

MAY/FY06

**RADFORD ARMY
AMMUNITION PLANT**
Virginia

**Army Defense Environmental
Restoration Program
Installation Action Plan**

Final 22 August 2006

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The purpose of the Installation Action Plan (IAP) is to outline the total multi-year Cleanup Program for an installation. The plan identifies environmental cleanup requirements at each site or area of concern, and proposes a comprehensive, installation-wide approach, with associated costs and schedules, to conduct investigations and necessary remedial actions.

In an effort to coordinate planning information between the restoration manager, US Army Environmental Center (USAEC), Radford Army Ammunition Plant, executing agencies, and regulatory agencies, an IAP was completed. The IAP is used to track requirements, schedules and tentative budgets for all Army installation cleanup programs.

All site-specific funding and schedule information has been prepared according to projected overall Army funding levels and is, therefore, subject to change.

The following agencies contributed to the formulation and completion of this Installation Action Plan during a planning workshop held on 24-25 May 2006:

Company/Installation/Branch

VA DEQ

Engineering & Environment Inc. for USAEC

Radford Army Ammunition Plant

USACE, Baltimore District

US Army Environmental Center

ATK for Radford Army Ammunition Plant

USEPA Region III

Acronyms & Abbreviations

AAP	Army Ammunition Plant
ACD	Air Curtain Destructor
AEDB-R	Army Environmental Database Restoration
AOC	Area of Concern
AST	aboveground storage tank
BDDT	Building Debris Disposal Trench
BLA	Bag Loading Area
BLDG	building
BRA	baseline risk assessment
CaSO₄	calcium sulfate
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMI	Corrective Measures Investigation
CMI(C)	Corrective Measures Investigation (Construction)
CMS	Corrective Measures Study
COC	contaminant of concern
CORA	Corrective Action Permit
CS	Confirmation Study
CTC	Cost-to-Complete
cy	cubic yards
DAA	Draper Aden & Associates
DD	Decision Document
DERA	Defense Environmental Restoration Account (currently called ER,A)
DERP	Defense Environmental Restoration Program
DES	Design
DNT	Dinitrotrotoluene
EPA	Environmental Protection Agency
ERA	Ecological Risk Assessment
ER,A	Environmental Restoration, Army (formerly DERA)
FAL	Fly Ash Landfill
FLFA	Former Lead Furnace Area
FS	Feasibility Study
FY	Fiscal Year
GIS	Geographic Information System
GPS	Groundwater Protection Standards
GW	Groundwater
HBN	health-based number
HHRA	Human Health Risk Assessment
HRS	Hazard Ranking Score
HWMU	hazardous waste management unit
IAA	Igniter Assembly Area
IAP	Installation Action Plan
IMA	Installation Management Agency
IR	Installation Restoration
IRA	Interim Remedial Action

Acronyms & Abbreviations

IRP	Installation Restoration Program
IT	The IT Group, a contractor used by RFAAP
K	thousand
LAP	Load, Assemble and Pack
LTM	Long-Term Management
MACT	Maximum Achievable Control Technology
MCL	maximum contaminant level
MEC	munitions and explosives of concern
MMA	Main Manufacturing Area
MMRP	Military Munitions Response Program
NBG	Northern Burning Grounds
NFA	No Further Action
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRU	New River Unit
PA	Preliminary Assessment
PBC	Performance-Based Contract
PCB	polychlorinated biphenyl
RA	Remedial Action
RA(C)	Remedial Action (Construction)
RA(O)	Remedial Action (Operation)
RAAP	Radford Army Ammunition Plant
RAB	Restoration Advisory Board
RBC	risk-based concentration
RC	Response Complete
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
REM	Removal
RFAAP	Radford Army Ammunition Plant
RFI	RCRA Facility Investigation
RI	remedial investigation
RIP	Remedy-in-Place
ROD	Record of Decision
RRSE	Relative Risk Site Evaluation
RY	Rail Yard
SARA	Superfund Amendments and Reauthorization Act
SI	Site Investigation
SLERA	Screening Level Ecological Risk Assessment
SPCC/ISCP	Spill Control & Countermeasures Plan/Installation Spill Contingency Plan
SSP	Site Screening Process
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TCE	trichloroethylene
TCLP	Toxicity Characteristic Leachate Procedure
TNT	trinitrotoluene
TPH	total petroleum hydrocarbon

Acronyms & Abbreviations

URS	aka Dames & Moore
USACE	US Army Corps of Engineers
USACHPPM	US Army Center for Health Promotion and Preventive Medicine
USAEC	US Army Environmental Center
USATHAMA	US Army Toxic and Hazardous Materials Agency (currently called USAEC)
USEPA	US Environmental Protection Agency
VA	Virginia
VDEQ	Virginia Department of Environmental Quality
VI	Verification Investigation
VI/RFI	Verification Investigation/RCRA Facility Investigation
VOC	volatile organic compound
WBG	Western Burning Grounds
WWTP	Waste Water Treatment Plant

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA) Acronym Conversions

<u>CERCLA</u>		<u>RCRA</u>
PA Preliminary Assessment	=	RFA RCRA Facility Assessment
SI Site Inspection	=	CS Confirmation Sampling
RI/FS Remedial Investigation/ Feasibility Study	=	RFI/CMS RCRA Facility Investigation/Corrective Measures Study
RD Remedial Design	=	DES Design
RA(C) Remedial Action (Construction)	=	CMI(C) Corrective Measures Implementation (Construction)
RA(O) Remedial Action (Operations)	=	CMI(O) Corrective Measures Implementation (Operations)
LTM Long-Term Management	=	LTM Long-Term Management
IRA Interim Remedial Action	=	IM Interim Measure

Site ID Conversions

AEDB-R#	ALIAS	AEDB-R#	ALIAS
RAAP-001	SWMU 51	RAAP-023	SWMU 43
RAAP-002	SWMU 71	RAAP-024	SWMU 45
RAAP-003	SWMU 69	RAAP-025	SWMU 50
RAAP-004	SWMU 74	RAAP-026	SWMU 31
RAAP-005	SWMU 13	RAAP-027	SWMU 58
RAAP-006	Area F	RAAP-028	SWMU 59
RAAP-007	SWMU 28	RAAP-029	SWMU 52
RAAP-008	SWMU 27	RAAP-030	SWMU 17
RAAP-009	SWMU 40	RAAP-031	Area Q
RAAP-010	SWMUs 8, 9, 35, 36, 37, 38, Area A	RAAP-032	SWMUs 61, 75, 76
RAAP-011	SWMU 41	RAAP-033	SWMU 68
RAAP-012	SWMU 6	RAAP-035	SEWERLINES
RAAP-013	SWMU 49	RAAP-036	SWMU 10
RAAP-014	SWMU 54	RAAP-037	Area P
RAAP-015	SWMU 26	RAAP-038	Area O
RAAP-016	SWMU 39	RAAP-039	HWMU 16
RAAP-017	SWMU 53	RAAP-040	FLFA
RAAP-018	SWMU 48	RAAP-041	HWMU 4
RAAP-019	SWMU 32	RAAP-042	HWMU 5
RAAP-020	SWMU 29	RAAP-043	HWMU 7
RAAP-021	SWMU 46	RAAP-044	NRU
RAAP-022	SWMU 57	RAAP-045	BLDG 4343

Installation Locale: Radford Army Ammunition Plant (RAAP) is located in the western part of Virginia, approximately 40 miles west of Roanoke. RAAP consists of two locations in mountainous terrain. The New River flows through the main manufacturing area (MMA). The New River unit (NRU) is located approximately six miles from the MMA near Dublin, VA. Land usage surrounding the MMA and NRU is primarily agricultural with some residential and industrial use.

Installation Mission: The RAAP primary mission is the manufacturing of propellants. Since 1968, RAAP has also produced trinitrotoluene (TNT) on an intermittent basis.

Lead Organizations:

Installation Management Agency, Northeast Regional Office

Installation: RAAP, Restoration Program Manager. RAAP is a government-owned, contractor-operated facility. Alliant Ammunition and Powder Company, LLC is the operating contractor.

Lead Executing Agencies:

Installation: Investigation Phase Executing Agency: Radford Army Ammunition Plant and US Army Corps of Engineers (USACE), Baltimore District.

Remedial Design/Action Phase Executing Agency: The US Army Corps of Engineers (USACE), Baltimore Districts as well as some IRAs conducted through Radford Army Ammunition Plant.

Regulatory Participation

Federal: US Environmental Protection Agency (USEPA), Region III (RCRA and Office of Superfund)

State: Virginia Department of Environmental Quality (VDEQ), Federal Facilities Restoration Program

National Priorities List (NPL) Status:

- Non-NPL (National Priorities List), but future listing is possible. EPA Region III, Office of Superfund has shown interest in RAAP-044, The New River Unit in Dublin, VA.
- Resource Conservation and Recovery Act (RCRA) Corrective Action Permit, September 26, 2000.

Installation Restoration Advisory Board (RAB)/Technical Review Committee (TRC)/Technical Assistance for Public Participation (TAPP) Status: RAB activities have included quarterly meetings with regulators present, plant tours, and project and program status briefings.

Installation Program Summaries

IRP

Primary Contaminants of Concern: Explosives, Metals, Perchlorate, SVOCs, VOCs,

Affected Media of Concern: Groundwater, Surface Water, Sediment, Soil

Estimated Date for Response Complete (RC): 2013

Funding to date (up to FY05): \$26,268K

Current year funding (FY06): \$1,149K

Cost-to-Complete (FY07+): \$44,805K

MMRP

Primary Contaminants of Concern: Metals

Affected Media of Concern: Soil

Estimated Date for RC: 2012

Funding to date (up to FY05): \$0K

Current year funding (FY06): \$0K

Cost-to-Complete (FY07+): \$667K

Installation Historic Activity

Radford Army Ammunition Plant (RAAP) is located in the mountains of southwest Virginia in Pulaski and Montgomery Counties. RAAP consists of two noncontiguous areas: Main Manufacturing Area (MMA) and New River Unit (NRU). The MMA is located approximately five miles northeast of the city of Radford, Virginia which is approximately ten miles west of Blacksburg and 47 miles southwest of Roanoke. The New River Unit is located about six miles west of the MMA, near the town of Dublin.

RAAP lies in one of a series of narrow valleys typical of the eastern range of the Appalachian Mountains. Oriented in a northeast-southwest direction, the valley is approximately 25 miles long, eight miles in width at southeast end and narrowing to two miles in the northeast end. RAAP lies along the New River in the relatively narrow northeastern corner of the valley. The New River divides RAAP into two areas. The Horseshoe Area (which is part of the Main Manufacturing Area) exists within a meander of the New River.

The RAAP primary mission, the manufacturing of propellants, began in 1941 and continues today. Since 1968, RAAP has also produced TNT on an intermittent basis. The working population at RAAP varies greatly with mission requirements.

IRP

- **Prior Year Progress:** The overall program is being delayed to the extent that Army site completion goals will not be met due to the extended time taken for the Region III USEPA document review and comment cycle. A separate issue affecting site progress is the additional time required to respond to comments assumed by the Army to be resolved based on USEPA and VDEQ approved documents at Radford AAP. These concerns are presently being addressed at the supervisory (Tier 2 Army) level.
- **Future Plan of Action:** Quarterly meetings were started in March 2006 by RFAAP with the USEPA, VDEQ and USAEC.

MMRP

- **Prior Year Progress:** The range inventory was completed in May 2003 and the site investigation is scheduled for initiation in FY07.
- **Future Plan of Action:** The installation plans to complete the Supplemental SI and Remedial Investigations/ Feasibility Studies (RI/FS) by 2012 and execute follow-on phases/actions as required in the individual site cleanup strategies.

RADFORD ARMY AMMUNITION PLANT

Installation Restoration Program

Total AEDB-R IRP Sites/AEDB-R sites with Response Complete: 45/18

Different Site Types:

1 Above Ground Storage Tank	3 Burn Areas
1 Chemical Disposal	1 Contaminated Groundwater
1 Contaminated Soil Piles	22 Landfills
1 Plating Shop	2 Spill Site Areas
3 Storage Areas	9 Surface Impoundment/Lagoons
1 Waste Line	

Most Widespread Contaminants of Concern: Explosives, Metals, Perchlorate, SVOCs, VOCs

Media of Concern: Groundwater, Surface Water, Sediment, Soil

Completed Removal (REM)/Interim Remedial Action (IRA)/Remedial Action (RA):

- IRM at RAAP-014, SWMU #54, 1998 & 1999 (\$1,899,900)
- IRM at RAAP-045, NRU, 1999 (\$107,400)

Total IRP Funding

Prior years (up to FY05):	\$26,268K
Current year funding (FY06):	\$ 1,149K
Future Requirements (FY07+):	\$44,805K
Total:	\$72,222K

Duration of IRP

Year of IRP Inception: 1990

Year of IRP RC: 2013

Year of IRP Completion including Long-Term Management (LTM): 2038

IRP Contamination Assessment

IRP Contamination Assessment Overview

In a RCRA Facility Assessment completed by USEPA in 1987, 98 Solid Waste Management Units (SWMUs) were identified. The initial requirements for the corrective action process were specified in a RCRA permit issued by USEPA in 1989. The permit which governs corrective action was re-issued in October, 2000. The first phase of investigations at the SWMUs was completed in October 1992 under the 1989 permit. Various investigations and actions have since been completed and submitted to the USEPA and the Commonwealth of Virginia. USEPA and the Commonwealth of Virginia are currently reviewing results of these investigations. In some cases SWMUs are grouped together based on similar histories or proximity.

The October 2000 Corrective Action Permit is the Region III USEPA's enforceable document to manage the Radford AAP IRP and specific ER,A eligible sites. Radford AAP has separate permits issued by the Commonwealth of Virginia that manage operations pertaining to RCRA Subpart C, D and X. Similarly, the post-closure care permits are the enforceable documents issued by the Commonwealth of Virginia to manage the Radford AAP IRP and specific ER,A eligible sites.

The primary contaminants of concern at RAAP include metals and explosives. Groundwater within the RAAP boundaries has been impacted. Groundwater is believed to eventually discharge to the New River. Current data does not suggest that off-post groundwater has been impacted. Regional efforts are underway to delineate the occurrence and flow of groundwater. The efforts are complicated due to the presence of karst geology (highly fractured and channelized limestone). Due to the nature of the karst geology, source removal (clean closure) is the preferred alternative when an action may be required.

IRP Cleanup Exit Strategy

RFAAP in consultation with USEPA and VDEQ will investigate sites so as to assess what action if any is required to achieve response complete. It is anticipated that the remaining sites will fall into three broad categories: no further action, source removal, or waste in place with LTM.

The following documents were submitted to the USEPA in accordance with the 1989 RCRA permit:

1992

- Verification Investigation Report, Dames and Moore, October 29 Draft Final.
- RCRA Facility Investigation Report, Dames and Moore, October 29 Draft Final.

1994

- SWMU 69 Closure Report, Dames & Moore, Draft, August
- Draft Section 8.0, SWMU O, Dames and Moore, September 16, 1994 of the 1992 RFI report.
- The following sections of the 1992 VI were revised by: Draft Section 7.0 SWMUs 10 and 35, Dames and Moore, September 8, 1994; Draft Section 9.0 SWMUs 27, 29 and 53, Dames and Moore, August 19, 1994; Draft Section 11.0 SWMU 39, Dames and Moore August 31, 1994; Draft Section 24.0 SWMU 71, Dames and Moore, August 19, 1994.

1995

- Final Community Relations Plan, September 5

1996

- RCRA Facility Investigation for Solid Waste Management Units 17, 31, 48, 54, Parsons Engineering and Science, Inc., Draft, January

1997

- New River and Tributaries Study, Radford Army Ammunition Plant, Parsons Engineering Science, Inc. December

1998

- Site Management Plan, ICF Kaiser Engineers, Inc., May 1997 and May 1998.
- RAAP Master Work Plan, Draft Final, April
- SWMU 68 Closure Report, Draft Final, April
- Ecological Risk Assessment Approach, Main Manufacturing Area and New River Unit, October
- Closure Documentation for Solid Waste Management Unit 10, Biological Treatment Plant Equalization Basin, Radford Army Ammunition Plant, Radford, VA, Final, December 8
- Closure Report for the Eastern Lagoon of SWMU 8, Final, December
- Supplemental RFI for SWMU 54, Draft, December

1999

- RCRA Facility Investigation Report for SWMUs 31, 39, 48, 49, & 58, Draft, ICF Kaiser, January
- Work Plan Addenda for SWMU 54 Interim Stabilization Measure, ATK, Draft Final January

1999 (cont.)

- Work Plan Addendum 8: RI/FS for the Northern and Western Burning Grounds (at the NRU) and RFI for Building 4343, ICF Kaiser, June
- Draft Screening Ecological Risk Assessment Report, The IT Group, September
- Work Plan Addendum 009: RFI Activities at Solid Waste Management Units 31, 48, and 49 and Horseshoe Area Groundwater Study, The IT Group, November

2000

- Work Plan Addendum 010: Background Study, August
- Final Work Plan Addendum 11: Soil Sampling and Reporting SWMU 6, November

2001

- Draft Facility-wide Background Study Report, January
- Draft Work Plan Addendum 12: SWMU 39, 48, 49, 50, 58, 59, AOC-FLFA, AOC-Building 4343, New River Unit, April
- Draft Work Plan Addendum 009: SWMU 31 and Horseshoe Area Groundwater Study, April
- Final SWMU 6 Sampling Results Report, May
- Draft Current Conditions Report Horseshoe Area, May
- Site Screening Process, October
- Final Facility-wide Background Study Report, December

2002

- Draft Work Plan Addendum 009: SWMU 31 and Horseshoe Area Groundwater Study, February
- Draft Work Plan Addendum 12: SWMU 39, 48, 49, 50, 58, 59, AOC-FLFA, AOC-Building 4343, New River Unit, February
- Draft Master Work Plan, Master Quality Assurance Plan, Master Health & Safety Plan, February
- Draft Work Plan Addendum 13 RFI at SWMU 54, April
- Draft Work Plan Addendum 14 RFI at SWMU 40/71, April
- Draft SWMU 6 Decision Document, May
- Final Work Plan Addendum 009: SWMU 31 and Horseshoe Area Groundwater Study, September
- Final Work Plan Addendum 012: SWMUs 39, 48, 49, 50, 58, 59, AOC-FLFA, AOC-Building 4343, New River Unit, September
- Final Master Work Plan, September
- Final Work Plan Addendum 13 RFI at SWMU 54, Sept
- Final Work Plan Addendum 14 RFI at SWMU 40/71, Sept
- Final SWMU 6 Decision Document, Oct.
- Draft Work Plan Addendum 15: Soil Sampling Investigation for SWMUs 8 and 36, December 2002 (non-ER, A funded).

2003

- Draft Building 4343 RCRA Facility Investigation Report, Feb
- Draft Work Plan Addendum 16, Site Screening Process for SWMUs 13, 37, 38, 46, 57, 68, 69, 75, 76 and AOCs A, F, Q, Mar
- Draft Field Investigation Report and Risk Assessment for HWMUs 5 and 7, Mar
- Final Work Plan Addendum 15, Soil Sampling Investigation for SWMUs 8 and 36, Mar (non-ER,A funded).
- Draft SWMU 58 RCRA Facility Investigation Report, Mar
- Draft Work Plan Addendum 17, SWMU 51 RCRA Facility Investigation, Jul
- Final Work Plan Addendum 16, Site Screening Process fro SWMUs 13, 37, 38, 46, 57, 68, 69, 75, 76, and AOCs A, F, Q Mar
- Draft Soil Sampling Report, SWMU 8 and 36, Aug
- Draft Work Plan Addendum 18, RCRA Facility Investigation at SWMU 41, Aug
- Draft Building 4343 RCRA Facility Investigation/Corrective Measures Study Report, Oct
- Draft NRU Additional Characterization Sampling: Work Instructions, Nov
- Final Work Plan Addendum 17 SWMU 51 RCRA Facility Investigation, Dec
- Final Work Plan Addendum 18, RCRA Facility Investigation at SWMU 41, Dec
- Final SWMU 58 RCRA Facility Investigation Report, Dec

2004

- Final Soil Sampling Report, SWMU 8 and 36, Jan
- Final Building 4343 RCRA Facility Investigation/Corrective Measures Study Report, Feb
- Final Work Plan Addendum 17 SWMU 51 RCRA Facility Investigation, Feb
- Draft SWMU 54 Additional Characterization: Work Instructions, Mar
- Draft SWMU 39 RCRA Facility Investigation/Corrective Measures Study Report, May
- Final New River Unit Additional Characterization: Work Instructions, May 20
- Final SWMU 54 Additional Characterization: Work Instructions, Jul
- Final SWMU 58 Decision Document – No Further Action, Aug
- Draft Site Screening Process Report for SWMUs 13, 37, 38, 46, 57, 68, 69, and AOC A, F, Q, Sep
- Draft New River Unit Investigation Report: Rail Yard Investigation, Oct
- Final SWMU 39 RCRA Facility Investigation/Corrective Measures Study Report, Oct
- Draft SWMUs 40, 71 RCRA Facility Investigation/Corrective Measures Study Report, Dec

2005

- Final SWMU 39 RCRA Facility Investigation/Corrective Measures Study Report, Jun
- Final No Further Action Decision Documents for SWMUs 8 and 36, Jul
- Draft Sampling Plan (email) in re Site Screening Process for SWMUs 13, 37, 38, 46 57, 68, 69 and AOCs A, F,Q; Aug

2005 (cont.)

- Draft Sampling Plan (email) in re RCRA Facility Investigation/Corrective Measures Study for SWMU 40/71; Aug
- Draft Current Conditions Report Horseshoe Area, Aug
- Draft SWMU 31 RCRA Facility Investigation Report, Nov

2006

- Final Sampling Plan (email) in re Site Screening Process for SWMUs 13, 37, 38, 46 57, 68, 69 and AOCs A, F, Q; Jan
- Draft Final Building 4343 Interim Measures Work Plan, April
- Draft RCRA Facility Investigation Report for SWMU 41, May

RADFORD ARMY AMMUNITION PLANT

Installation Restoration Program
Site Descriptions

TNT WASTE ACID NEUTRALIZATION PITS (S51)

SITE DESCRIPTION

SWMU 51 is located on a plateau in the southeastern section of the Horseshoe Area and consists of one unlined trench, approximately 20 feet wide by 200 feet long. An estimated 10 tons of red water ash was reportedly disposed of in the trench from 1968-1972. Additionally, the trench was used for disposal of TNT neutralization sludge from the treatment of red water in the 1970s. The pits were backfilled and revegetated.

A RCRA Facility Investigation (Dames & Moore 1992) evaluated groundwater and soil samples and a Corrective Measures Study (CMS) was recommended. The soil and groundwater concentrations of COCs exceeded health based numbers (HBNs) in the 1989 RCRA CORA (Corrective Action Permit) and could indicate risk under an industrial worker scenario.

The soil samples for the site screening process, a quantitative human health risk assessment (HHRA), and a screening-level ecological risk assessment (SLERA) were collected in FY04.

CLEANUP STRATEGY

In FY06, an RFI/CMS effort is to be procured (USAEC PBC) and will address site-specific groundwater. Source removal (clean closure) and five years of monitoring is anticipated.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Metals, VOCs, Explosives, SVOCs

MEDIA OF CONCERN: Soil, Groundwater

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	200207	200710
DES	200709	200802
CMI(C)	200804	200908
LTM	200909	201409

RC: 200908



RAAP-002

FLASH BURN PARTS AREA (S71)

SITE DESCRIPTION

SWMU 71 consists of an open, hard-packed gravel area approximately 25 feet wide by 50 feet long. The SWMU was used from 1962 to 1982 to flash-burn metal process pipes contaminated with propellant. The pipes were then reused or sold for scrap.

A RCRA Verification Investigation (VI) (Dames & Moore 1992) detected metals and total petroleum hydrocarbons (TPH) from soil samples which led to a Supplementary VI (Dames & Moore 1994). A dye-trace study (Engineering-Science 1993) indicated a nearby karst conduit to the New River. However, it is believed that this site does not affect groundwater.

This site and SWMU 40 (RAAP-009) are combined for the initial RFI. Based on the 2000 RCRA CORA permit, additional soil investigations are required. Soil samples were collected in FY03 to confirm previous investigative results and provide additional data to support a quantitative HHRA and SLERA. The RFI was submitted VDEQ and USEPA for review in FY04. There were several comment review cycles in FY05. It was agreed amongst stakeholders that additional sampling was needed to address soil and groundwater data gaps.

CLEANUP STRATEGY

RFAAP is in the process of procuring and implementing this additional sampling in FY06. The RFI/CMS report is to be revised to address site-specific groundwater as part of the site conceptual model.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Metals, SVOCs

MEDIA OF CONCERN: Soil

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	200507	200908

RC: 200908



POND BY CR ACID TREATMENT TANKS (S69)

SITE DESCRIPTION

SWMU 69 was an unlined settling pond that received SWMU 68 neutralized wastewater from rocket encasement cleaning activities. Before 1974, runoff consisted of neutralized chromic acid (pH=8.6), which had been treated with sulfuric acid, sodium metabisulfate, and calcium lime. After 1974 up to the time operations ceased, Oakite 33, an acidic rust stripper consisting of phosphoric acid and butyl cellosolve mixture, was used to clean rocket encasements. Oakite 33 was adjusted to a pH of 5.0 with soda ash before discharge to SWMU 69.

A Verification Investigation (VI) (Dames & Moore 1992) performed a qualitative human health risk assessment. The VI recommended interim corrective measures to remove all accumulated pond water, pond sediments, and adversely impacted surficial soil. Impacted soils and sediments were removed as indicated by confirmatory samples (Dames & Moore 1994). The Closure Report was submitted to the regulators in August 1994.

Site-screening sampling was performed in FY04. The report was submitted in FY04. There were several comment review cycles in FY05. It was agreed amongst stakeholders that additional text revision was needed in an amended report.

CLEANUP STRATEGY

SWMU 69 is included in the Site Screening Process (SSP) report with other sites. NFA is anticipated for SWMU 69. The SSP report will be revised and submitted once additional data is collected at other selected sites.



STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Metals

MEDIA OF CONCERN: Soil, Sediment

Phases	Start	End
RFA	198409	198410
CS	198410	198412
RFI/CMS	199007	200705

RC: 200705

WASTE PROPELLANT BURNING GROUND (S13)

SITE DESCRIPTION

SWMU 13, approximately 20 acres in size, is located in the southeast section of the Horseshoe Area on the northern bank of the New River within the 100-year floodplain. The SWMU has been used for the burning of waste explosives, propellants, and laboratory wastes (propellant and explosive residues, samples, and analytical residues) since manufacturing operations began at RAAP in 1941. Until 1985, burning was conducted on the soil. From that time burning is performed in pans.

A RCRA Facility Investigation (Dames & Moore 1992) evaluated groundwater quality and potential soil contamination for explosives, VOCs, SVOCs, and heavy metals.

The concentrations of COCs exceeded health-based numbers (HBNS) in the 1989 RCRA Corrective Action Permit (CORA) and could indicate risk under an industrial worker scenario.

Site-screening sampling was performed in FY04. The site screening effort has identified off-site migration associated with activities before 1986. A RFI/CMS was procured in FY05. Also, a permit was issued in FY05 by the VDEQ governing burning operations at the Open Burning Ground. A GW and soil monitoring program is part of the permit.

CLEANUP STRATEGY

The RFI/CMS report will be submitted in FY07.



STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Perchlorate, Metals, Explosives, VOCs, SVOCs

MEDIA OF CONCERN: Soil, Groundwater

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	200505	200808
DES	200809	201005
CMI(C)	201006	201108

RC: 201108

FORMER DRUM STORAGE AREA 9387-2 (F)

SITE DESCRIPTION

Area F is a gravel lot located in the Main Manufacturing Area southeast of Warehouse No. 2 (9387-2) approximately 50 feet long by 50 feet wide. The area was used to stage empty drums that were used throughout RAAP before being sold. Storage of drums on this lot was discontinued in 1991 when a second lot was constructed 150 feet to the east, west of Building 4934-1.

A RCRA Verification Investigation (Dames & Moore 1992) evaluated four surface soil samples that were collected beneath stained gravel from both the former drum storage area and the new storage lot and analyzed for VOCs and SVOCs. Analytical results demonstrated that there had been no releases to surface soils.

Site-screening sampling was performed in FY04. The report was submitted in FY04. There were several comment review cycles in FY05. It was agreed amongst stakeholders that additional sampling was needed in a revised report.

CLEANUP STRATEGY

Area F is included in the Site Screening Process (SSP) report with other sites. NFA is anticipated for Area F. The SSP report will be revised and submitted once additional data is collected at other selected sites.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: Medium

CONTAMINANTS OF CONCERN: VOCs, SVOCs

MEDIA OF CONCERN: Soil

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	199201	199212

RC: 200009



RAAP-009

LANDFILL NITRO AREA (S40)

SITE DESCRIPTION

SWMU 40 was reportedly used as a sanitary landfill, approximately 1.5 acres, in the 1970s and early 1980s for the disposal of uncontaminated paper, municipal refuse, cement, and rubber tires. It is not known whether hazardous wastes or wastes containing hazardous constituents were ever disposed of in the landfill. Between 1991 and 1992, a fenced enclosure for asbestos storage was constructed over the northeast corner of this SWMU. The unit was strictly an area fill, and the unit was covered with soil and grass.

A RCRA Verification Investigation (Dames & Moore 1992) attempted to install four monitoring wells, which could not be sampled as the four borings were dry. A dye-trace study was conducted in the adjacent area (Engineering-Science 1993 and 1994) to identify groundwater flow paths in the south-central section of the Main Manufacturing Area. However, it is believed that this site does not affect groundwater. This site and SWMU 71 (RAAP-02) are combined for the RFI. A contract to perform a RFI/CMS was procured in FY01. Field investigations were completed in FY03. Soil samples were collected to confirm previous investigative results and provide additional data to support a quantitative HHRA and SLERA. A portion (20 cy) of the IDM was determined to be hazardous waste (lead) and was stabilized and disposed of in a permitted treatment storage and disposal facility.

The RFI was submitted VDEQ and USEPA for review in FY04. There were several comment review cycles in FY05. It was agreed amongst stakeholders that additional sampling was needed to address soil and groundwater data gaps.

CLEANUP STRATEGY

RFAAP is in the process of procuring and implementing this additional sampling in FY06. The RFI/CMS report is to be revised to address site-specific groundwater as part of the site conceptual model.



STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Metals

MEDIA OF CONCERN: Soil, Surface Water

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	200105	200908

RC: 200908

RAAP-010

CASO4 SETTLING LAGOONS, DRYING BEDS

(S8,9,35,36,37,38,A) (PAGE 1 OF 5)

SITE DESCRIPTION

This site is listed in AEDB-R as CASO4 TRMT/DISP Area (SWMUs 8, 9, 35, 36, 37, 38, A)

SWMU 8 consists of two unlined, below-grade earthen lagoons located in the northeast section of the MMA along the south bank of the New River. The lagoons were designed to neutralize acidic wastewater from the Acidic Wastewater Treatment Plant with hydrated lime. The supernatant is discharged to the New River via Outfall 007. Sludge was dredged from the lagoons and was placed in the adjacent drying beds. Between 1982 and 1991, the dried sludge removed from the beds was disposed of in Fly Ash Landfill No. 2 (SWMU 29). In December 1998 the Eastern Lagoon was closed and replaced with a concrete tank. The closure documentation was submitted to EPA Region III and VDEQ in 1999 demonstrating no further action is required. Operations ceased at the Western Lagoon in November 1999. A VI was performed in 1992 by Dames & Moore. Since operations ceased in 1999, this site is not eligible for ER,A funding. The RFI report (non ER,A funded) contained a recommendation for NFA and was approved by USEPA and VDEQ.

SWMU 9 consists of two unlined, below-grade earthen lagoons located in the northwest section of the MMA. The lagoons were designed to neutralize acidic wastewater from the Acidic Wastewater Treatment Plant with hydrated lime. The supernatant is discharged to the New River via Outfall 005. SWMU 9 ceased operations as a sludge settling lagoon in 1993. Sludge was dredged from the lagoons and was placed in the adjacent drying beds. Between 1982 and 1991, the dried sludge removed from the beds was disposed of in Fly Ash Landfill No. 2 (SWMU 29). In 1987, a RCRA Facility Assessment was conducted by the USEPA that included a preliminary data review, evaluation, and visual site inspection. A VI was performed in 1992 by Dames & Moore. This site is active and therefore not eligible for ER,A funding.

SWMU 35 is an unlined Calcium Sulfate Drying Bed 160 feet by 80 feet with approximately 8 feet of sediment remaining in the basin. The SWMU is located along the New River in the northeast section of the Main Manufacturing Area immediately east of SWMU 10 and west of and adjacent to SWMU 8. Calcium sulfate sludge was dredged from SWMU 8

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Metals

MEDIA OF CONCERN: Soil

Phases	Start	End
RFA	198409	198410
CS	198410	198412
RFI/CMS.....	199201	200801
DES	200802	200808
CMI(C)	200809	201008

RC: 201008

RAAP-010

CASO4 SETTLING LAGOONS, DRYING BEDS (S8,9,35,36,37,38,A) (PAGE 2 OF 5)

prior to 1980 and pumped into SWMU 35. RAAP reported that sediment from SWMU 10 was also deposited in SWMU 35 during the early 1980s. A RCRA Verification Investigation (VI) (Dames & Moore 1992) and a Supplemental VI (Dames & Moore 1994) were performed that included groundwater sampling. Explosives and metals in soil, groundwater, surface water and sediment exceeded HBNs as per the 1989 RCRA CORA permit. Site-screening sampling was performed in FY04. The report was submitted in FY04. There were several comment review cycles in FY05. It was agreed amongst stakeholders that additional sampling was needed in a revised report.

SWMU 36 consists of three separate unlined drying beds located in the northeast section of the MMA adjacent to SWMU 8. The north bed, located closest to the New River, is approximately 200 feet long, 50 feet wide, and 10 feet deep, and appears to be the original drying bed. The adjacent south bed appears to be the next oldest and is also approximately 200 feet long, 50 feet wide, and 10 feet deep. The east bed is approximately 60 feet wide by 200 feet long. The depth of this bed is unknown. Sludge was last deposited in 1999.

The RCRA Verification Investigation (VI) (Dames & Moore 1992) included the collection of one composite sludge sample from each SWMU 36 drying bed to determine whether concentrations exceeded permit levels for VOCs, SVOCs, and TCLP metals. Although VOCs and SVOCs were detected, reported results were below 1989 RCRA CORA permit levels. A non-ER,A funded report of results recommending no further action was submitted in FY04 and is pending regulatory approval. Since operations ceased in 1999, this site is not eligible for ER,A funding. The RFI report (non ER,A funded) contained a recommendation for NFA and was approved by USEPA and VDEQ.

SWMU 37 is an unlined drying bed approximately 100 feet long, 80 feet wide, and eight feet deep located in the northwest section of the MMA. The SWMU is immediately southwest of and adjacent to SWMU 9 and received calcium sulfate sludge. Beds have been inactive since the 1980s. A RCRA Verification Investigation (VI) (Dames & Moore 1992) included the collection of one composite sludge sample to determine whether concentrations exceeded permit levels for VOCs, SVOCs, and TCLP metals. Although VOCs and SVOCs were detected, reported results were below 1989 RCRA CORA permit levels. Site-screening sampling was performed in FY04. The report was submitted in FY04. There were several comment review cycles in FY05. It was agreed amongst stakeholders that additional sampling was needed in a revised report.

SWMU 38 is an unlined drying bed approximately 225 feet long, 40 feet wide, and 8 feet deep located in the northwest section of the Main Manufacturing Area. The drying bed received calcium sulfate sludge and, when it reached capacity, the overflow was pumped to Area Q via pipes that ran through a depression in the berm surrounding the drying bed. Beds have been inactive since the 1980s. A RCRA VI (Dames & Moore 1992) included the collection of one composite sludge sample to determine whether concentrations

RAAP-010

CAS04 SETTLING LAGOONS, DRYING BEDS (S8,9,35,36,37,38,A) (PAGE 3 OF 5)

exceeded permit specifications for VOCs, SVOCs, and TCLP metals. The limited data indicates no exceedences of 1989 RCRA CORA permit HBNs. Site-screening sampling was performed in FY04. The report was submitted in FY04. There were several comment review cycles in FY05. It was agreed amongst stakeholders that additional sampling was needed in a revised report.

Area A is located in the eastern portion of the MMA, near Building 1558. It was identified during the April 1987 Visual Site Inspection as a 1-foot-deep soil depression that received runoff from the A-Line (Visual Inspection Field Notes 1987). Site-screening sampling was performed in FY04. The report was submitted in FY04. There were several comment review cycles in FY05. It was agreed amongst stakeholders that additional sampling was needed in a revised report.

CLEANUP STRATEGY

SWMU 35, 37, 38 and Area Q: Based on the SSP report comment resolution, these sites will go to RFI. These sites contain identical wastes and are in close proximity. Source removal is anticipated.

Area A: Area A is included in the Site Screening Process (SSP) report with other sites. NFA is anticipated for Area A. The SSP report will be revised and submitted once additional data is collected at other selected sites.



SWMU 8 - CAS04 TREATMENT/DISPOSAL AREA

RAAP-010

CAS04 SETTLING LAGOONS, DRYING BEDS
(S8,9,35,36,37,38,A) (PAGE 4 OF 5)



SWMU 9 - CAS04 TREATMENT LAGOONS



SWMU 35 - CAS04 DRYING BED



SWMU 36 - CAS04 DRYING BED

RAAP-010

CAS04 SETTLING LAGOONS, DRYING BEDS
(S8,9,35,36,37,38,A) (PAGE 5 OF 5)



SWMU 37 - CAS04 DRYING BED



SWMU 38 - CAS04 DRYING BED



AREA A - NITROCELLULOSE RAINWATER DITCH

RED WATER ASH BURIAL GROUNDS (S41)

SITE DESCRIPTION

SWMU 41 is located in the MMA and consists of two non-contiguous disposal areas for red water ash. The northern area consisted of an unlined lagoon approximately 50 feet by 70 feet, which was backfilled. The southern area consisted of a clay-lined disposal area approximately 100 feet by 150 feet. Prior to the construction of the red water treatment plant, red water was concentrated by evaporation and burned in four rotary kilns located in the TNT manufacturing area. The ash produced from these kilns was disposed of in SWMU 41 from 1967 to 1971.

A RCRA VI (Dames & Moore 1992) included the collection and analysis of groundwater samples near the landfill, ash and soil samples from the lagoon north of the landfill, and a surface water sample from Stroubles Creek.

Data from the VI indicate explosives and metals in soil and SVOCs and metals in groundwater above 1989 RCRA CORA permit HBNs. The soil samples for the site screening process, a quantitative HHRA, and a SLERA were collected in FY04.

CLEANUP STRATEGY

SWMU 41 RFI/CMS report is on hold pending resolution of risk methodology as discussed in March 29-30, 2006 meeting among RFAAP, USEPA, USAEC, USACHPPM, USACE and VDEQ.

A RCRA one-acre cap is anticipated for the southern area (USAEC PBC). A request for NFA is anticipated for the northern area.



STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Metals, Explosives, SVOCs

MEDIA OF CONCERN: Soil, Surface Water, Groundwater

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	200207	200703
DES	200704	200709
CMI(C)	200712	200810
LTM	200810	203808

RC: 200810

RAAP-013

RED WATER ASH BURIAL #2 (S49)

SITE DESCRIPTION

SWMU 49 is approximately 75 feet by 50 feet and is located in the Horseshoe Area, contiguous with SWMUs 48, 50 and 59. The four SWMUs were classified together during the 1980s because no distinction could be made between the areas by visual observation. SWMU 48 was later divided into an upper and a lower disposal area, and SWMU 49 was determined to be the part of the SWMU 48 lower disposal unit. SWMU 49 reportedly received 10 tons of redwater ash during its active life.

A RCRA VI (Dames & Moore 1992) and a RCRA Facility Investigation (RFI) (Parsons Engineering-Science 1996) were conducted to determine the impacts to groundwater quality and soil. A draft RFI (ICF Kaiser 1999) included the verification of previous RFI results. Metals, VOCs and SVOCs were detected above 1989 RCRA CORA permit HBNs.

The RFI sampling was completed in FY02. In FY06, USAEC decided to implement a PBC at SWMUs 49, 48, 50 and 59, which are in proximity to each other.

CLEANUP STRATEGY

SWMU 49 RFI/CMS report is on hold pending the outcome of the PBC award. Due to their contiguous nature, RAAP-013 (SWMU 49), -018 (SWMU 48), -025 (SWMU 50), and -028 (SWMU 59) are being managed as one unit.

No further action is anticipated and closeout documentation is included in the AEDB-R sites RAAP-013 (SWMU-49) and RAAP-025 (SWMU 50).

Two remedial actions (excavation, transportation and disposal) are anticipated at RAAP-018 (SWMU 48) and RAAP-028 (SWMU 59)



STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Metals, Explosives, SVOCs, VOCs

MEDIA OF CONCERN: Soil, Groundwater

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	199712	200908

RC: 200908

PROPELLANT BURNING ASH DISPOSAL (S54)

SITE DESCRIPTION

SWMU 54 is an inactive disposal area situated on approximately 5 acres within the easternmost section of the Horseshoe Area. The SWMU was used during the 1970s for disposal of the Propellant Burning Ground (SWMU 13) ash.

A RCRA VI (Dames & Moore 1992), a RCRA Facility Investigation (Parsons Engineering-Science 1996) and a Supplemental RFI (ICF Kaiser 1997) were conducted. Soil and groundwater samples were taken in these efforts. Soil data indicates the presence of metals; VOCs and explosives in exceedence of 1989 RCRA CORA permit HBNs.

An interim removal action (Parallax 1999) was performed to remove "hot spots" associated with lead.

A contract to perform a RFI/CMS was procured in FY01. Clean closeout will mitigate long-term monitoring and long-term operation liability. RFI sampling was conducted in FY03 through FY06. More sampling is needed per March 29-30, 2006 meeting among RFAAP, USAEC, USACE, USACHPPM, VDEQ and USEPA.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Perchlorate, Metals, Explosives, VOCs

MEDIA OF CONCERN: Soil, Surface Water, Groundwater

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	199601	200707
DES	200708	200808
IRA	199808	200001
CMI(C).....	200808	200908
LTM	200908	201408

RC: 200908

CLEANUP STRATEGY

SWMU 54 RFI/CMS report is on hold pending procurement and collection of additional data. Final source identification/removal is anticipated.



WASTEWATER PONDS FROM PROP INCINERATOR (S39)

SITE DESCRIPTION

SWMU 39 consists of two unlined earthen ponds, approx. two acres total, located in the north-central section of the Horseshoe Area, adjacent to and associated with SWMU 14 (Hazardous Waste Incinerator). The settling ponds were excavated approximately six to eight feet into the natural grade. These ponds received overflow from the former incinerator spray pond. Caustic was reportedly added to neutralize the water. Sludges are believed to remain in the former ponds.

A RCRA VI (Dames & Moore 1992) and a Supplemental VI (Dames & Moore 1994) installed and sampled three monitoring wells near the ponds. Metals exceeding 1989 RCRA CORA permit HBNs were detected in the soil and groundwater.

A draft RFI was submitted in 1999 (ICF Kaiser). The RFI/CMS was submitted in FY04. This document was subsequently reviewed, revised and approved by EPA on June 6, 2005 and by VDEQ on December 9, 2004. An internal Army Decision Document was prepared and submitted by RFAAP on August 17, 2005. In FY06, USAEC decided to implement a PBC at SWMU 39.

CLEANUP STRATEGY

Further phases for SWMU 39 are on hold pending the outcome of the PBC award.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Metals,

MEDIA OF CONCERN: Soil, Groundwater

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS.....	199802	200512
DES	200601	200708
CMI(C)	200610	200808
LTM	200809	201209

RC: 200808



RAAP-018

OILY WATER BURIAL AREA (S48)

SITE DESCRIPTION

This unit is contiguous to SWMU 49 (Red Water Ash Disposal Area), SWMU 50 (Calcium Sulfate Disposal Area) and SWMU 59 (Bottom Ash Pile). It is estimated that 200,000 gallons or more of oil-contaminated wastewater were disposed in unlined trenches at this unit prior to off-plant used oil recycling.

A RCRA Verification Investigation (Dames & Moore 1992) and a RCRA Facility Investigation (RFI) (Parsons Engineering-Science 1996) was conducted to evaluate potential groundwater contamination. Four monitoring wells were installed and sampled. Soil data from the VI indicated the presence of metals and explosives above 1989 RCRA CORA permit HBNs. Groundwater data from the VI indicated the presence of chlorinated solvents and metals above 1989 RCRA CORA permit HBNs.

A draft RFI was submitted in 1999 (ICF Kaiser). Soil data from the RFI indicated the presence of metals above 1989 RCRA CORA permit HBNs. The RFI sampling was completed in FY02. In FY06, USAEC decided to implement a PBC at SWMUs 49, 48, 50 and 59, which are in proximity to each other.

CLEANUP STRATEGY

SWMU 48 RFI/CMS report is on hold pending outcome of the PBC award. Due to their contiguous nature, RAAP-013 (SWMU 49), -018 (SWMU 48), -025 (SWMU 50), and -028 (SWMU 59) are being managed as one unit.

No further action is anticipated and closeout documentation is included in the AEDB-R sites RAAP-013 (SWMU-49) and RAAP-025 (SWMU 50). Two remedial actions (excavation, transportation and disposal) are anticipated at RAAP-018 (SWMU 48) and RAAP-028 (SWMU 59).



STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Explosives, Metals,

MEDIA OF CONCERN: Soil, Groundwater

Phases	Start	End
RFA	198409	198410
CS	198410	198412
RFI/CMS	199712	200710
DES	201106	201208
CMI(C)	201209	201308
LTM	201309	201809

RC: 201308

RAAP-021

PROPELLANT BURIAL AREA (S46)

SITE DESCRIPTION

The reported location of SWMU 46 is a small depression with no outward drainage. Approximately one ton of propellants and propellant-contaminated soil were reportedly disposed of at this location because of a railroad derailment in the 1950s (USATHAMA 1976). The actual size of the Waste Propellant Disposal Area is not known. During a March 1990 facility visit, a broken-off sign identifying buried explosive waste was found in a low area between the railroad tracks and the driveway leading to Building 456.

A RCRA VI (Dames & Moore 1992) collected one surface water and one sediment sample, and no contaminants of concern were detected against HBNS. In 1997, USACHPPM conducted further studies by collecting five subsurface (five to nine feet) soil samples. Samples were analyzed for SVOCs, explosives, total metals and nitrite/nitrates. No exceedences were detected. Direct-push groundwater sampling was attempted but groundwater was not encountered.

Site-screening sampling was performed in FY04. The report was submitted in FY04. There were several comment review cycles in FY05. It was agreed amongst stakeholders that additional sampling was needed in a revised report.

CLEANUP STRATEGY

SWMU 46 is included in the Site Screening Process (SSP) report with other sites. NFA is anticipated for SWMU 46. The SSP report will be revised and submitted once additional data is collected at other selected sites.



STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: Low

CONTAMINANTS OF CONCERN: Explosives, Metals,

MEDIA OF CONCERN: Soil

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	199201	200705

RC: 200705

RAAP-022

POND BY BLDGS 4931 & 4928 (S57)

SITE DESCRIPTION

SWMU 57 is designated as an acid settling pond that supported the Nike program and is located in the western section of the Horseshoe Area. SWMU 57 is approximately 30 feet in diameter, surrounded by a gravel berm, and is enclosed by a perimeter fence. The pond is connected to a maintenance shop (Building 4931) by an underground pipe. A similar practice occurred at Building 4343 (RAAP-045), where subsequent investigations found metal concentrations above action levels.

A RCRA VI (Dames & Moore 1992) collected one surface water and one sediment sample. No contaminants of concern were detected against HBNs. The VI never received regulatory approval.

Site-screening sampling was performed in FY04 to comply with the 2000 RCRA CORA. The report was submitted in FY04. There were several comment review cycles in FY05. It was agreed amongst stakeholders that additional sampling was needed. The RFI is underway as agreed during comment resolution.

CLEANUP STRATEGY

NFA is anticipated.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: Low

CONTAMINANTS OF CONCERN: Metals,

MEDIA OF CONCERN: Sediment

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	199201	200708

RC: 200708



RAAP-023

SANITARY LANDFILL NO.2 (S43)

SITE DESCRIPTION

SWMU 43 is a closed, unlined sanitary landfill, approximately two acres, located immediately adjacent to the New River in the northeast section of the RAAP MMA that operated from 1958 to 1969. The exact boundaries of the unit have not been determined because of the unavailability of a site plan or documents. Site was regraded in accordance with VI recommendation. A RCRA VI (Dames & Moore 1992) installed six groundwater monitoring wells. Groundwater and surface water data indicates the presence of metals and VOCs which did not exceed 1989 RCRA CORA permit HBNS.

CLEANUP STRATEGY

A RFI will be conducted to fill data gaps and evaluate data in accordance with the 2000 RCRA CORA permit. NFA is anticipated.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: Low

CONTAMINANTS OF CONCERN: Metals

MEDIA OF CONCERN: Sediment

Phases	Start	End
RFA	198409	198410
CS	198410	198412
RFI/CMS	200710	201009

RC: 201009



RAAP-024 LANDFILL NO.3 (S45)

SITE DESCRIPTION

SWMU 45 is an inactive sanitary landfill, approximately 5 acres, located in the north-central section of the MMA that operated between 1957 and 1961. The unit was never operated as a permitted landfill. Paper and municipal refuse were the only materials reportedly disposed of in SWMU 45. Evidence of burning has been observed in the area.

A RCRA VI (Dames & Moore 1992) included monitoring well installation, a geophysical survey, and a baseline human health risk assessment.

RFI was procured in FY05. In FY06, a geophysical delineation and groundwater assessment was added as agreed among stakeholders.

CLEANUP STRATEGY

A SSP will be conducted in accordance with the RCRA CORA 2000 Permit. NFA is anticipated.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: SVOCs

MEDIA OF CONCERN: Groundwater

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	200503	200809

RC: 200809



RAAP-025

CASO4 TREATMENT/DISPOSAL AREA (S50)

SITE DESCRIPTION

SWMU 50 is an open area south of SWMU 48 approximately 300 feet long by 300 feet and is located within the Horseshoe Area. Until 1982, SWMU 50 was one of the major disposal areas at RAAP for sludge removed from the calcium sulfate drying beds (SWMUs 35, 36, 37, 38, and Area Q).

A RCRA VI (Dames & Moore 1992) collected two subsurface soil samples. Metals, VOCs and SVOCs were detected above 1989 RCRA CORA permit HBNs.

The RFI sampling was completed in FY02. In FY06, USAEC decided to implement a PBC at SWMUs 49, 48, 50 and 59, which are in proximity to each other.

CLEANUP STRATEGY

SWMU 50 RFI/CMS report is on hold pending resolution of the PBC award. Due to their contiguous nature, RAAP-013 (SWMU 49), -018 (SWMU 48), -025 (SWMU 50), and -028 (SWMU 59) are being managed as one unit.

No further action is anticipated and closeout documentation is included in the AEDB-R sites RAAP-013 (SWMU-49) and RAAP-025 (SWMU 50).

Two remedial actions (excavation, transportation and disposal) are anticipated at RAAP-018 (SWMU 48) and RAAP-028 (SWMU 59).

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: Low

CONTAMINANTS OF CONCERN: Metals, VOCs Explosives, SVOCs

MEDIA OF CONCERN: Soil, Groundwater

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	199201	200909

RC: 200909



COAL ASH SETTLING LAGOONS (S31)

SITE DESCRIPTION

SWMU 31 consists of three unlined settling lagoons, approximately a total of 2.5 acres, located in the northwest section of the Horseshoe Area and received fly ash wastewater flow from Power House No. 2 when it was operating and filter backwash from the active potable water plant.

A RCRA VI (Dames & Moore 1992) and a RFI (Parsons Engineering-Science 1996) collected sludge, groundwater, and subsurface soil samples to determine the migration of metals from the lagoons. A draft RFI was submitted in 1999 (ICF Kaiser). A contract for additional RFI/CMS efforts was procured in FY01. The RFI fieldwork was completed in summer 2002. The draft RFI report needs to be revised based on the March 29-30, 2006 meeting among the stakeholders.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Metals, SVOCs

MEDIA OF CONCERN: Soil, Surface Water

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	199601	200708

RC: 200708

CLEANUP STRATEGY

A new SWMU 31 RFI report is to be submitted based upon consultation with USEPA and VDEQ. NFA is anticipated.



RAAP-028

BOTTOM ASH PILES (S59)

SITE DESCRIPTION

SWMU 59, the Bottom Ash Pile, is located near SWMUs 48 and 50 in the Horseshoe Area of RAAP, approximately 3,400 feet east of the main bridge over the New River. Although there are currently no bottom ash accumulation piles, bottom ash has been spread within the immediate SWMU vicinity.

A RCRA VI (Dames & Moore 1992) collected soil samples. Soil data indicates metals in exceedence of 1989 RCRA CORA permit HBNs. Groundwater data indicates VOCs in exceedence of 1989 RCRA CORA permit HBNs.

The RFI sampling was completed in FY02. In FY06, USAEC decided to implement a PBC at SWMUs 49, 48, 50 and 59, which are in proximity to each other.

CLEANUP STRATEGY

SWMU 59 RFI/CMS report is on hold pending resolution of the PBC award. Due to their contiguous nature, RAAP-013 (SWMU 49), -018 (SWMU 48), -025 (SWMU 50), and -028 (SWMU 59) are being managed as one unit.

No further action is anticipated and closeout documentation is included in the AEDB-R sites RAAP-013 (SWMU-49) and RAAP-025 (SWMU 50).

Two remedial actions (excavation, transportation and disposal) are anticipated at RAAP-018 (SWMU 48) and RAAP-028 (SWMU 59).



STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: Low

CONTAMINANTS OF CONCERN: Explosives, Metals,

MEDIA OF CONCERN: Soil, Groundwater

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	199102	200710
DES	201010	201203
CMI(C)	201012	201307
LTM	201308	201809

RC: 201307

CASO4 TREATMENT/DISPOSAL AREA (Q)

SITE DESCRIPTION

Area Q is an abandoned lagoon located in the northwest section of the MMA. This site is less than a quarter of an acre. Area Q is immediately northwest and adjacent to SWMU 38 and was reported to be used as a sludge drying bed when SWMU 38 reached capacity. Sludge was pumped from SWMU 38 to Area Q via pipes that ran through a depression in the berm surrounding the drying bed.

Site-screening sampling was performed in FY04. The report was submitted in FY04. There were several comment review cycles in FY05. It was agreed amongst stakeholders that additional sampling was needed in a revised report.

CLEANUP STRATEGY

Based on the SSP report comment resolution, Area Q will go to RFI combined with SWMUs 35, 37 and 38. These sites contain identical wastes and are in close proximity.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: Low

CONTAMINANTS OF CONCERN: Metals

MEDIA OF CONCERN: Soil

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS.....	199201	200801

RC: 200801



CHROMIC ACID TREATMENT TANKS (S68)

SITE DESCRIPTION

SWMU 68 is located 100 feet northwest of SWMU 57 where the plateau of the Horseshoe Area begins sloping towards the New River. The unit previously contained two 4,000-gallon aboveground tanks, which were used to neutralize wastewater generated from the cleaning of rocket encasements (USEPA 1987). Neutralized wastewater was subsequently discharged to the finishing pond, previously located at SWMU 69.

A RCRA VI (Dames & Moore 1992) detected metals in surface soil samples above the 1989 RCRA CORA permit HBNs. A RFI (ICF Kaiser 1998) was conducted to evaluate potential subsurface contamination and included up gradient surface and subsurface soil samples to establish SWMU-specific background metals concentrations. The results of confirmation samples demonstrated that previous SWMU process-related activities had not adversely impacted subsurface conditions and associated contamination sources had been removed.

Site-screening sampling was performed in FY04. The report was submitted in FY04. There were several comment review cycles in FY05. It was agreed amongst stakeholders that additional text revision was needed in an amended report.

CLEANUP STRATEGY

SWMU 68 is included in the Site Screening Process (SSP) report with other sites. NFA is anticipated for SWMU 68. The SSP report will be revised and submitted once additional data is collected at other selected sites.



STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Metals

MEDIA OF CONCERN: Soil

Phases	Start	End
RFA	198409	198410
CS	198410	198412
RFI/CMS	199201	200705

RC: 200705

RAAP-037

BATTERY STORAGE AREA (P)

SITE DESCRIPTION

The Spent Battery Storage Area (Area P) consists of an open lot several acres in size that was used for the storage of shredded scrap metal, decommissioned tanks, powder cans and batteries prior to off-post shipment. This area is approximately 50 feet by 200 feet long and is located within the former scrap metal salvage yard 600 feet west of the Biological Treatment Plant (SWMU 10).

A RCRA VI (Dames & Moore 1992) evaluated surface and subsurface soils within the SWMU to determine the impact of spent battery acid spillage. Data from the soil sampling indicates metals in exceedence of 1989 RCRA CORA permit HBNS.

CLEANUP STRATEGY

A RFI/CMS will be performed. Excavation, transportation and disposal of impacted soil are anticipated.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: Low

CONTAMINANTS OF CONCERN: Explosives, Metals,

MEDIA OF CONCERN: Soil, Groundwater

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	200610	200710
DES	200711	200804
CMI(C)	200805	200912

RC: 200912



RAAP-038

UNDERGROUND FUEL OIL SPILL (O)

SITE DESCRIPTION

Area O consists of one inactive 269,000-gallon fuel oil AST that is situated on a concrete base and surrounded by a concrete secondary containment system. The Underground Fuel Oil Spill was located in the east section of the MMA.

An Oil Audit was conducted by USACE in 1982 placed fuel leakage of an underground pipeline at approximately 3,000 gallons. In 1983, four monitoring wells were installed to characterize groundwater flow and quality at the site.

The RFI (Dames & Moore 1992) and a Phase II RFI (Dames & Moore 1994) collected groundwater samples at previously sampled wells. VOCs and SVOCs exceeded 1989 RCRA CORA permit HBNs.

CLEANUP STRATEGY

A RFI will be performed at Area O. The anticipated remedial action is source removal for soil and groundwater air-sparging system.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: VOCs, SVOCs

MEDIA OF CONCERN: Soil, Groundwater

Phases	Start	End
RFA	198409	198410
CS	198410	198410
RFI/CMS	200310	200706
DES	200707	200712
CMI(C)	200801	200908
LTM	200909	201308

RC: 200908



HAZARDOUS WASTE LANDFILL (HWMU 16)

SITE DESCRIPTION

Hazardous waste management unit (HWMU) 16 is located in the Horseshoe Area of the plant between RAAP-007 (SWMU 28, Permit 401) and RAAP-029 (SWMU 52, Permit 401) and covers ~two acres. The site is a closed landfill (early 1980s) used for lab chemicals, burning ground, and incinerator residue.

Groundwater data indicates the presence of elevated concentrations of explosives and chlorinated solvents. There are indications that the groundwater contamination at HWMU 16 is migrating to the areas of SWMU 28 and 52.

A post-closure care permit requiring LTM was issued by VDEQ in October 2002.

CLEANUP STRATEGY

Long-term monitoring is planned for 30 years at this site. Wells will be sampled quarterly as required in the permit.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: VOCs, Explosives

MEDIA OF CONCERN: Groundwater

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	200010	200210
LTM	200210	203309

RC: 200210

RAAP-040

FORMER LEAD FURNACE AREA

SITE DESCRIPTION

The Former Lead Furnace area (FLFA) is located in the south-central portion of the MMA adjacent to SWMU 17A (Stage and Burn Area) and was operational during World War II. Typically, lead recovered during routine operations would be melted in the furnace and cast into ingots for salvage. It is not known precisely how long the lead furnace was in operation. The SWMU location has apparently been used for various activities and is listed in the RCRA Permit as a used oil and transfer location.

The FLFA was added to the Dames and Moore VI of 1992 by USATHAMA after the discovery of solid lead slag in the soil during the removal of used oil tanks in SWMU 76. The VI included the sampling and analysis of subsurface soil in the vicinity of the FLFA, located within SWMU 17A. A RFI was conducted to verify VI results and included the sampling/removal of lead hot spots and the collection and analysis of subsurface soil samples. RFI sampling was completed in FY02.

CLEANUP STRATEGY

Complete the RFI and produce DD for future actions.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Metals

MEDIA OF CONCERN: Soil

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	199803	200709

RC: 200709



SURFACE IMPOUNDMENT #4 (HWMU #4)**SITE DESCRIPTION**

HWMU 4 is located in the eastern area of the MMA. It was a lined surface impoundment and was used as an equalization basin for acidic wastewaters.

The source (the impoundment and associated soils) was removed in 1988 in accordance with a VDEQ approved closure plan.

The site was clean-closed for soil by the VDEQ in 1997. Long-term groundwater monitoring and a post closure permit were required by the VDEQ. The clean closure report was submitted in March 21, 2000.

CLEANUP STRATEGY

Long-term monitoring is planned for 30 years at this site. Wells will be sampled quarterly as required in the post-closure plan. Radford AAP will pursue with VDEQ the clean-closure for GW demonstration that was submitted in March 2000.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Metals

MEDIA OF CONCERN: Soil, Groundwater

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	198701	198801
CMI(C)	198701	198801
LTM	199901	203309

RC: 198801

SURFACE IMPOUNDMENT #5 (HWMU #5)

SITE DESCRIPTION

HWMU 5 is located in the middle of the MMA. It was a surface impoundment used for acidic wastewaters. Sludge was removed, but contaminated soil below the sludge layer was left in place. The lagoon was filled and capped. The presence of residual waste precludes clean-closure.

Groundwater monitoring has been performed for the past 15 years. DNT and TCE were recently detected. TCE exceeded Groundwater Protection Standards (GPS). Alternate source demonstration report for TCE was resubmitted to VDEQ in FY04.

In fall 2002, an investigative effort was completed for HWMUs 5 and 7. The subsequent draft Field Investigation Report and Risk Assessment for HWMUs 5 and 7 (DAA 2003) was submitted to VDEQ. This report is to facilitate elimination of LTM. A post-closure care permit requiring LTM was issued by VDEQ in Oct 2002.

CLEANUP STRATEGY

Long-term monitoring is planned for 30 years at this site. Wells will be sampled quarterly as required in the permit. LTM is required until relief is granted by the clean closure action and follow-on GW data.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Metals

MEDIA OF CONCERN: Soil, Groundwater

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	200010	200210
LTM	200210	203309

RC: 200210

SURFACE IMPOUNDMENT #7 (HWMU #7)

SITE DESCRIPTION

HWMU 7 is located in the western section of the MMA along the New River. It was a surface impoundment used for acidic wastewaters. VDEQ issued a post-closure permit in 2001, which requires LTM.

In fall 2002, an investigative effort was completed for HWMUs 5 and 7. The subsequent draft Field Investigation Report and Risk Assessment for HWMUs 5 and 7 (DAA 2003) was submitted to VDEQ. This report is to facilitate elimination of LTM. A post-closure care permit requiring LTM was issued by VDEQ in Oct 2002.

CLEANUP STRATEGY

Long-term monitoring is planned for 30 years at this site. Wells will be sampled quarterly as required in the permit. LTM is required until relief is granted by the clean closure action and follow-on GW data.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Heavy Metals

MEDIA OF CONCERN: Soil, Groundwater

Phases	Start	End
RFA	198410	198412
CS	198410	198412
RFI/CMS	200010	200210
LTM	200210	203309

RC: 200210

NEW RIVER UNIT (PAGE 1 OF 3)

SITE DESCRIPTION

The New River Unit (NRU) is located approximately 6 miles west of the RAAP MMA and consists of approximately 2,813 acres. Between 1940 and 1945, the NRU was used for the loading of propellants and igniter charges and the manufacturing of igniter charge bags. Between 1943 and 1945, operations were expanded to include an additional bag-loading line, rolled powder operations, flash-reducer loading lines, and black powder drying facilities. Production ended after World War II, and the plant was officially designated as part of the RAAP installation. Since 1947, approximately 1,000 acres in the western section of the plant have been sold or transferred for other uses.

There is conductive flooring in several buildings. The material is comprised of barium, copper, asbestos, and lead. It is exposed to the elements and is leaching to surrounding soil.

A Remedial Investigation sampling effort included the collection of surface soil, sludge, and water samples. Metals have been detected in exceedence of the 1989 RCRA CORA permit HBNS; however this site is not subject to any RCRA CORA permit. Six areas within the New River Unit are being investigated: the Bag Loading Area (BLA), the Igniter Assembly Area (IAA), Northern Burning Grounds (NBG), Western Burning Grounds (WBG), Rail Yard (RY), and the Building Debris Disposal Trench (BDDT). The RI fieldwork was completed in FY02. Effort from the Work Instructions was performed in FY04.

In FY06, USAEC decided to implement a PBC at NRU in FY07.

CLEANUP STRATEGY

The ongoing RI/FS is to be transitioned to PBC in FY07 and will include groundwater as part of the site conceptual model. Excavation, transportation and disposal of contaminated soil are anticipated at the BLA, IAA, NBG, WBG, and BDDT. The presence of asbestos within the conductive flooring at the BLA and IAA may render these two areas ineligible for further ER,A funding.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Metals

MEDIA OF CONCERN: Soil, Groundwater

Phases	Start	End
PA.....	199705	199708
SI.....	199712	199806
RI/FS	199806	200909
RD	200910	201105
RA(C).....	201106	201209

RC: 201209

RAAP-044
NEW RIVER UNIT (PAGE 2 OF 3)



BUILDING DEBRIS DISPOSAL TRENCH



IGNITER ASSEMBLY AREA



BAG LOADING AREA

RAAP-044
NEW RIVER UNIT (PAGE 3 OF 3)



NORTHERN BURNING GROUND



WESTERN BURNING GROUND



RAIL YARD

FORMER CADMIUM PLATING FACILITY (BLDG 4343)

SITE DESCRIPTION

Building 4343 is located within the Pilot B Area of the Rocket Manufacturing Area, which is situated within the Horseshoe Area.

In 1956, the building was converted from a Fire Water Pump House to support Nike igniter grain cadmium plating operations. Conversion activities included the installation of a drying cabinet, cadmium plating baths, an exterior lead catch tank (which was discharged to the ground), and an exhaust system. The pump and pump engine were removed and floor sumps were filled to level.

Surface soil evaluation was performed (Alliant Techsystem 1996) and found cadmium exceeded regulatory limits for Toxicity Characteristic Leachate Procedure (TCLP) analysis.

The Final RFI/CMS was submitted in FY04 and was approved by EPA on August 16, 2004 and by VDEQ (draft) on August 28, 2003. In FY06, the draft interim measures workplan was submitted.

CLEANUP STRATEGY

Per the recommendation from the final RFI/CMS, excavation, transportation, and disposal of affected soil will be implemented. Close-out documentation will be prepared.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Cadmium

MEDIA OF CONCERN: Soil

Phases	Start	End
RFA	199607	199607
RFI/CMS	199812	200408
DES	200310	200509
CMI(C)	200505	200708

RC: 200708



RFAAP-046

MMA GROUNDWATER STUDY

SITE DESCRIPTION

This site was created during the 1 July 2004 Program Review meeting at USAEC to address MMA groundwater Geographic Information System (GIS) support at Radford AAP as a separate site. Previously the program funding and requirements were included in RAAP-038. Now the MMA groundwater requirements and funding have been moved from RAAP-038 to RAAP-046. Note the MMA includes the Horseshoe Area.

The initial GIS procurement was completed in FY02. The GIS has and will continue to capture IR data, support ERIS, and facilitate project and program decision making.

From the September 2005 stakeholder meeting, it was agreed to study groundwater on a site-by-site basis. Thus, a regional GW study effort will not be performed and the effort will be divided among the remaining open IRP sites. The GIS effort is funded under this site. Efforts to study GW are complicated due to the presence of karst geology (highly fractured and channelized limestone).

CLEANUP STRATEGY

GW investigations will be funded and conducted under the site-by-site RFI/CMS process. Support for the Web-based GIS will continue under this AEDB-R site.

STATUS

REGULATORY DRIVER: RCRA, Subtitle C: Hazardous Wastes

RRSE: High

CONTAMINANTS OF CONCERN: Explosives, VOCs, Metals

MEDIA OF CONCERN:

Groundwater

Phases	Start	End
RFA	198609	198710
RFI/CMS	200109	200809
LTM	200910	202509

RC: 200809

IRP No Further Action Sites Summary

AEDB-R#	Site Title	Documentation/Reason for NFA	NFA Date
RAAP-007	CLOSED SANITARY LANDFILL (S28)	Handled under post closure care permit for RAAP-039, HWMU 16	200009
RAAP-008	CASO4 TREATMENT/DISPOSAL AREA (S27)	Not eligible for ER,A funding	200009
RAAP-012	ACID WASTEWATER LAGOON (S6)	The Decision Document was approved by EPA on October 9, 2002 and by VDEQ on October 24, 2002.	200210
RAAP-015	FLY ASK LANDFILL #1 (S26)	Not eligible for ER,A funding	200009
RAAP-016	WASTEWATER PONDS FROM PROPELLENT INCINERATOR	The RFI/CMS Report was approved by EPA on June 6, 2005 and by VDEQ on December 9, 2004. An internal Army Decision Document was prepared and submitted by RFAAP on August 17, 2005.	200508
RAAP-017	ACTIVATED CARBON DISPOSAL AREA (S53)	Not eligible for ER,A funding	200009
RAAP-019	INERT LANDFILL NO. 1 (S32)	Not eligible for ER,A funding	200009
RAAP-020	FLY ASH LANDFILL #2 (S29)	Not eligible for ER,A funding	200009
RAAP-027	RUBBLE PILE (S58)	VDEQ approved the RFI Report on August 3, 2003 and EPA approved it on May 24, 2004. A Decision Document was submitted to EPA and VDEQ on September 10, 2004. No action taken by these agencies.	200405
RAAP-029	CLOSED SANITARY LANDFILL (S52)	see RAAP-007	200009

IRP No Further Action Sites Summary (cont.)

AEDB-R#	Site Title	Documentation/Reason for NFA	NFA Date
RAAP-030	AIR CURTAIN DESTRUCTOR & OPEN BURN (S17)	Not eligible for ER,A funding	200009
RAAP-032	MOBILE USED OIL TANKS (S61, 75, 76)	SWMU 61 not eligible for ER,A funding. SWMU 75: VDEQ letter of October 3, 1995 and EPA approval of Work Plan Addendum 16 on September 8, 2003; SWMU 76: VDEQ letter of September 9, 1992 and EPA approval of Work Plan Addendum 16 on September 8, 2003.	200309
RAAP-035	SEWAGE LINES	Not eligible for ER,A funding	200205
RAAP-036	BIOPLANT BASIN (S10)	Not eligible for ER,A funding	199812

Initiation of IRP: 1990

Past Phase Completion Milestones

1990

- Verification Investigation Initiation

1992

- Verification Investigation Completion

1994

- Interim Remedial Action RAAP-003 (SWMU 69)
- RCRA Facility Investigation Initiation

1995

- Started Interim Remedial Design
RAAP-007 (SWMU 28)
RAAP-023 (SWMU 43)
RAAP-029 (SWMU 52)

1997

- Completed RCRA Facility Investigation
- Completed IRA at SWMU 43
- Completed IRA at SWMU 68
- Completed New River and Tributaries Study

1998

- Completed Master Work Plan
- Completed Site Management Plan
- Started RFI/CMS for SWMU 39
- Started IRM at SWMU 54

1999

- Completed IRM at SWMU 54
- Started and completed RI/RFI sampling at NRU & Bldg 4343

2000

- Started and completed sampling for Inorganic Background Study

2001

- Started and completed sampling at SWMU 6
- Started Site Screening Process document
- Started RFI/CMS at SWMUs 40/71 and 54
- Started treatability study at NRU
- Started RFI data gap work at SWMUs 39, 48, 49, 50, 59, FLFA, Bldg. 4343, NRU
- Monitored groundwater at HWMUs 4, 5, 7 and 16

2002

- Started RFI at SWMUs 35, 37, 38, 41, 51
- Started Site Screening SWMUs 13, 37, 38, 46, 57, 68, 69, 75, 76, Areas A and F
- Monitored groundwater at HWMUs 4, 5, 7 and 16

2003

- Started RFI at SWMUs 31, 39, 48, 49, 50, 58, 59, Bldg 4343, Former Lead Furnace Area, 40/71, 54
- Started RI at NRU
- Procured equipment for web based GIS system
- Monitored groundwater at HWMUs 4, 5, 7 and 16
- Procured additional Site Screening effort for SWMUs 46 and 57.
- Procured CMS/FS for SWMUs 48, 49, 50, 39, Former Lead Furnace Area, Building 4343 and New River Unit.
- Procured annual GW monitoring and IRP support.

2004

- Performed annual GW monitoring and IRP support.
- Prepared and submitted various Work Plans, RFI/RI and CMS/FS reports.

2005

- Performed annual GW monitoring and IRP support
- Prepared and submitted various Work Plans, RFI/RI and CMS/FS reports. See Contamination Assessment Previous Studies section for a specific list.
- Scoped and procured effort for Building 4343 source removal action.

2005-2014

- Start and complete follow-up investigations, studies and actions for the remaining sites.

Projected Record of Decision (ROD)/Decision Document (DD) Approval Dates:
Unknown

Schedule for Next Five-Year Review: Unknown

Estimated Completion Date of IRP (including LTM phase): 2038

RADFORD ARMY AMMUNITION PLANT IRP SCHEDULE

(Based on current funding constraints)

AEDB-R #	PHASE	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15+
RAAP-001	RFI/CMS									
	DES									
	CMI(C)									
	LTM									
RAAP-002	RFI/CMS									
RAAP-005	RFI/CMS									
	DES									
	CMI(C)									
RAAP-010	RFI/CMS									
	DES									
	CMI(C)									
RAAP-011	RFI/CMS									
	DES									
	CMI(C)									
	LTM									203808
RAAP-013	RFI/CMS									
RAAP-014	DES									
	CMI(C)									
	LTM									
RAAP-016	CMI(C)									
	LTM									
RAAP-018	RFI/CMS									
	DES									
	CMI(C)									
	LTM									201809
RAAP-022	RFI/CMS									
RAAP-023	RFI/CMS									
RAAP-024	RFI/CMS									
RAAP-025	RFI/CMS									

RADFORD ARMY AMMUNITION PLANT IRP SCHEDULE

(Based on current funding constraints)

AEDB-R #	PHASE	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15+
RAAP-028	RFI/CMS									
	DES									
	CMI(C)									
	LTM									201809
RAAP-031	RFI/CMS									
RAAP-037	RFI/CMS									
	DES									
	CMI(C)									
RAAP-038	RFI/CMS									
	DES									
	CMI(C)									
	LTM									
RAAP-039	LTM									203309
RAAP-040	RFI/CMS									
RAAP-041	LTM									203309
RAAP-042	LTM									203309
RAAP-043	LTM									203309
RAAP-044	RI/FS									
	RD									
	RA(C)									
RFAAP-046	LTM									202509

Prior Years Funds

Funding up to FY04: \$23,592

Year	Site Information	Expenditures	FY Total
FY05	RAAP-002 RI	101K	
	RAAP-005 RI	297K	
	RAAP-009 RI	101K	
	RAAP-010 RI	70K	
	RAAP-021 RI	35K	
	RAAP-022 RI	388K	
	RAAP-024 RI	320K	
	RAAP-039 LTM	99k	
	RAAP-041 LTM	99K	
	RAAP-042 LTM	99K	
	RAAP-043 LTM	99K	
	RAAP-045 RAC	611K	
	RFAAP-046 RI	357K	\$2,676K
Total Prior Years Funding: \$26,268K			

Current Year Requirements

Year	Site Information	Expenditures	FY Total
FY06			
	RAAP-005 RI	29K	
	RAAP-010 RI	77K	
	RAAP-016 RI	86K	
	RAAP-022 RI	215K	
	RAAP-031 RI	77K	
	RAAP-033 RI	77K	
	RAAP-039 LTM	122K	
	RAAP-041 LTM	122K	
	RAAP-042 LTM	122K	
	RAAP-043 LTM	122K	
	RAAP-045 RAC	80K	
	RFAAP-046 RI	20K	\$1,149K
Total Funding FY06: \$1,149K			

Total Future Requirements: \$44,805K

Total IR Program Cost (from inception to completion of the IRP): \$72,222K

RADFORD ARMY AMMUNITION PLANT

Military Munitions Response Program

Total AEDB-R MMRP Sites/AEDB-R sites with Response Complete: 1/0

AEDB-R Site Type:

1 Small Arms Range

Most Widespread Contaminants of Concern: Metals

Media of Concern: Soil

Total MMRP Funding

Prior years (up to FY05):	\$ 0K
Current Year (FY06):	\$ 0K
Future Requirements (FY07+):	\$667K
Total:	\$667K

Duration of MMRP

Year of MMRP Inception: 2002

Year of MMRP RC: 2012

Year of MMRP Completion Including LTM: 2012

MMRP Contamination Assessment

The Phase 3 Army Range Inventory was completed at Radford Army Ammunition Plant in May 2003. The inventory identified one site as eligible for the MMRP. The Phase 3 Inventory serves as the preliminary assessment under CERCLA. A site inspection is scheduled to begin in October 2006.

CLEANUP EXIT STRATEGY: The installation plans to complete the SI in 2007 and execute follow-on phases/actions as required.

2002

- US Army Closed, Transferred and Transferring Range/Site Inventory for Radford Army Ammunition Plant, Virginia, Malcolm Pirnie, Inc., Nov

RADFORD ARMY AMMUNITION PLANT

Military Munitions Response Program
Site Descriptions

RFAAP-001-R-01

ARMY RESERVE SMALL ARMS RANGE

SITE DESCRIPTION

The closed Army Reserve Small Arms Range occupied approximately 3 acres. It was used for small arms training from approximately 1941 to 1967. The closed range is located along the southeastern boundary of RAAP. A berm (approximately 200 feet long by 10 feet high) is still present and indicates that the direction of fire was southeast. The berm is adjacent to a stream, which forms the installation boundary. This range likely contained 10-15 stations. The "Radford Ordnance Works Historic Investigation" states that 155,375 rounds of ammunition were "expended in the pistol range by the RAAP police department from October 1941 to October 1945." The local rifle club from 1946-1967 may have also used the range.

STATUS

REGULATORY DRIVER: CERCLA

RAC: Negligible Risk

CONTAMINANTS OF CONCERN:
Metals

MEDIA OF CONCERN: Soil

Phases	Start	End
PA	200202	200305
SI	200610	200803
RI/FS	201110	201209

RC: 201209

The former small arms range is not within the secure limited manufacturing area, but public access is restricted. The former range is currently a grass field surrounded by an unlocked fence. The field was once used as a baseball field and was accessible to the public up until the late 1960s.

CLEANUP STRATEGY

Army and DoD experience indicates that contamination on small arms ranges is primarily lead in soils and that remediation of these sites would primarily consist of excavation, off-site transportation, stabilization, and disposal. No MEC components would be expected at small arms ranges; therefore, they are not included in the estimate. Although the types of small arms ranges and patterns of contamination can vary, assumptions for this CTC estimate were based on the characteristics of a typical pistol and/or rifle MMRP range.

The RA selected for small arms ranges is the excavation of lead-contaminated soil with transportation and disposal at an off-site facility with stabilization. Soil excavation volumes are based on site size.

Initiation of MMRP: 2002

Past Phase Completion Milestones:

2002

PA, RFAAP-001-R-01, May

Projected ROD/DD Approval Dates: Unknown

Projected Construction Completion: N/A

Schedule for Five Year Reviews: Unknown

Estimated Completion Date of MMRP including LTM: 2012

RADFORD ARMY AMMUNITION PLANT MMRP SCHEDULE

(Based on current funding constraints)

AEDB-R#	PHASE	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15+
RFAAP-001-R01	SI									
	RIFS									

Prior Years Funds**Funding up to FY04: \$0K**

Year	Site Information	Expenditures	FY Total
FY05		\$0K	\$0K
Total Funding up to FY05: \$0K			

Current Year Requirements

Year	Site Information	Expenditures	FY Total
FY06		\$0K	\$0K
Total Funding FY06: \$0K			

Total Future Requirements: \$667K***Total MMR Program Cost (from inception to completion of the MMRP): \$667K***

The surrounding community for Radford AAP included the counties of Montgomery (2004 Pop. 83,959), Pulaski (2004 Pop. 35,152), Floyd (2004 Pop. 14,464), Giles (2004 Pop. 16,989) and the City of Radford (Pop. 15,940).

In February 1995 and January 1998 we conducted surveys to determine if enough community interest existed to sustain a Restoration Advisory Board. A Community Relations Plan was finalized in September 1995.

February 1995 and January 1998, RAAP with the assistance of the US Army Environmental Center conducted community interviews with residents of the surrounding counties and city, and placed two newspaper advertisements soliciting community members to volunteer for RAB positions. In June 1998, RAAP held a public meeting to share information about the RAAP cleanup program and about forming a RAB. August 1998, RAAP held first RAB-style meeting in which the Community Co-chair person was selected. In September 1999, an information repository was established at the Montgomery Floyd Regional Library, Christiansburg Branch, consistent with RAB recommendation.

RAB activities to date have included quarterly meetings with regulators present, plant tours, and project and program status briefings.

RAAP is committed to involving the public in the restoration program and will do all we can to make it a success.