search distances to be considered when evaluating adjacent properties and their possible impact on RVAAP. Based on the environmental database review, the following adjacent properties were identified as being potential environmental concerns including leaking underground storage tanks or heavy metal contamination. Table 4-3 describes adjacent properties with environmental concerns and their current status (BBL Environmental Database Report, June 1998). All of these businesses (except Bliss, formerly Midwest Machinery) had or have leaking underground storage tanks. Bliss has, or had, heavy metal contamination.

Table 4-2 Minimum Search Distances

RECORDS SOURCE	DISTANCE
Federal NPL site list	1.0 mile
Federal CERCLIS list	0.5 mile
Federal RCRA TSD facilities list	1.0 mile
Federal RCRA generators list	property and adjoining properties
Federal ERNS list	property only
State lists of HazWaste sites identified for investigation of remediation	1.0 mile
State landfill and/or solid waste disposal site lists	0.5 mile
State leaking UST lists	0.5 mile
State registered UST lists	property and adjoining properties

4.3 Adjacent Properties with Environmental Concerns around RVAAP Area

Database review identified two businesses in Windham, located approximately one-half mile from RVAAP, with environmental concerns. A Citgo Service Station (formerly D & A Oil) and Pennzoil Service Station (formerly Windham Mobile Service) had leaking underground storage tanks. Both the locations are upgradient form RVAAP. **Significant, leaks or spill at the service stations will pose environmental concern limited to the northern boundary of RVAPP.** Regulations regarding USTs require the owner/operators to install proper leak detection devises to monitor the loss of stored product. With this arrangement, the threat of off-site contamination is significantly reduced.

Harrison Walker Refractories and Home Oil Company in Newton Falls were within one-half mile of RVAAP. Harrison Walker Refractories was on the Environmental Protection Agency's RCRA-G list for generating ignitable hazardous waste. This activity is permitted under RCRA-G#OHD046626628. Ms. Evelyn Neiss, owner of Home Oil Company was interviewed to gather additional information. The interview revealed that one 1,000 gallon and one 2,000 gallon tank were installed in 1940. Both of these tanks were removed in 1994 by Hal Jones Construction Company from Akron, Ohio. At the present time, two USTs exist, one 6,000 gallon UST with three 2,000 gallon compartments and one 1,000 gallon UST with two 500 gallon compartments (one for waste oil and one for kerosene). No further information was provided by Ms. Neiss.

Table 4-3 Adjacent Properties with Environmental Concerns in the RVAAP Area

PROPERTY	ADDRESS	ENVIRONMENTAL CONCERN	CURRENT STATUS
Citgo Service Station	9660 E Center St, Windham	LUST*	Leak confirmed
Pennzoil Service Station	9790 E Center, Windham	LUST	Site assessment submitted
Newton Falls Water plant	138 W River Rd Newton Falls	LUST	Site assessment completed
Home Oil Co	212 N Canal St Newton Falls	LUST	Site assessment submitted
City Hall	19 N Canal St Newton Falls	LUST	Corrective actions are underway
Certified 146	260 Milton Blvd Newton Falls	LUST	Corrective actions completed
Kwik Fill	210 Milton Blvd Newton Falls	LUST	Leak suspected
Harrison Walker Refractories	E Center Street, Rte 303 Newton	RCRA - Generator Hazardous Wastes	EPA permitted large generator
Bliss	1536 Newton Falls-Braceville Rd, Newton Falls	Release of heavy metals	Medium priority, 9/26/90, cleanup status unknown

* LUST = Leaking Underground Storage Tank

RVAAP does not have a significant environmental threat from adjacent properties indicated in the above table, at this time.

5 ENVIRONMENTAL CONDITION OF RVAAP PROPERTY

This section presents the categorization of RVAAP property IAW the criteria established in CERFA guidance. The environmental conditions of the installation property were documented and a site map depicting the environmental condition was developed, based on the ASTM categories listed in the table below. To clarify slight deviations from the methodology established in the guidance documents, this report defines Category 6 properties as areas or parcels of real property with confirmed contamination and Category 7 properties as areas or parcels of real property that need further evaluation.

Table 5-0 Description of Categories (ASTM Definitions)

Category 1: An area or parcel of real property where no storage and release, or disposal of hazardous substances or petroleum products or their derivatives has occurred (including migration of these substances from adjacent properties).
Category 2: An area or parcel of real property where only the storage of hazardous substances or petroleum products or their derivatives has occurred (but no release, disposal, or migration from adjacent properties has occurred).
Category 3: An area or parcel of real property where storage and release, release, disposal, or migration, or some combination thereof, of hazardous substances or petroleum products or their derivatives has occurred, but at concentrations that do not require a removal or remedial action.
Category 4: An area or parcel of real property where storage and release, release, disposal, or migration, or some combination thereof, of hazardous substances or petroleum products or their derivatives has occurred, and all remedial actions necessary to protect human health and the environment have been taken.
Category 5: An area or parcel of real property where storage and release, release, disposal, or migration, or some combination thereof, of hazardous substances or petroleum products or their derivatives has occurred and removal or remedial actions, or both, are underway, but all required actions have not yet been taken.
Category 6: An area or parcel of real property where storage and release, release, disposal, or migration, or some combination thereof, of hazardous substances or petroleum products or their derivatives has occurred, but required response actions have not yet been initiated.
Category 7: An area or parcel of real property that is unevaluated or requires additional evaluation.

5.1 Parcel Designations

Based on a review of installation documents, Federal, State and local records, the site visit, employee interviews, and visual inspections of selected areas on RVAAP and adjacent properties, RVAAP is categorized into parcels that represent the environmental condition of the property area. Parcels and the resulting categorizations are identified in Table 5-1. The RVAAP Categorization Map included as Figure 5.1 which depicts the categorization of RVAPP with appropriate color codes. Areas containing non-CERCLA contamination substances are delineated as QP.

Property boundaries are drawn using the best available information on the extent of contamination at these locations. Point sources of contamination or storage, such as load lines, are delineated by 0.25 acre parcels centered on the source(s), as stipulated in DoD guidance. For consistency and to facilitate the summation of acreage, parcel acreage's were calculated to two decimal places using AutoCad Release 13. This method is not meant to imply an accurate calculation of the acreage of the parcels.

To categorize the installation, all areas and facilities on RVAAP have been identified and assigned a number, including those not previously mentioned in other reports and which may or may not be associated with previously identified or obvious environmental concerns. For the purposes of this report Areas 39-44 are sites that have not been previously identified as AOCs.

5.1.1 RVAAP Parcels

The table below describes all parcels of property on RVAAP and their status, including all previously identified AOCs (RVAAP 1-38) and sites that have not been previously identified as AOCs (Areas 39-45). Detailed discussions of individual sites are made in Section 3 of this report as indicated in Table 5-1. Source documents referred in Section 3 discussion of the sites have been omitted from the following summarizing statements.

Table 5-1 Parcel Descriptions at RVAAP

CATEGORY	RVAAP / Area #	NAME	SECTION REF
1	Area 41	Natural Areas	5.2.1
2	[illegible]	Building 1601 Hazardous Waste Storage	3.5.16
2	RVAAP 15	Load Line 6 Pink Water Treatment Plant	3.5.3.8
2	RVAAP 20	Sand Creek Sewage Treatment Plant	3.5.3.10
2	RVAAP 21	Depot Sewage Treatment Plant	3.5.3.11
2	RVAAP 22	George Road Sewage Treatment Plant	3.5.3.12
2	RVAAP 25	Building 1034 Motor Pool Waste Oil Tank	3.5.4.2.2
2	RVAAP 30	Load Line 7 Pink Water Treatment Plant	3.5.3.15
3	RVAAP 06	C-Block Quarry	3.5.2.6
4	RVAAP 14	Load Line 6 Evaporation Unit	3.5.3.7
4	[illegible]	Building 854, PCB Storage	3.5.16.1
5	RVAAP 01	Ramsdell Quarry Landfill	3.5.2.1
5	[illegible]	Deactivation Furnace	3.5.1.7
6	RVAAP 08	Load Line 1 and Dilution/Settling Pond	3.5.3.1
6	RVAAP 09	Load Line 2 and Dilution/Settling Pond	3.5.3.2
6	RVAAP 10	Load Line 3 and Dilution/Settling Pond	3.5.3.3
6	RVAAP 11	Load Line 4 and Dilution/Settling Pond	3.5.3.4
6	RVAAP 12	Load Line 12 and Dilution/Settling Pond	3.5.3.5
6	RVAAP 13	Building 1200 Dilution/Settling Pond	3.5.3.6
6	[illegible]	Load Line 12 Pink Waste Water Treatment Plant	3.5.3.9
6	RVAAP 19	Landfill North of Winklepeck Burning Grounds	3.5.2.8
6	RVAAP 29	Upper and Lower Cobbs Pond Complex	3.5.3.14
6	RVAAP 31	Ore Pile Retention Pond	3.5.3.17
7	RVAAP 02	Erie Burning Grounds	3.5.2.2
7	RVAAP 16	Quarry Landfill/Former Fuze and Booster Burning Pits	3.5.2.7
7	RVAAP 23	Unit Training Equipment Site Waste Oil Tank	3.5.4.1
7	RVAAP 24	Reserve Unit Maintenance Area Waste Oil Tank	3.5.4.2
7	RVAAP 26	Fuze and Booster Area Settling Tanks	3.5.3.13
7	RVAAP 28	Mustard Agent Burial Site	3.5.1.8
7	RVAAP 33	Firestone Test Facility	3.5.1.3

CATEGORY	RVAAP / Area #	NAME	SECTION REF
7	RVAAP 35	Building 1037 Laundry Waste Water Tank	3.5.3.16
7	RVAAP 37	Pesticide Building [illegible]452	3.5.18.1
7	RVAAP 38	NACA Test Area	3.5.1.4
7	Area 39	Grounds & Roads Maintenance Area	5.8.11
7	Area 40	Underground & Aboveground Storage	5.8.12
7	Area 42	Wet Storage	5.8.13
7	Area 44	Fuze and Booster Load Lines 5,8,9,10,11	5.8.14
QP	RVAAP 03	Demolition Area 1	3.5.2.3
QP	RVAAP 04	Demolition Area 2	3.5.2.4
QP	RVAAP 05	Winklepeck Burning Grounds	3.5.2.5
QP	RVAAP 32	40 and 60 mm Firing Range	3.5.1.2
QP	RVAAP 34	Sand Creek Disposal Road Landfill	3.5.2.9
QP	RVAAP 36	Pistol Range	3.5.11

5.2 [illegible] Parcels

One parcel, comprising approximately [illegible] is designated as Category 1 as there has been [illegible]nted industrial activity or release of hazardous substances or petroleum products; nor has there been documented release, disposal, or migration from an adjacent property of hazardous substances or petroleum products within the identified area.

5.2.1 [illegible] Number and Area Label 41(1) - Natural Areas

Category 1 parcel are all areas that do not fall under Categories 2 - 7 or are considered [illegible]. These areas include natural or wooded areas, ponds and streams [illegible] affected by [illegible] and other areas where no known storage, release, or disposal has occurred. They are still in a relatively natural state and there is no documented release and/or no environmental concern due to past or present operations at RVAAP.

5.3 [illegible] Category 2 Parcels

Seven parcels totaling approximately 37 acres are identified as Category 2 because there has been storage of hazardous substances at these locations, but no documented release or migration has occurred.

5.3.1 Parcel Number and RVAAP [redacted] Hazardous Waste Storage

Building 1601-Hazardous Waste Storage is a RCRA hazardous waste storage area. All wastes were placed in 55-gallon drums which rested on pallets. All hazardous waste at this area has been removed and the site is currently undergoing Ohio EPA closure. There is no documented release from this area, however, no subsurface investigation has been conducted as confirmation. Potential contaminants of concern are metals in soil. Although Building 1601 by itself does not present a problem due to its past use, it lies within Winklepeck Burning Grounds, a high priority site based on on-going CERCLA actions.

5.3.2 Parcel Number and RVAAP [redacted] Load Line 6 Pink Water Treatment Plant

Load Line 6 Treatment Plant received pink water effluent from Load Line 6, the former Fuze Line. This treatment plant was a permitted facility from 1987 to 1993 and presents a low potential for any release to the environment. Potential contaminants of concern are explosives. The Ohio EPA accepted a no further action (NFA) recommendation for this unit in 1989. At the present time, the facility no longer exists. Records documenting its removal were not available.

5.3.3 Parcel Number and RVAAP Label 20(2) - Sand Creek Sewage Treatment Plant

The Sand Creek Sewage Treatment Plant handled domestic sewage intermittently from 1969-1993. The treatment plant had a NPDES permit during its last stages of operation. Dried sludge was spread on the ground in an unknown location as a part of this operation. Since this unit treated only domestic sewage and operated under a NPDES permit, there is low potential for any environmental concern. This site was closed in 1993 IAW Ohio EPA requirements.

5.3.4 Parcel Number and RVAAP Label 21(2) - Depot Sewage Treatment Plant

The Depot Sewage Treatment Plant handled domestic sewage from 1941-1993. The treatment plant had a NPDES permit during its last stages of operation. Sludge was hauled to the George Road Plant for disposal. Since this unit treated only domestic

sewage and operated under a NPDES permit, there is low potential for any environmental concern. This plant was closed in 1993 IAW Ohio EPA requirements.

5.3.5 Parcel Number and RVAAP Label 22(2) - George Road Sewage Treatment Plant

The George Road Sewage Treatment Plant handled domestic sewage and pink water effluent from 1941 to 1993. This site was a NPDES permitted facility and was closed in 1993 IAW Ohio EPA requirements.

5.3.6 Parcel Number and RVAAP Label 25(2) - Building 1034 Motor Pool Waste Oil Tank

The Motor Pool AST area next to Building 1034 has a waste oil AST that was in operation from 1974-1993. In 1993, the contents were emptied and it currently remains inactive. Three other ASTs are presently in use at the Motor Pool. They are inspected by Mason & Hanger every two months for integrity. The contents of these three tanks are gasoline/fuel oil, kerosene and propane. Potential contaminants of concern are petroleum hydrocarbons and other compounds associated with waste oil. There are no documented releases from this unit.

5.3.7 Parcel Number and RVAAP Label 30(2) - Load Line 7 Pink Water Treatment Plant

Load Line 7 Pink Water Treatment Plant was a permitted facility from 1989 to 1993. The unit received waste water from Load Line 7, the former Booster Line. After treatment, the water was discharged to George Road Sewage Treatment Plant. Since this unit operated under a NPDES permit, its discharge was regulated and met the NPDES requirements. There is a low potential for environmental concern from this unit.

5.4 Category 3 Parcel

One parcel, consisting of approximately 5.25 acres, is placed in Category 3 because it is an area where storage and release has occurred, but at concentrations that do not require removal or other remedial actions.

5.4.1 Parcel Number and RVAAP Label 6(3) - C Block Quarry

C-Block Quarry is an abandoned borrow pit used as a disposal site for different types of annealing process wastes for a short time during the 1950s. Liquid wastes were apparently dumped on the ground in the pit bottom. The site is now heavily forested. Although metals are potential contaminants, analytical results from sampling activity report concentrations below toxic limits.

5.5 Category 4 Parcels

Two parcels, comprising approximately 10.5 acres, are identified as Category 4 because they are areas where storage and release has occurred, but all remedial actions to protect human health and the environment have been taken.

5.5.1 Parcel Number and RVAAP Label 14(4) - Load Line 6 Evaporation Unit

Load Line 6 Evaporation Unit was in operation from 1981 to 1987. It consisted of a concrete evaporation tank that received wastewater containing explosives from Load Line 6, the former Fuze Line. In 1985, hairline cracks were observed in the unit. It was subsequently lined with PVC as a remedial action. A subsurface investigation revealed TNT and RDX in the soil in concentrations up to 200 ppm. In 1989 the unit was closed under RCRA and all contaminated soil was removed. No documents exist to indicate the extent of the remedial action, although the IAP states that subsurface sampling conducted after soil removal confirmed clean closure of the unit.

5.5.2 Parcel Number and RVAAP Label 27(4) - Building 854, PCB Storage

Building 854, PCB Storage, was a 250 by 50-feet area within a wooden frame building that was in operation from 1983 to 1992. All PCB-containing items were stored within secondary containment pans or rested on wooden pallets on the floor. M&H records indicate that on 1 November 1995, installation personnel finished cleaning Building 854 and all PCB-containing materials were removed. Ohio EPA PCB Enforcement Coordinator, Tom Buchan, confirmed that Building 854 tested clean on November 1, 1995 IAW Federal criteria.

5.6 Category 5 Parcels

Two parcels, approximately 10.5 acres, are Category 5 because storage and release of hazardous materials has occurred and remedial actions are underway, but not all required actions have been taken.

5.6.1 Parcel Number and RVAAP Label 1(5) - Ramsdell Quarry Landfill

Ramsdell Quarry Landfill was an unlined 10-acre landfill in an old quarry used intermittently from 1946 to 1989. It was used for OB/OD of napalm and explosives from Load Line 1 from 1946-1950. In 1976, it was used as a nonhazardous landfill. In 1978, it was permitted by the State of Ohio as a sanitary landfill. Landfilled material included domestic, commercial and industrial solid wastes, including explosives and liquid wastes of various types. In 1990 it was closed as a landfill under State of Ohio Solid Waste Closure Regulations. Five monitoring wells were installed in 1991 as a part of the closure and are checked quarterly for contaminants. Long-term monitoring post closure requirements are 30 years.

5.6.2 Parcel Number and RVAAP Label 17(5) - Deactivation Furnace

The Deactivation Furnace was in operation from the 1960's to 1983. The unit consisted of an oil-fired rotary retort fed by a conveyor belt with the purpose of deactivating fuzes, boosters, and small munitions items. After ignition and burning of explosives, the metal was removed and salvaged as scrap. This unit is currently undergoing RCRA closure under Ohio EPA guidelines. Under the closure plan, sampling was conducted and metals were detected in soil surrounding the unit. The closure plan also calls for removal of contaminated soil associated with the unit. Contaminants of concern are metals.

5.7 Category 6 Parcels

Ten parcels, comprising approximately 438 acres, are identified as Category 6 sites. These sites have been placed in this category because storage and release of hazardous materials has occurred, but required response actions have not yet been initiated.

5.7.1 Parcel Number and RVAAP Label 8, 9, 10, 11(6) - Load Lines 1-4 Dilution/Settling Ponds

Load Lines 1, 2, 3 and 4 are grouped together due to their similarities use. They were used to melt and load TNT and Composition B into large caliber shells and bombs and were in operation from 1941 to 1971. Associated concrete sumps and settling ponds received explosives-contaminated wastewater. Explosives were also swept outside the doors directly onto the ground. Sampling of soil and groundwater has confirmed the existence of explosives, metals, petroleum, PCBs and pesticides as contaminants.

5.7.2 Parcel Number and RVAAP Label 12(6) - Load Line 12 and Dilution/Settling Pond

Load Line 12, the bomb melt-out facility, was primarily used for the demilitarization of munitions. The associated dilution settling pond received pink water effluent from the Load Line and discharged into Upper and Lower Cobbs Ponds. Load Line 12 was intermittently operational from 1951-1993. Past practices included washing down explosive-contaminated areas. Sampling of soil and groundwater has confirmed the existence of explosives, metals, petroleum, PCBs and pesticides as contaminants.

5.7.3 Parcel Number and RVAAP Label 13(6) - Building 1200 Dilution/Settling Pond

Ammunition was steam-demineralized at the Building 1200 Dilution/Settling Pond complex from 1941 to 1971. The pink water was discharged from a man-made ditch into a 0.5 acre sedimentation pond before entering Eagle Creek. Subsurface investigations have confirmed organic compounds, metals and explosives as contaminants at this site.

5.7.4 Parcel Number and RVAAP Label 7(6) - Load Line 12 Pink Waste Water Treatment Plant

Load Line 12 Pink Waste Water Treatment Plant is located in the center of Load Line 12. It is an active treatment plant that has operated under a NPDES permit since 1982. Subsurface investigations have confirmed explosives, metals, organics, PCBs and pesticides as contaminants.

5.7.5 Parcel Number and RVAAP Label 19(6) - Landfill North of Winklepeck Burning Grounds

This site is an unlined landfill due north of Winklepeck Burning Grounds. It is 10 acres in size and was operational from 1969 to 1976. General refuse was disposed at this site. An unknown quantity of material reportedly was landfilled at this site, including booster cups, aluminum liners, sanitary waste, and possibly explosive waste and ash.

Although, explosives were not detected during a soil, sediment, and groundwater investigation, lead, manganese and selenium were detected in sediment at concentrations above the background level, and a pesticide was detected in a groundwater sample. During the site inspection, no UXO was observed at this site, although the possibility of its presence cannot be completely ruled out due to past disposal practices.

5.7.6 Parcel Number and RVAAP Label 29(6) - Upper and Lower Cobbs Pond Complex

Upper and Lower Cobbs Ponds, located northwest of Load Line 3, received effluent from 1941 to 1971. The upper pond is about five acres and the lower is about three to four acres in size. These ponds received discharge from both Load Lines 3 and 12. They are located on a tributary of Sand Creek that discharges off the installation. Confirmed contaminants are explosives and metals. Aluminum chloride is a potential contaminant.

5.7.7 Parcel Number and RVAAP Label 31(6) - Ore Pile Retention Pond

The Ore Pile Retention Pond has been operational since the mid-1950's and was constructed to retain or control runoff from the manganese ore piles. Visual inspection during the EBS site inspection confirmed that the large ore piles are still present in this area at RVAAP. The confirmed contaminants in soil surrounding the ore piles are explosives.

All of the above listed Category 6 sites are inactive except for Load Line 12 Pink Water treatment Plant (RVAAP - 18), which has a current NPDES permit.

5.8 Category 7 Parcels

The remaining 14 parcels of land at RVAAP, comprising approximately 3,107 acres, are identified as Category 7 parcels. These sites have been placed in this category because of the potential for release or migration of hazardous materials due to past industrial operations and/or they are unevaluated or require additional information. There are no records documenting any intrusive environmental investigation to confirm or deny contamination at these sites.

5.8.1 Parcel Number and RVAAP Label 2(7) - Erie Burning Grounds

Erie Burning Grounds were used from 1941-1951 for open burning of bulk, obsolete, non-specification propellants; conventional explosives; rags; and large explosive-contaminated items. Ash residue was left on site. Unspecified large metal items were thermally treated to remove explosive residue before being salvaged and processed as scrap.

There is a potential for environmental threat to soil, surface and groundwater from this site due to its past use. Potential contaminants of concern are white phosphorus, explosives, and metals.

5.8.2 Parcel Number and RVAAP Label 16(7) - Quarry Landfill/Former Fuze and Booster Burning Pits

The Quarry Landfill/Former Fuze and Booster Burning Pits area consists of three elongated ponds, approximately 15-20 feet deep. It was in operation from 1945-1993. Since 1976, it was a disposal site for spent brine regenerate and sand filtration backwash water from the drinking water treatment plants. Prior to 1976, it was used for open burning/open detonation. Adjacent lands were used to test 40mm projectiles and deactivate fuze and booster components. No records are available to indicate any investigation at this site. Due to past practices, this site has a potential to contaminate surface water, sediment and/or groundwater. The contaminants of concern are sodium chloride, calcium chloride, manganese, iron, explosives, and metals.

5.8.3 Parcel Number and RVAAP Label 23(7) - Unit Training Equipment Site / Waste Oil Tank

The UTES Waste Oil Tank was a UST in operation for approximately 20 years. The exact age of this tank is unknown, but it ceased operation in 1988. It was used at the Auto Shop maintenance area. A fuel oil storage tank was located next to the UTES tank and both were 15 feet away from the drinking water well for the Auto Shop area. Both tanks and the contaminated soil were reportedly removed off-site in 1989. No additional information is available regarding the removal of these tanks and associated soil. Also, there is no record of regulatory involvement. Potential contaminants are waste oils and metals.

5.8.4 Parcel Number and RVAAP Label 24(7) - Reserve Unit Maintenance Area Waste Oil Tank

The Reserve Unit Maintenance Area Waste Oil Tank (400 gallon) is an inactive steel AST without secondary containment that was emptied in 1993. There is no data to suggest any integrity testing has been done. This tank is programmed for future sampling (Patterson, 1998). Since this sampling is to occur, this site has been placed in Category 7 because further evaluation has been deemed necessary. Contaminants of concern are petroleum hydrocarbons.

5.8.5 Parcel Number and RVAAP Label 26(7) - Fuze and Booster Area Settling Tanks

The 450 acre Fuze and Booster Area Settling Tanks which operated from 1941-1971, consist of concrete tanks located throughout Load Lines 5, 7, 9, 10 and 11. These Load Lines produced fuzes, boosters, detonators, percussion elements, and artillery elements. The AOC consists of 14 concrete underground tanks and one concrete above ground tank that served as settling basins for explosive-contaminated wastewater from the load lines. Sludge from the tanks was periodically collected and disposed of at the burning grounds. The discharge location of the water from these tanks is not positively known. It may have been pumped out onto the ground or routed to the sewer system. All tanks were emptied and cleaned in 1971. All tanks, except the Load Line 7 tank, are in place but have been emptied, cleaned and covered. In 1981, shallow monitoring wells were

installed around the perimeter of the area. Subsequent sampling of wells did not detect heavy metals in the groundwater.

The monitoring wells installed and sampled were at the perimeter of the area. There is no documented investigation immediately below and around the tanks. There are no records concerning proper disposal of waste water from these tanks. This site poses a potential environmental concern because of the potential contaminants in the waste water processed, and the suspected method of disposal of the processed waste water.

5.8.6 Parcel Number and RVAAP Label 28(7) - Mustard Agent Burial Site

This unit is a possible Mustard Agent Burial Site. Former employees have reported that mustard agent may have been buried on site, before 1969. Records indicate that in 1969 excavation of the site revealed the presence of seven empty cans and a 55-gallon drum.

During the site inspection a magnetometer survey revealed anomalies probably attributable to barb wire and broken chain-link fence surrounding the area. The actual presence of Mustard Gas agent has never been confirmed at this site.

5.8.7 Parcel Number and RVAAP Label 33(7) - Firestone Test Facility

The Firestone Test Facility was a classified test facility for munitions. Shape charges were constructed and tested for the DoD. The site consists of an underwater test chamber and aboveground structures. No file documentation exists for this site. Due to the lack of information about the specific use of the facility, potential hazards/contaminants at this area are unknown.

5.8.8 Parcel Number and RVAAP Label 35(7) - Building 1037 Laundry Waste Water Tank

Building 1037 consists of a concrete sump that was used as a settling tank for the installation laundry facility. Uniforms, rags and gloves contaminated with explosives were laundered here. Rags and gloves from the Artillery Primer Line (Load Line 11) were so flammable they were brought to the laundry in cans of water to prevent spontaneous combustion. This facility started operations in the 1940s. At present, Building 1037 is the Army Headquarters.

No documentation exists concerning subsurface investigation of the sump. Staining was not observed during the site inspection. Due to the nature of its past use, this site poses a potential explosives and metals threat to soil and groundwater.

[redacted] Parcel Number and RVAAP Label 37(7) - Pesticide Building S-4452

The Pesticide Building S-4452 was used from the 1970s to 1993 for the storage and mixing of various types of pesticides, both inside and outside the building. No documentation exists about previous investigations at this site.

A strong odor of pesticides was noted during the site inspection in July 1998. Possible contaminants of concern are organic compounds (pesticides). Media of concern are soil and groundwater.

5.8.10 Parcel Number and RVAAP Label 38(7) - NACA Test Area

The NACA Test Area was an approximately 12 acre site used as a test area for planes. NACA was trying to develop explosion-proof fuel tanks and fuel. Aircraft was crashed into a wall during these tests and were later landfilled on-site. No documentation exists concerning environmental investigation at this site. Possible contaminants of concern are petroleum hydrocarbons. Media of concern are soil, surface water, sediment, and groundwater.

The following sites have not been previously identified as AOCs.

5.8.11 [redacted] Parcel Number and Area Label 39(7) - Grounds and Roads Maintenance

The Grounds and Roads Maintenance Area is a site that has not been previously identified as an AOC and is assigned as Area 39. According to the 1941 aerial photography reviewed, the Grounds and Roads Maintenance Area originally had 16 buildings and 1 tank. The 1952 aerial revealed eight buildings. All the buildings had been removed in the 1966 aerial photograph. No file documentation exists for this site. Presently, the land area is used as an uncovered temporary storage of railroad ties, ammunition components and construction rubble.

Railroad ties are treated with creosote used as a protective coating for wood to prevent decomposition. At the time of the site inspection, strong hydrocarbon odor was observed. Creosote is a brownish oily liquid consisting chiefly of aromatic hydrocarbons obtained by distillation of coal tar. Since these railroad ties are stored unprotected from rain, there is a potential for soil contamination due to leaching. Typical grounds and roads maintenance activities involve storage and use of hazardous materials. This site needs further investigation to confirm or deny contamination.

5.8.12 Parcel Number and Area Label 40(7) - Underground and Aboveground [redacted]

Most, if not all Underground and Aboveground Storage, including all igloos, Blocks A-E, Areas 1-8, and magazine storage areas were used for the storage of bulk explosives and/or finished ammunition or components. Typically in the past, spills in these areas were cleaned up by sweeping loose explosives out of the door and onto the ground. During the site inspection five igloos were visually inspected. Although no stressed vegetation or ground staining was observed around the igloos, past practices and the type of containment used for the bulk explosives (cardboard with paper or wax liners) indicate that there may be a potential contamination as a result of a release. Water or the activity of rodents can damage or compromise the containment of bulk explosives. Very little documentation exists for storage and clean up practices at these igloos. Potential contaminants are explosives in soil, surface and groundwater.

5.8.13 Parcel Number and Area Label 42(7) - Wet Stora[redacted]

Wet Storage is an area located in the center of the installation, north of Load Line 9. Extremely unstable explosives such as lead azide, fulminate of mercury and tetryl were stored in water in this area. No file documentation exists for this site. Due to the past use of this area, there is a potential environmental concern. Potential contaminants are metals and explosives.

5.8.14 Parcel Number and Area Label 44(7) - Fuze and Booster Load Lines 5, 8, 9, 10 and 11.

The Fuze and Booster Load Lines 5, 8, 9, 10, and 11 were used to manufacture fuzes, boosters, detonators, percussion elements, and artillery elements. This area was operational from 1941 to 1971. The settling basins associated with these Load Lines received explosive-contaminated wastewater. Wastewater was also swept out the doors of manufacturing and other processing areas directly onto the ground. Shallow monitoring wells were installed around the perimeter of the area in 1981. Subsequent groundwater sampling of these wells did not detect heavy metals. However, they were never sampled for explosives and most were later destroyed by frost heave. In 1987, centrally-located wells were sampled for synthetic organic compounds, and no explosives or high priority pollutants were found. There is a high potential for release to soil and groundwater because the integrity of the tanks and associated plumbing is not known. There is no documented investigation immediately below the tanks or associated with the plumbing connecting the Load Lines to the tanks. Due to its long usage, potential contaminants and the suspected methods of disposal of the processed wastewater, this site poses an environmental concern. **Contaminants of concern** are TNT, RDX, black powder, lead, lead azide, mercury, lead styphnate, and tetryl.

5.9 Qualified Parcels

Six parcels, approximately 301 acres, are categorized as QP. In determining the qualified parcels, the following guidelines were used:

- If a complete asbestos survey has not been conducted, then all buildings constructed prior to 1987 are assumed to contain ACM.
- If a complete LBP survey has not been conducted, then all buildings constructed prior to 1978 are assumed to contain LBP.
- **Areas used as firing ranges** (e.g., impact areas and firing points) are assumed to potentially contain UXO and ammunition components (e.g., metal casings and projectiles from small arms, projectiles from large ammunition, and explosives residue). **The potential presence of these substances is the result of military training and not a result of release or disposal.** Therefore, areas potentially containing UXO or ordnance fragments are not categorized by the

environmental condition of property categories but are designated as qualified for UXO. The US Army is actively implementing a UXO program, which includes site surveys and cleanup. An "X" for the presence of UXO and ammunition components is used to qualify the parcel.

5.9.1 Parcel Number and RVAAP Label 3(QP) - Demolition Area 1

Demolition Area 1 was used for OB/OD of munitions from 1941-1949. Munitions fragments including scrap metal, small arms primers and fuzes lie on the ground. Fuzes may be live. Some areas are denuded. There is a potential for release from this unit to soil and groundwater. Contaminants of concern are UXO, metal munitions and explosives.

5.9.2 Parcel Number and RVAAP Label 4(QP) - Demolition Area 2

Demolition Area 2 was used to detonate large-caliber and "off-spec" bulk explosives from 1948 to 1986. A geotechnical study conducted at this site in 1992 confirmed minor amounts of contamination in soil. Four monitoring wells were installed as a part of the study. During the site visit, numerous fuzes were noted along Sand Creek in the northeast corner of the site. These fuzes may be live. Contaminants of concern are UXO, metal munitions and explosives.

5.9.3 Parcel Number and RVAAP Label 5(QP) - Winklepeck Burning Grounds

Winklepeck Burning Grounds was used to treat munitions by open burning from 1941 to 1980. An AEHA geotechnical study was also conducted at the active part of this site in 1992, and minor amounts of contamination were detected in soils. Four monitoring wells were installed as a part of the AEHA study. The wells are currently sampled on a quarterly basis. During the site visit, several fuze components, a 50 series mechanical time artillery fuze and a 20 pound fragmentation bomb were observed at this site. A hand-held magnetometer search revealed several anomalies throughout the area. The building next to the Deactivation Furnace had several of what appeared to be 37 mm fuzes. Contaminants of concern are UXO, explosives, metals and waste oils.

5.9.4 Parcel Number and RVAAP Label 32(QP) - 40 and 60mm Firing Range

40 and 60mm Firing Range was used from the 1940s-1950s to test 40 and 60mm projectiles. No file documentation exists for this site. There is potential for UXO at the 40 and 60mm Firing Range. Due to the heavy coverage of brush and trees, a cursory magnetometer survey could not be completed during the site inspection. Possible contaminants of concern are UXO and metals.

5.9.5 Parcel Number and RVAAP Label 34(QP) - Sand Creek Disposal Road Landfill

The Sand Creek Disposal Road Landfill was a construction landfill for concrete, wood, asbestos debris and fluorescent light bulbs located along Sand Creek. No file documentation exists for this site. Potential contaminants of concern is asbestos.

5.9.6 Parcel Number and RVAAP Label 36(QP) - Pistol Range

The Pistol Range was a 350 by 150 foot area used by installation security for pistol qualification purposes. Shots were fired across Sand Creek and into the opposite bank. No file documentation exists for this site. Contaminants of concern is lead in soil and surface water.

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APPENDIX A

Types and Amounts of Explosives Stored at RVAAP (1998)

1998 Cyclic Inventory of Underground and Aboveground Storage at RVAAP Totals By Block

Item	UNDERGROUND									ABOVEGROUND	
	A BLOCK	B BLOCK	C BLOCK	D BLOCK	E BLOCK	GROUP 1	GROUP 1A	GROUP 7		GROUP 2	
COMP A5	0	0	0	4,320	0	0	0	0		0	
COMP B	3,020,454	6,854,280	3,301,380	1,288,560	7,632,900	3,135,780	9,855,780	1,457,820		0	
COMP B Type 5	0	0	0	0	0	0	0	0		0	
COMP B 4	0	0	0	0	0	0	0	0		0	
CH 6	0	0	931	0	0	0	0	0		0	
CYCLOTOL	0	0	0	120	0	0	0	0		0	
NITROGUANIDINE	9,590,258	5,447,226	6,025,328	4,556,850	1,561,250	0	0	0		0	
TETRYL	0	0	0	50	0	0	0	0		0	
PBX	0	0	0	0	0	0	0	0		0	
BLACK POWDER	0	0	0	50	0	0	0	0		0	
25 mm	0	0	0	0	0	0	0	0		0	
PROPELLANT	0	0	0	80	0	0	0	0		0	
105MM CTG	0	0	0	0	0	0	0	0		0	
105MM PROJECTILE	0	0	0	0	0	0	0	0		0	
155MM M483 PROJECTILE	0	0	0	0	0	0	0	0		2,496	
155MM M107 PROJECTILE	0	0	0	0	0	0	0	0		0	
8 INCH PROJECTILE	0	0	0	0	0	0	0	0		0	
Total all blocks 12/96											
Comp A5	4,320										
Comp B	36,546,954										
COMP B4	0										
COMP B TYPE 5	0										
CH 6	931										
Cyclotol	120										
Nitroguanidine	27,181,326										
PBX	0										
Tetryl	50										
Black Powder	50										
25MM BODIES			0	0	0	0	0	0		0	
25MM SEPARATOR			0	0	0	0	0	0		0	
BOTTOM SUPPORT	78,218		0	0	0	0	0	0		78,218	
M2A1 METAL CANS	0		0	0	0	0	0	0		0	
155MM PROJECTILE	2,496										

APPENDIX B

Summary of Major Facilities at RVAAP

Table 3-3
Summary of Major Facilities at RVAAP

Name of Facility	Past Function	Current Function	Location	Year Built/Date of Initial operations
Administration Area				
Administration - Army	Former Laundry Headquarters/Admin Area	Headquarter/Admin Area	South-Central Southern Boundary	World War II
Administration - M&H				World War II
Adminstration - Depot				World War II
Motor Pool	Vehicle Maintenance	Vehicle Maintenance	South-Central Southern Boundary	World War II
Roads & Grounds Maintenance Area	Roads & Grounds Maintenance	Facility no longer exists/ Now open storage	South Eastern Near LL4	Unknown
Waterworks - 3		Inactive	South Western	Unknown
Waterworks - 4		Inactive	South Western	Unknown
RVAAP - 18	Pink Water Treatment Plant	Active - NPDES Permit	South Eastern LL12	1981
Housing Area	Staff Housing	Inactive	South-Central Southern Boundary	World War II
Storage Underground				
Blocks A-E	Storage of explosives	Some bunkers contain one or more types of expolosives - rest are empty	North Western Portion	Unknown
Area 1	Bomb Storage		North Central	World War II
Areas 1-A	Ammunition storage magazine	Some bunkers contain one or more types of expolosives - rest are empty	North Central	World War II
Area 5	High explosive storage	Hazardous materials satellite accumulation point	Central	World War II
Area 7	High explosive storage	Some bunkers contain one or more types of expolosives - rest are empty	Eastern	World War II

Table 3-3
Summary of Major Facilities at RVAAP

Name of Facility	Past Function	Current Function	Location	Year Built/Date of initial operations
Aboveground				
Areas 2-4	Area 2 - Ammunition storage, Type 2 Area 3 - Smokeless powder Area 4 - Fuze and Booster storage	Some bunkers contain 155 mm and m483 projectiles and the rest are empty	Areas 2 and 3 - North East Area 4 - South Central	World War II
Area 6,8 (Inert)	Storage of non-explosive materials	Area 6 - utilized by the Guard Area 8 - DLA - Strategic materiel storage	Area 6 - East Area 8 - South East	World War II
Standard magazine	Storage of non-explosive materials	Empty	North Western	World War II
Wet storage	High explosive storage			World War II
Transport/Material Storage	Loading finished ammunition, unloading bulk explosives open storage of strategic materials	Ferro-Chromium and manganese storage	North West Corner	Unknown
Tank Farm, Rt. 80		DLA strategic materiels storage	Area 8	Unknown
Tank Farm, Load Line 3		DLA strategic materiels storage	Load Line 3	Unknown
Miscellaneous Open Storage	Old Roads and Grounds Maintenance Area	Temporary strorage construction rubble rail road ties	South Eastern near Southern perimeter	Unknown
Testing and Firing Ranges				
Pistol Range	Pistol Range	Inactive	North-Central	Unknown
40 and 60mm Range	40 and 60mm ammunition firing range	Inactive	South Western	1940's
Firestone Test Facility	Classified testing of shaped charges	Inactive	South Western	Unknown
Projectile Testing Area	Area where projectiles were fired into targets	Inactive	Central Region - RVAAP 4	Unknown
NACA Test Area	Plane crash testing	Inactive	South West, Southern Boundary	Unknown
OB/OD/Demil				
Winklepeck	Open burning in pits, pads, and roads	Inactive	North-Central	1941
Erie Burning Grounds	Open burning of munitions on ground	Inactive	North East Corner	1941

Table 3-3
Summary of Major Facilities at RVAAP

Name of Facility	Past Function	Current Function	Location	Year Built/Date of Initial operations
Demolition Area No. 1	Thermal treatment of munitions	Inactive	South West	1941
Demolition Area No. 2	Detonation of large caliber Munitions and off-spec. bulk explosives	Inactive	Central	1948
Deactivation Furnace	Deactivate fuses, boosters, and ammunitions	Inactive	North Central	
Fuze and Booster Burning Pits		Revegated	Central	1945
LF/Sewage Treatment Plants				
C-Block Quarry	Liquid waste, garbage disposal	Inactive	North West	1950's
Landfill North of Winklepeck	General refuse and possibly explosives	Inactive	North Central	1969
Sand Creek Disposal Road	Construction landfill with asbestos	Unknown	South Eastern Portion	Unknown
Sand Creek Sewage	Treatment of Domestic Sewage	Inactive	South Eastern Portion	1969
Depot Sewage	Treatment of Domestic Sewage	Inactive	South Central Portion	1941
George Road Sewage	Treatment of Domestic Sewage and effluent RVAAP 15 and RVAAP 30	Inactive	South Central Boundary	
Load Line 1	Melt and load TNT and composition B into large caliber shells and bombs	Inactive	Lower South East Portion	1941
Load Line 2	Melt and load TNT and composition B into large caliber shells and bombs	Inactive	Lower South East Portion	1941
Load Line 3	Melt and load TNT and composition B into large caliber shells and bombs	Inactive	Lower South East Portion	1941
Load Line 4	Melt and load TNT and composition B into large caliber shells and bombs	Inactive	Lower South East Portion	1941
Load Line 12		Inactive	Lower South East Portion	
Load Line 5	Manufactured fuzers	Inactive	South Eastern/Central	World War II
Load Line 6	Manufactured fuzes/R & D on shape charges - Fire Stone Test Facility	Inactive	South Eastern/Central	World War II

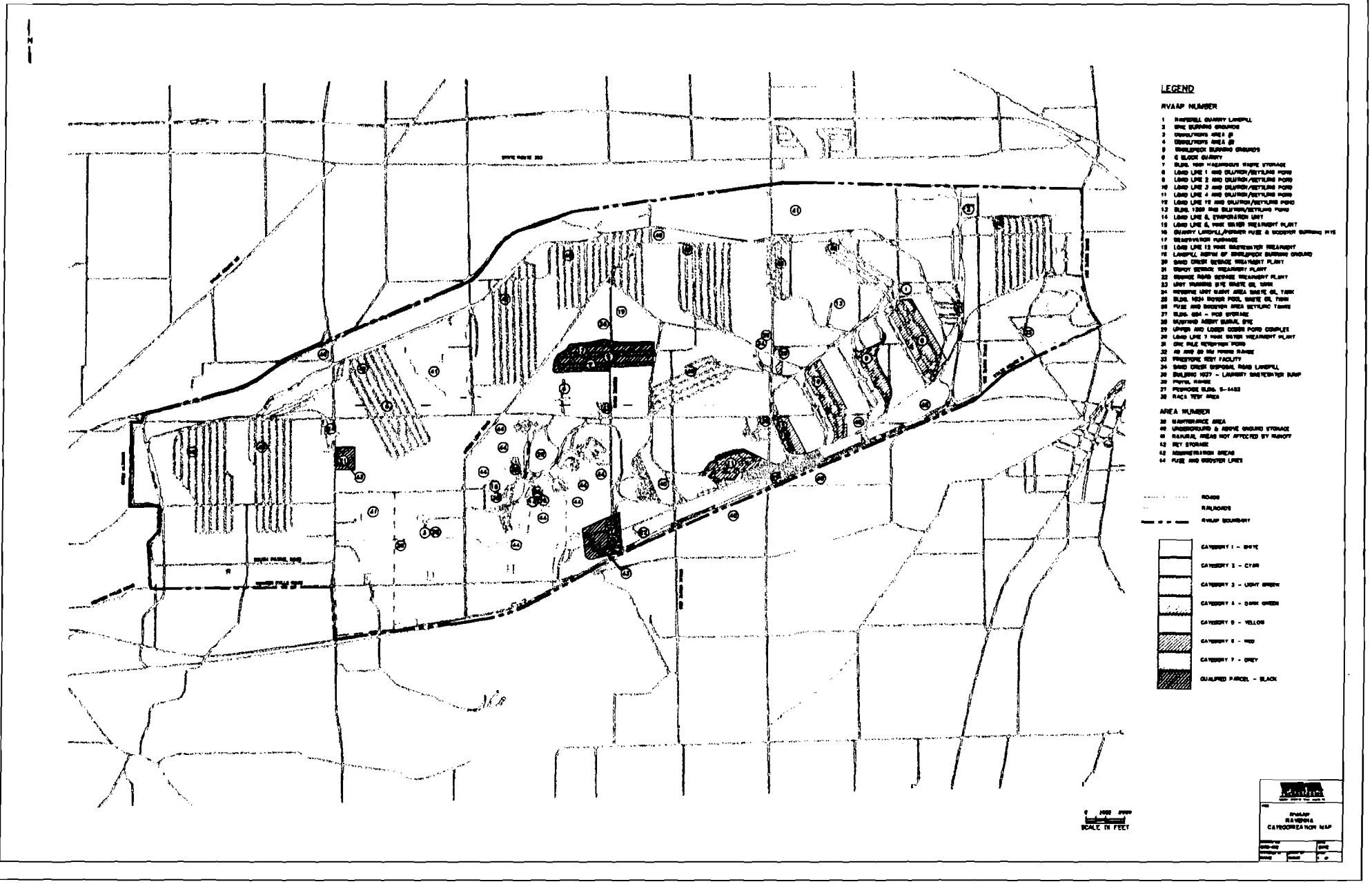
Table 3-3
Summary of Major Facilities at RVAAP

Name of Facility	Past Function	Current Function	Location	Year Built/Date of Initial operations
Load Line 7	Manufactured booster charges	Inactive	South Eastern/Central	World War II
Load Line 8	Manufactured booster charges	Inactive	South Eastern/Central	World War II
Load Line 9	Manufactured detonators	Inactive	South Eastern/Central	World War II
Load Line 10	Manufactured percussion elements	Inactive	South Eastern/Central	World War II
Load Line 11	Manufactured artillery primers	Inactive	South Eastern/Central	World War II

APPENDIX C

CERFA Map

CERFA Map



DEPARTMENT OF THE ARMY
RAVENNA ARMY AMMUNITION PLANT
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297

REPLY TO
ATTENTION OF

SIORV-NR (200-3)

8 October 1998

MEMORANDUM FOR Commander, U.S. Army Industrial Operations Command, ATTN: AMSIO-ACE-D (Mr. Robert Matthys), Rock Island, IL 61299-6000

SUBJECT: Environmental Baseline Survey (EBS) - Final Report for Ravenna Army Ammunition Plant (RVAAP)

1. Subject final report and the comments and responses on the draft report have been received by the RVAAP. Upon review of the RVAAP Ravenna CERFA Map and the responses to many of our comments on the draft report, we find the EBS to be flawed and question its usefulness in helping to make property excessing and transfer decisions. There are known areas of concern that are not addressed or are inadequately addressed in the EBS. A list of specific comments beyond those in this memorandum are enclosed.

2. The EBS continually references explosive underground magazines. This is an inappropriate term. There are no underground magazines at the RVAAP. We have earth covered magazines (ECM) that we call igloos. The use of the term underground magazine is not consistent with current terminology and could confuse readers as to the facilities at RVAAP.

3. The EBS clearly states that the load line 1 and load line 2 settling ponds, Criggy's Pond (misnamed as Griggy's Pond in the EBS) and Kelly's Pond, drain into Sand Creek. This is incorrect and was brought to VISTA's attention in the RVAAP comments, but not corrected in the final EBS. VISTA indicated that they got their information from Halliburton. Halliburton can not be found in their list of references. Regardless, these ponds do not empty into Sand Creek. They are not even in the Sand Creek drainage basin.

4. The EBS does not accurately depict the areas of contamination on the CERFA map. The little circles denoting the locations of areas of concern (AOC's) do not denote the boundaries of the AOC's. Drainage areas from load lines to settling ponds are not shown, nor are the areas shown of known unexploded ordnance around demolition area number 2. Criggy's Pond and Kelly's Pond are not shown on the map. It is not clear what criteria were used to determine the boundaries on the CERFA map. For example, the load line boundaries generally follow the fence lines except for load line 2. The map is not detailed enough to be of any use in determining areas suitable to excess or transfer. Beyond this, the map is riddled with other errors. Roads are mislabeled and the RVAAP property boundary is grossly inaccurate in several areas.

5. The EBS uses old reports and incomplete CERCLA investigations to draw conclusions on contamination levels, locations, and remedial actions needed at the RVAAP. We are just beginning the field work associated with the RVAAP environmental restoration program. This work is done in strict compliance

with RCRA, CERCLA, and other regulatory protocols in cooperation with the Ohio EPA. We do not have enough information to accurately determine the boundaries of any AOC, let alone declare them safe to excess or transfer. The EBS makes sweeping judgements over vast areas of the RVAAP with little or no data.

6. The EBS does not reflect the direction of the RVAAP environmental restoration program. There are large areas designated as category 1 (real property with no release or disposal of hazardous substances), suitable to excess that are under investigation for closure as part of our environmental restoration program. The existing data is incomplete and inappropriate for this determination. The environmental restoration program will generate the necessary data as the program proceeds. Until then, the areas of contamination around AOC's must be broadly defined. To do so correctly will result in an increase in the area of category 5, 6, and 7 properties.

7. The concept of developing an accurate property classification and demarcation to support a finding of suitability to excess or transfer property at the RVAAP based on existing data is flawed. Some areas can be designated as uncontaminated, but not as many areas as shown on the CERFA map. We have found it difficult to obtain the concurrence of regulators on AOC boundaries without properly collected and analyzed data. The EBS developed by VISTA Technologies does not adequately denote category boundaries and is of little value for making sound decisions or determining the suitability to excess or transfer RVAAP real property.

8. The POCs on this action for the RVAAP are Mr. Tim Morgan and Mr. Mark Patterson (330) 358-7311.

Encl
As stated

JOHN A. CICERO, JR.
Commander's Representative

CF:
Cdr, IOC, ATTN: AMSIO-IBI-REST (Mr. Mendoza), Rock Island, IL 61299-6000
Cdr, IOC, ATTN: AMSIO-IBI-REST (Mr. Whelove), Rock Island, IL 61299-6000
Cdr, IOC, ATTN: AMSIO-IBI-ADV (Mr. Vermost), Rock Island, IL 61299-6000
Cdr, IOC, ATTN: AMSIO-IBI-ADV (Mr. Cramond), Rock Island, IL 61299-6000

RVAAP Comments On Final EBS
8 October 1998

1. Page "a" states "*all areas at Ravenna Army Ammunition Plant are designated as Category 1,2,4,5,6,or 7*" yet page b" states "5.25 acres are designated as Category 3".

2. Page 20 states that "*RVAAP … was constructed primarily as a site for loading medium and major caliber artillery ammunition, bombs, mines…*". To the best of our knowledge, mines were refurbished at RVAAP but were never loaded here. If Vista has information to the contrary, they should cite the source.

3. Page 21 makes reference to the proposal to add 13 new AOCs to the current, official list of 38. The EBS should discuss these sites in more detail since the purpose of the document is to "determine, discover, and document the obviousness or likely presence of a release of any hazardous substance or petroleum product within the subject property boundaries." Some of the proposed AOCs are discussed in Sections 5.8.11 to 5.8.14 of the EBS. These sections should include more information on the proposed AOCs, which was available from Corps, and RVAAP personnel who were conducting investigations into potentially new AOCs at the time the EBS fieldwork was being done. A document titled "Additional Environmental AOCs at RVAAP, OH" dated August 21, 1998 is available as a result of the investigative efforts. Jim Sheehy of USACHPPM will be conducting fieldwork during the last two weeks of October, 1998 for the RRSEs for the 13 new AOCs.

4. Page 232 Section 3.5.1.2. Explosives should be listed as potential contaminants for RVAAP-32.

5. Page 24 Section 3.5.1.4. The airplanes at RVAAP - 38 NACA Test Area were not connected to a conveyor belt and crashed. Rather the "crash site … was arranged to permit the airplane to accelerate from rest under its own power and, constrained by a single guide rail, to arrive at a crash barrier at approximately take-off speed (80 to 105 mph)" (Page 548. Thirty-Ninth Annual Report of the National Advisory Committee for Aeronautics, 1953).

6. Page 25 Section 3.5.1.7. Explosives should also be listed as contaminants of concern for RVAAP - 17.

7. Page 26 Section 3.5.2.1. Results of groundwater monitoring are available for the five monitor wells installed in 1987 at RVAAP - 01 are available in the RVAAP technical library in Building 1037.

8. Page 27 Section 3.5.2.3. Heavy metals should also be listed as contaminants of concern for RVAAP - 03.

9. Page 28 Section 3.5.2.5. The EBS states that "present activities are limited to an area of about 15 acres." The statement is vague and could be construed to imply that open burning is still done at the site. The only activities taking place at RVAAP - 05 are closure of the Deactivation Furnace and Burning Trays, and the IRP investigation of the entire site, which is approximately 200 acres.

10. Page 30 Section 3.5.2.5. The RI, that is currently in progress, is Phase II not Phase I as stated.

11. Page 39 Section 3.5.3.9. Spent Carbon from the Pink Water Treatment plant in Load Line 12 has not been stored in Building 1601 for at least five years. The spent carbon is removed from the towers, hauled off-site, regenerated, and returned to the plant for reuse.

12. Page 40 Section 3.5.11. The Imhoff tanks and trickling units at the three STPs RVAAP - 20,21,22 were not cleared" from the sites but were emptied and covered with clean fill.

13. Page 50 Section 3.5.8. The RVAAP maintenance contractor samples the drinking water wells and sends the samples to the ODOH for E-coli testing.

14. Page 52 Table 3-5-13. Demolition Area 2 RVAAP 04 and Winklepeck Burning RVAAP - 19 were marked according to recommendations made by U.S. EPA during an on-site inspection in August, 1997. Vista should not the specific deficiencies in the markings at these sites so they can be corrected if necessary.

15. Page 54 3.5.16.1. Building 854 did contain PCB contaminated equipment at the time of the EBS inspection. The building was undergoing closure by S.D. Myers IAW OEPA guidance. The Material has been removed and the building is considered decontaminated as of 9/30/98.

16. Page 55 Section 3.5.17. A comprehensive asbestos survey to identify all asbestos in buildings at RVAAP was completed in 1991. The records of the survey are available in the technical library in Building 1037. To date, all the friable asbestos has been removed from the buildings. Table 3-5-17 should reflect this.

17. Page 56 Section 3.5.18.1. This section should detail the investigation report closure plans, which have been developed for the demolition of the Pesticide Building RVAAP - 37 and removal of adjacent, contaminated soils.

18. Page 57 Section 4.2. The water from approximately 25 residential wells adjacent to the RVAAP property was sampled by the OEPA during the winter of 1997/1998. The results showed no evidence of contaminants that could be directly attributed to past activities at RVAAP. No explosives were detected in the samples. The data is available from Mark Patterson at RVAAP. This data should be discussed or at least cited in the EBS considering its potential importance.

19. Page 62 Table 5-1. All the current AOCs in Table 5-1, except RVAAP - 07, 17, 18, 27, and 37, will require additional evaluation. According to the Category definitions, this would put these sites in Category 7 but some are listed in other categories.

Draft

Letterhead

SIORV-NR (200-3) Date

MEMORANDUM FOR Commander IOC AMSIO-ACE-D (Mr. Robert Matthys) Rock Island, IL

Subject: Environmental Baseline Survey (EBS) - Final Report for Ravenna Army Ammunition Plant (RVAAP)

1. Subject final report and the comments and responses on the draft report have been received by the RVAAP. Upon review of the RVAAP Ravenna CERFA Map and the responses to many of our comments on the draft report, we find the EBS to be flawed and question it's usefulness in helping to make property excessing and transfer decisions. There are known areas of concern that are not addressed or are inadequately addressed in the EBS.

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Draft

contamination around AOC's must be broadly defined. To do so correctly will result in an increase in the area of category 5, 6, and 7 properties.

7. The concept of developing an accurate property classification and demarcation to support a finding of suitability to excess or transfer property at the RVAAP based on existing data is flawed. Some areas can be designated as uncontaminated, but not as much as shown on the CERFA map. The appropriate approach is to designate boundaries and determine the real property categories based on input from those working on the RVAAP environmental restoration program. We have found it difficult to obtain the concurrence of regulators on AOC boundaries without properly collected and analyzed data. The EBS developed by VISTA Technologies does not adequately denote category boundaries and is of little value for making sound decisions or determining the suitability to excess or transfer RVAAP real property.

8. The POC's on this action for the RVAAP are Mr. Tim Morgan and Mr. Mark Patterson.

Sincerely,

J. A. C.
Big Cheese

CF: R. Mendoza
Cramond
Vermost
WHO ELSE????????
B. Whelove

Note: No evidence of significant surface or groundwater residential well sampling

TECHNOLOGIES

25 September 1998

Mr. Robert Matthys
HQ Industrial Operations Command
AMSIO-ACE-D, Building 350
5th Floor, Post D-15
Rock Island, IL 61299-6000

Subject: Comments and Responses for the Ravenna Army Ammunition Plant Environmental Baseline Survey

Dear Mr. Matthys:

Attached you will find comments and responses regarding the Environmental Baseline Survey for Ravenna Army Ammunition Plant. References in these documents are made relative to the draft forwarded for review and subsequent changes may be reflected on different pages and/or sections.

If you have any questions please feel free to call, (210) 829-5800

Sincerely,

Prakash Raja
Program Manager

1919 Oakwell Farms Parkway, Suite 100, San Antonio, TX 78218
(210) 829-5800 FAX (210) 829-4649

VISION - INNOVATION - RESULTS

COMMENT RESPONSE PACKAGE

COMMENTS BY BOB WHELOVE
FOR ENVIRONMENTAL BASELINE SURVEY
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

Comment 1:
Page I of the *Table of Contents*, at the bottom "There is no description of RVAAP 23, 24, 25."

Response:
Descriptions were in the report on pages (original/draft) 46-47.

Comment 2:
Page ii of the Table of Contents, Section 3.5.3.5 Load Line 12 *(RVAAP-1)* circled and "?" pointing to it.

Response:
"RVAAP 1" was changed to "RVAAP 12."

Comment 3:
Page ii of the Table of Contents, Section *3.5.4.1 Underground Storage Tanks* "23,24,25" added.

Response:
No response or change.

Comment 4:
Page 1, Section 1, 1.2 Scope of the Environmental Baseline Survey, last sentence of first paragraph, *Potential future are additionally addressed in the EBS.* was underlined and "How can you predict the future?" written after paragraph.

Response:
The EBS does not predict the future.

Comment 5:
Page 2, Section 1, 1.3 Survey Methodology, third bullet statement *former employees* was underlined and "when?" written underneath it.

Response:
"Former employees" was deleted.

COMMENT RESPONSE PACKAGE

Comment 6:
Page 3, Section 1, 1.3 Survey Methodology, last bullet statement *(ASTM)* was underlined and "this is a BRAC designation?" was written after it, before Category 1.

Response:
The ASTM standard was developed to classify property area types for DoD real property. This is not a BRAC reference.

Comment 7:
Page 7, Section 1, 1.6 General Geographic and Environmental Settings, second paragraph first sentence *Figure 1.6-1* was circled and 1.5-1 was written above it

Response:
Figure 1.5-1 was changed to 1.6-1.

Comment 8:
Page 7, Section 1, 1.6 General G Geographic And Environmental Settings, second paragraph second sentence *Figure 1.6-2* was circled and 1.5-2 was written above it.

Response:
Figure 1.5-2 was changed to 1.6-2.

Comment 9:
Page 7, Section 1, 1.6 General Geographic and Environmental Settings, second paragraph last sentence *Table 1-6 contains the RVAAP facility map legend.* was circled and "What about the 13 sites we know about but have not put them in DSERTS report because we don't have rating for them?" was written with an arrow pointing to it.

Response:
As of the time the EBS was conducted there were 38 AOC's.

Comment 10:
Page 7, Section 1, 1.6 General Geographic And Environmental Settings, first paragraph, second sentence insert "city of" before *Ravenna* also insert "city of" before *Newton Falls*.

Response:
"City of" was inserted before *Ravenna* and also before *Newton Falls*.

Comment 11:
Page 7, Section 1, 1.6 General Geographic And Environmental Settings, second paragraph *is generally rural* is underlined and a "?" above it.

Response:
No response or change.

Comment 12:
Page 10, Section 1, *Table 1-6 RVAAP Facility Map Legend* need to add Site and Facility for 39-51.

Response:
As of the time the EBS was conducted there were 38 AOC's.

Comment 13:
Page 11, Section 1, 1.6.4 Surface Hydrology, at the end of second paragraph "I thought there are 6 creeks at RVAAP."

Response:
Three major creeks drain RVAAP.

Comment 14:
Page 12, Section 1, 1.6.5 Geology and Soils, first paragraph line 7 *central* was lined out and "central western" was written above it.

Response:
Changed to read "central western."

Comment 15:
Page 13, Section 2, Sources of Information , 2.1 Installation Property line 4 of paragraph *present and former* underlined and "who?" written after it with () on *former*.

Response:
"Former" was deleted.

Comment 16:
Page 14, Section 2, 2.1.2 Federal, State and Local Government Regulatory Records, *(ASTM)* was underlined and "BRAC designation" was written next to it.

Response:
The ASTM standard was developed to classify property area types for DoD real property. This is not a BRAC reference.

Comment 17:
Page 14, Section 2, 2.1.2 Federal, State and Local Government Regulatory Records, *Table 2-2-2 Environmental Databases* was circled and "Where is this discussed or referenced?"

Response:
The table is referenced two sentences prior to the table's presentation.

Comment 18:
Page 15, Section 2, "not complete received NOV's in 94 & 95 informal correspondence up through 98" was written at the bottom of the page

Response:
NOV's were updated.

Comment 19:
Page 16, Section 2, 2.1.3 Aerial Photographs, third paragraph *environmental concerns identified during the review analysis of these aerial photographs* was underlined and "on or off post?" was written after it.

Response:
"Any concerns" implies "on or off post."

Comment 20:
Page 18, Section 2, 2.2.1 RVAAP Personnel Interviewed and 2.2.2 Mason and Hanger Personnel Interviewed, "Who was former employee that was interviewed?" was written next to these two sections.

Response:
There is no reference made in this section to "former employees."

COMMENT RESPONSE PACKAGE

Comment 21:
Page 20, Section 3, 3.2 Installation History and Mission, *RVAAP is a GOCO US Army Materiel Command facility* has "Industrial Operations Command under USAMC written above it; this should read RVAAP is a GOCO Industrial Operations Command under US Army Materiel Command facility.

Response:
The report was changed to reflect the comment.

Comment 22:
Page 20, Section 3, 3.2 Installation History and Mission, at the end of the first sentence of the third paragraph "when?" was written and an arrow pointing to it.

Response:
No response or change.

Comment 23:
Page 20, Section 3, 3.2 Installation History and Mission, at the end of the second sentence of the third paragraph "when & by whom" was written and arrow pointing to it.

Response:
No response or change.

Comment 24:
Page 20, Section 3, 3.2 Installation History and Mission, at the end of the first sentence of the fourth paragraph *munitions* was underlined and () around it also "no munitions" was written above it with an arrow pointing to it.

Response:
The change was made from "munitions" to "explosives."

Comment 25:
Page 20, Section 3, 3.2 Installation History and Mission, at the end of the last sentence of the fourth paragraph *Normal Operations on RVAAP is overseen by about 35* was underlined.

Response:
RVAAP has approximately 29 people overseeing operations.

Comment 26:
Page 21, Section 3, 3.2 Installation History and Mission, first paragraph *As part of its mission to restore and manage the environment, the US Army is involved in and committed to the cleanup of 38 potentially contaminated areas of concern (AOCs) on RVAAP.*() before and after the sentence. Also *RVAAP* was circled with "we know of 51 sites" written next to it with an arrow pointing to it.

Response:
As of the time the EBS was conducted there were 38 AOC's.

Comment 27:
Page 21, Section 3, 3.2 Installation History and Mission, first paragraph *RVAPP* had a keystroke error, should be RVAAP.

Response:
The change was made.

Comment 28:
Page 21, Section 3, 3.4 Current Tenant Activities, first bullet statement *A, B, C, D, E, F, and G, for training. These areas are* is circled with "what map or where shown or designated" written next to it.

Response:
The areas are on the enclosed map.

Comment 29:
Page 21, Section 3, 3.4 Current Tenant Activities, third bullet statement *route 80 and monozite* was circled and "? this is not on site now" was written next to it. Also *chromium* was circled with "ferro-chromium ore" written with an arrow pointing to it.

Response:
The change was made.

Comment 30:
Page 22, Section 3, 3.5 Facility Support Activities and Associated AOCs, second paragraph *(RVAAP-39 thru RVAAP-44)* "Do not use DSERTS notations for non sites not acceptable!!" was written next to it.

Response:
The change was made from "RVAAP-39 – RVAAP-44" to Area 39 – Area 44.

Comment 36:
Page 24, Section 3, 3.5.1.6 Building 1601 Hazardous Waste Storage (RVAAP-07), line 6 *Potential contaminants at this site are metals, although there is little potential for contamination resulting from the operation of this facility.* has () before and after it with "I question this statement?" written underneath it with an arrow pointing to it.

Response:
The statement was deleted.

Comment 37:
Page 25, Section 3, 3.5.1.7 Deactivation Furnace (RVAAP-17), first paragraph line 4 *has been* was lined out and "was" written above it.

Response:
The change was made.

Comment 38:
Page 25, Section 3, 3.5.1.8 Mustard Gas Burial Site (RVAAP-28), "What year 1998?" written next to it.

Response:
No response or change.

Comment 39:
Page 25, Section 3, 3.5.2.1 Ramsdell Quarry Landfill (RVAAP-01), *Transportation Area* was underlined and "what is this where shown?" written underneath it.

Response:
Response to the Transportation Area was deleted.

Comment 40:
Page 26, Section 3, 3.5.2.1 Ramsdell Quarry Landfill (RVAAP-01), line 4 *napalm* was circled with "did not come from Load Line # 1

Response:
"Waste explosives," were from Load Line 1 not "Napalm."

COMMENT RESPONSE PACKAGE

Comment 41:
Page 26, Section 3, 3.5.2.2 Erie Burning Grounds (RVAAP-02), line 4 "this conflicts with earlier statements" written next to it with an arrow pointing to *1940.*

Response:
The reference was deleted.

Comment 42:
Page 26, Section 3, 3.5.2.2 Erie Burning Grounds (RVAAP-02), *as high as a million ponds* "where doe this come from speculations?" was written above it.

Response:
The statement was taken from the reference report.

Comment 43:
Page 27, Section 3, 3.5.2.3 Demolition Area 1 (RVAAP-03), "I would also state area was also used in 50's as a parking place for aircraft for the NACA test area. This means all UXO was removed prior to putting in aircraft" was written next to *100 to 150 square feet in* with an arrow pointing to the it.

Response:
A statement to that effect was added.

Comment 44:
Page 28, Section 3, 3.5.2.4 Demolition Area 2 (RVAAP-04), *An area where possible scrap bombs have been buried.* "Where did this come from?" was written above it with an arrow pointing to it.

Response:
"Halliburton NUS, 1992" was the source.

Comment 45:
Page 28, Section 3, 3.5.2.4 Demolition Area 2 (RVAAP-04), "Areas outside the RCRA area will be closed under CERCLA" was written after first paragraph.

Response:
A statement to that effect was added.

Comment 46:
Page 28, Section 3, 3.5.2.5 Winklepeck Burning Grounds (RVAAP-05), *It is not known how many pads were contained within this 200 acre unit* was underlined with a "?" written after it.

Response:
No comment or change.

Comment 47:
Page 29, Section 3, 3.5.2.5 Winklepeck Burning Grounds (RVAAP-05), *Many of the further flung projectiles are still in the field where they landed* has () around it with "is this true today? I doubt it!!" written next to the paragraph.

Response:
There is no available documentation to contradict the original statement.

Comment 48:
Page 29, Section 3, 3.5.2.5 Winklepeck Burning Grounds (RVAAP-05), above the third paragraph "This is a RCRA OB area being closed under RCRA" is written.

Response:
No comment or change.

Comment 49:
Page 30, Section 3, 3.5.2.5 Winklepeck Burning Grounds (RVAAP-05),"except for OB" was written above first paragraph of this page.

Response:
The change was made.

Comment 50:
Page 32, Section 3, 3.5.3 Waste Water and Wastewater Treatment, "not all basins are in RVAAP 26" was written next to this paragraph.

Response:
No comment or change.

Comment 51:
Page 32, Section 3, 3.5.3 Waste Water and Wastewater Treatment, *compound mixtures poured into the tanks* was underlined with "this was effluent?" written next to it with an arrow pointing to it.

Response:
Yes

Comment 52:
Page 32, Section 3, 3.5.3.1 Load Line 1 and Dilution/Settling Pond (RVAAP-08), second line *1971* was circled and "71 or 81 ?" was written next to it.

Response:
1971.

Comment 53:
Page 33, Section 3, 3.5.3.2 Load Line 2 and Dilution/Settling Pond (RVAAP-09), second paragraph "How much TNT?" was written next to it.

Response:
The amount of TNT was not reviewed in any available document.

Comment 54:
Page 35, Section 3, 3.5.3.3 Load Line 3 and Dilution/Settling Pond (RVAAP-10), next to third paragraph "is this Load Line # 3 or RVAAP 12 & 18?" was written next to it.

Response:
Load Line # 3.

Comment 55:
Page 36, Section 3, 3.5.3.5 Load Line 12 and Dilution/Settling Pond (RVAAP-1), *(RVAAP-1)* has a "?" with "RVAAP-12!" was written next to it.

Response:
The change was made.

Comment 56:
Page 37, Section 3, 3.5.3.5 Load Line 12 and Dilution/Settling Pond (RVAAP-1), line 6 of the second paragraph *Cobb Ponds* was underlined and "which one" was written above it.

Response:
Samples were taken from the Cobb Ponds Complex.

Comment 57:
Page 37, Section 3, 3.5.3.5 Load Line 12 and Dilution/Settling Pond (RVAAP-1), line 2 of the third paragraph *up to 19,000 mg/kg exist* was circled and "is this the value for one of the LL's' seems like LL # 12 was 380,000 mg/kg.

Response:
No response or change.

Comment 58:
Page 38, Section 3, 3.5.3.7 Load Line 6 Evaporation Unit (RVAAP-14), line 9 of the second paragraph after *RCRA Closure* "letter?" was written after it.

Response:
"Letter" was added.

Comment 59:
Page 40, Section 3, 3.5.3.10 Sand Creek Sewage Treatment Plant (RVAAP-20), line 5 of the second paragraph *Potential contaminants are metals* was underlined and "site is closed no potential" was written above it.

Response:
"Potential contaminants..." was deleted.

Comment 60:
Page 40, Section 3, 3.5.3.11 Depot Sewage Treatment Plant (RVAAP-21), second paragraph *Potential contaminants at this AOC are metals* was underlined and "no potential site is closed" was written underneath it.

Response:
"Potential contaminants..." was deleted.

Comment 61:
Page 41, Section 3, 3.5.3.12 George Road Sewage Treatment Plant (RVAAP-22), line 5 of the second paragraph *Potential contaminants at this site are metals* was underlined and a "?" was written above it.

Response:
"Potential contaminants..." was deleted.

Comment 62
Page 42, Section 3, 3.5.3.13 Fuze and Booster Area Settling Tanks (RVAAP-26), second line of first paragraph *load line* was circled and "which LL #'s makes a real difference" was written above it.

Response:
Changed to include Load Lines 5, 7, 9, 10, and 11.

Comment 63:
Page 43, Section 3, 3.5.3.14 Upper and Lower Cobb Ponds (RVAAP-29), first line of the page *did* was circled and "was" was written above it.

Response:
The change was made.

Comment 64:
Page 44, Section 3, 3.5.3.15 Load Line 7 Pink Water Treatment Plant (RVAAP-30), *No future IRP Phases are scheduled, as the IRP status is Response Complete* was underlined and "? RCRA site?" was written underneath it.

Response:
No comment or change.

Comment 65:
Page 44, Section 3, 3.5.3.16 Building 1037, Laundry Wastewater Sump (RVAAP-35), first paragraph *Building 1037 is currently the Military Headquarters for RVAAP* was underlined and "other sections of," was written above it.

Response:
The change was made.

Comment 66:
Page 44, Section 3, 3.5.3.17 Ore Pile Retention Pond (RVAAP-31), second sentence of first paragraph "ferro-chromium" was written above *chromium ore piles.*

Response:
The change was made.

Comment 67:
Page 44, Section 3, 3.5.3.17 Ore Pile Retention Pond (RVAAP-31), second paragraph "chromium" was written next to it.

Response:
The change was made.

Comment 68:
Page 44, Section 3, 3.5.3.17 Ore Pile Retention Pond (RVAAP-31),second paragraph *explosives* was underlined and "this whole treatment needs to talk about all three piles & etc, DLA site?" was written next to it.

Response:
No response or change.

Comment 69:
Page 44, Section 3, 3.5.4 Underground Storage Tanks, *by the Ohio EPA* was underlined and "were not seem of the closures done under supervision of county workers?" was written with an arrow pointing to it.

Response:
No response or change.

Comment 70:
Page 45, Section 3, 3.5.4 Underground Storage Tanks, *49* was circled and "50?" was written above it.

Response:
The change was made.

Comment 71:
Page 45, Section 3, Table 3.5.4.1 Former USTs at RVAAP, "numbers written out to side of each Tank Number and Page 46 "I count 50 tanks 50?" was written out to the side of the table.

Response:
The change was made.

Comment 72:
Page 47, Section 3, 3.5.4.2.3 Defense Logistics Agency (DLA) ASTs, *Route 80* was circled and "?" was written underneath the paragraph with an arrow pointing to it.

Response:
No response or change.

Comment 73:
Page 48, Section 3, 3.5.5.1 Earth-Covered Magazines, *currently* was underlined and "used a 1996 not 98 inventory?" was written underneath it with an arrow pointing to it.

Response:
A 1998 inventory was used.

Comment 74:
Page 49, Section 3, 3.5.5 Aboveground Magazines, first bullet statement of this page *M107* was circled and "inventory shows no M107 on M483!" was written above the paragraph with an arrow pointing to it.

Response:
The change was made.

Comment 75:
Page 49, Section 3, 3.5.7 Drinking Water Management, "Under the Ohio Wellhead provisions" was written after the paragraph.

Response:
The change was made.

Comment 76:
Page 53, Section 3, 3.5.16.1 Building 854, PCB Storage (RVAAP-27), *was tested clean IAW Ohio EPA criteria for PCBs in 1995* was underlined with a "?" and "Bldg is undergoing closure now" was written next to it.

Response:
No response or change.

Comment 77:
Page 55, Section 3, 3.5.18.1 Pesticide Storage Building S-4452 (RVAAP-37), *southeast* was circled and "north?" was written above with an arrow pointing to it.

Response:
The change was made.

Comment 78:
Page 55, Section 3, 3.5.18.1 Pesticide Storage Building S-4452 (RVAAP-37), *CERCLA* was lined out with "RCRA" written underneath it. Also "currently undergoing closure" written at the bottom of this paragraph.

Response:
The change was made.

Comment 79:
Page 56, Section 4, 4.2 Sources of Potential Contamination from Adjacent Property, *Table 4-1* was circled with 4-2 written next to it with an arrow pointing to it.

Response:
The change was made.

Comment 80
Page 59, Section 5 Environmental Condition of RVAAP Property, second line of paragraph *DoD BRAC Cleanup Plan* was underlined with "why BRAC?" written above it with an arrow pointing to it.

Response:
"BRAC" was deleted.

Comment 81:
Page 60, Site 5, 5.1.1 RVAAP Parcels, *and sites that have not been previously identified as AOCs (RVAAPs 39-45)* has () around it with "?" written next to it.

Response:
RVAAP'S 39-45 were changed to Areas 39-45.

Comment 82:
Page 72, Site 5, 5.8.10 Parcel Number and RVAAP Label 38(7) - NACA Test Area, *The following sites have been previously identified as AOCs* has an arrow pointing to "and below see sites 39 through 51.

Response:
RVAAP'S 39-45 were changed to Areas 39-45.

Comment 83:
Page 73, Section 5, 5.8.12 Parcel Number and RVAAP Label 40(7) - Underground and Aboveground Storage, *explosives out of the door and onto the ground* was underlined with "not true!! Where did you get this?" written next to it with an arrow pointing to it.

Response:
This statement was made by Larry Boggs of Mason & Hanger.

General Comments:
Insert page numbers following Tables.

Response:
VISTA standard format does not site page numbers following table references

COMMENTS RESPONSE PACKAGE

COMMENTS BY TIM MORGAN
FOR ENVIRONMENTAL BASELINE SURVEY
RAVENNA ARMY AMMUNITION PLANT
RAVENNA, OHIO

Comment 1:
pg. 17, 2.1.3. I question the claim that outwash erosion from wastewater discharge into streams and ditches associated with peak production was seen in photographs. My guess is that ground disturbance and erosion was related to some other activity, because there is very little relief in most areas to result in erosional force and discharge was slowed via sawdust filter tanks. Unless you have identified known discharge points and can support your finding with production data, request you re-evaluate this statement.

Response:
The statement was deleted.

Comment 2:
pg. 21, 3.2. Information on excessing is outdated. Your info. came from a 1992 ROA. This was redone in 1998. Excess area is consistent with the area IOC will retain in property transfer with the National Guard Bureau.

Response:
No response or change.

Comment 3:
pg. 22, 38 AOC's? This is changing. One current AOC is being broken out into several different AOC's, and several more are being added. Mark Patterson knows more about this. Total AOC will probably end up being 51.

Response:
As of the time the EBS was conducted there were 38 AOC's.

Comment 4:
pg. 31, 3.5.2.7. Combined pond area is greater than 1 acre.

Response:
No response or change.

Comment 5:

pg. 33, 3.5.3.1. Criggy's Pond does not drain into Sand Creek.

Response:
The report does not state that Criggy's Pond drains to Sand Creek.

Comment 6:
pg. 34, 3.5.3.2. Kelly's Pond does not drain into Sand Creek.

Response:
As reported by Halliburton, discharge from Kelly's Pond was channeled to Sand Creek.

Comment 7:
pg. 39, 3.5.3.7. The metal building is no longer there. It was built to house the carbon filters not the evaporation tank.

Response:
The change was made.

Comment 8:
pg. 54, 3.5.14. A radon survey was done by Ravenna Arsenal, Inc. in 1989/90 time frame.

Response:
VISTA did find/review any radon survey and therefore cannot provide definite conclusions regarding the pressure and extent of radon concerns.

Comment 9:
pg. 63, Table 5-1. Acreages should be shown on the table.

Response:
The area of each category of parcel type is listed in Section 5.

Comment 10:
pg. 67, 5.4. How can you say no remedial action is needed for the C-Block Quarry when the Phase 1 RI has not yet been done?

Response:
Analytical results reported chemical concentrations below mandated thresholds or action limits.

Comment 11:

pg. 78, 5.9.4. Yes, but not likely due to nature of test firing. One round was fired at a time. If it did not explode, it was detonated in place.

Response:
No response or change.