



Long-Term Stewardship Assessment Report

Radford Army Ammunition Plant

EPA ID #: VA1210020730

Radford, VA 24143

Assessment Date: October 21, 2019

Introduction: Long-term stewardship (LTS) refers to the activities necessary to ensure that engineering controls (ECs) are maintained and that institutional controls (ICs) continue to be enforced. The purpose of the EPA Region 3 LTS program is to periodically assess the efficacy of the implemented remedies (i.e., ECs and ICs) and to update the community on the status of the RCRA Corrective Action facilities. The assessment is conducted in twofold, which consists of a record review and a field inspection, to ensure that the remedies are implemented and maintained in accordance to the final decision.

Facility Background: Radford Army Ammunition Plan (RFAAP) is located in the mountains of southwest Virginia in Pulaski and Montgomery Counties and it consists of two non-contiguous areas: the Main Manufacturing Area (MMA) and the New River Unit (NRU). The facility is about 4600 acres in size. The MMA is located approximately five miles northeast of the city of Radford, Virginia, which is approximately ten miles west of Blacksburg and 4 7 miles southwest of Roanoke. The NRU is located about six miles west of the MMA, near the town of Dublin, and is not covered under the 2000 Permit.

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

RFAAP began manufacturing propellants in 1941 and continues that work today. RFAAP has also produced 2,4,6-trinitrotoluene (TNT) on an intermittent basis. The initial requirements for the Corrective Action process were specified in a RCRA Corrective Action Permit issued by EPA to Radford Army Ammunition Plant in 1989 (No. VA1210020730) and reissued by EPA on October 31, 2000. The Corrective Action Permit required RFAAP to complete RCRA Facility Investigations (RFIs), implement interim measures (IMs) as necessary, and complete a Corrective Measures Study (CMS) to address releases for approximately 80 Corrective Action Units (CAUs) at the Facility. Nine Solid Waste Management Units (SWMUs), four Facility Screening Areas (SSAs) and the Army

Reserve Small Arms Range were determined to have releases of constituents to soil and/or groundwater that exceeded EPA screening criteria and were evaluated for potential pathway risk. Facility-related constituents of concern include chlorinated solvents, explosives and perchlorate in groundwater and metals, explosives and dioxins/furans in soils.

RFAAP attempted to delineate the occurrence and flow of the groundwater, however, such efforts were complicated by the presence of karst geology (highly fractured and channelized limestone). Based on RF AAP' s delineation efforts, it appears that the groundwater under the Facility eventually discharges to the New River. Current data do not suggest that off-site groundwater has been impacted.

Current Site Status: In April 2012, EPA issued a Final Decision and Response to Comments (FDRTC) for the May 2011 SB prepared for most of the Facility’s CAUs. The Final Decision document described the information gathered during environmental investigations at the Facility and selected Remedy. The selected remedies included Institutional Controls for ten (10) CAUs. Of these ten (10) CAUs, engineering controls were also the selected remedy for three (3) units. On August 18, 2014, EPA issued another FDRTC for four (4) CAUs not included in the April 2012 FDRTC. Selected remedies consisted of institutional Controls, engineering controls, and monitored natural attenuation (MNA) and/or Long-term groundwater monitoring. The final remedies are implemented via Virginia Department of Environmental Quality (VDEQ) Hazardous Waste Management Corrective Action Permit No. VA1210020730 dated April 1, 2016 (Permit).

Long-term Stewardship Site Visit: On October 21, 2019, EPA conducted a long-term stewardship site visit with RFAAP to discuss and assess the status of the implemented remedies at the Facility.

The attendees were:

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Permit: The Permit is the method for implementing institutional controls required as a condition of the Statement of Basis and Final Decision. The following ICs apply to the Covestro facility, shown on Figure 1:

RFAAP shall use existing approved work plans and/or documents for operation and maintenance of long-term groundwater monitoring and reporting; and implementation of ICs, ECs, and additional groundwater use restrictions. Final remedies shown in Table 1 are summarized 1. Prohibit the use of groundwater beneath SWMUs 40, 48, 49 and 54; 2. Require inspection and maintenance of landfill caps and/or covers; 3. Restrict earth moving; and 4. Restrict subsurface soil excavation below 15 feet at SWMU 51.

Table 1: Corrective Action Unit Final Remedies

Location	Unit / Area Description	Institutional Controls	Engineering Controls
SWMU 13	Area between the Open Burning Ground and the New River	Restriction on earth moving, residential use	
SWMU 40	Landfill Nitro Area	Restriction on earth moving, residential use, and groundwater use	Maintain Cover
SWMU 41 B	Red Water Ash Burial Ground	Restriction on earth moving, residential use	
SWMU 43	Sanitary Landfill #2	Restriction on earth moving, residential use	
SWMU 45	Landfill #3	Restriction on earth moving, residential use	
SWMU 48	Oily Water Burial Area	Restriction on groundwater use	
SWMU 49	Red Water Ash Burial #2	Restriction on groundwater use; MNA	
SWMU 51	TNT Waste Neutralization Pits	Restriction on earth moving below 15 feet, residential use	
SWMU 54	Propellant Burning Ash Burial	Restriction on groundwater use; MNA	
SSA 72	Oleum Plant Acidic Wastewater Sump	Restriction on earth moving, residential use	
SSA 77	Garbage Incinerator	Restriction on earth moving, residential use	
SSA 30 and 79	Asbestos Disposal Trenches #1 and #2	Restriction on earth moving, residential use	Maintain Cover
Army Reserve Small Arms Range (ARSAR)	Southeast Hillside Area of ARSAR	Restriction on earth moving	
Former Mortar and Gun Range	Currently under active investigation		

Institutional Controls (ICs) Status:

Groundwater Use Restriction: Groundwater at SWMUs 40, 48, 49, and 54 shall not be used for any purpose, including, but not limited to, use as a potable water source, other than to conduct the maintenance and monitoring activities required by VADEQ and/or EPA; The Facility is connected to a local water utility and does not use groundwater for potable purposes.

Residential Land Use: SWMUs 13, 40, 41, 41B, 43, 45, 51, SSAs 30, 72, 77, 79 and the ARSAR shall not be used for residential purposes. The property remains under continued use as a U.S. military ammunitions manufacturing complex.

General Land Use: The ARSAR and SWMUs 48,49, and 54 shall not be used in a way that will adversely affect or interfere with the integrity and protectiveness of the final remedies implemented at the Facility. Earth-moving activities below 15 ft are restricted at SWMU 51. All earth-moving activities are restricted at SWMUs 13, 40, 41B, 43, 45 and SSAs 30, 72, 77, 79.

Engineering Controls (ECs) Status:

Installation Restoration Program (IRP) Areas: On an annual basis, SWMUs 13, 41, 40, 43, 45, 51 and SSAs 30, 72, 77 and 79 are inspected for soil erosion, settlement, pooling, deeply rooted vegetation, vegetative growth to ensure engineered controls remain protective of human health and the environment. Also, warning signage is maintained at IRP areas to prevent access and inform of potential risk. The latest inspection report was completed on March 26, 2019 with no issues other than minor maintenance at SWMU 41 including grading of hilltop and removal of large shrubs.

Groundwater Monitoring: RFAAP submits annual MNA groundwater reports for SWMU 49 and SWMU 54. The purpose of monitoring is to evaluate potential MNA of constituents in groundwater until selected remedial goals are achieved and maintained for three (3) years. SMWU 49 groundwater samples are analyzed for carbon tetrachloride (CT), trichloroethene (TCE), their breakdown products and MNA parameters. SWMU 54 groundwater samples are analyzed for 2,4,6-trinitrotoluene (2,4,6-TNT), dinitrotoluene (DNT) mixture, perchlorate, MNA parameters hexahydro-1,3,5-trinitro-1,3,5-triazacyclohexane (RDX) and its breakdown products.

Eleven (11) groundwater monitoring wells are sampled on a quarterly basis during annual MNA monitoring at SWMU49, while four more wells are sampled once a year. After 2 years of quarterly monitoring at SWMU 54, the well network was reduced from fourteen (14) wells to three (3) wells (54MW10, 54MW12 and 54MW13) and an upgradient well 54MW1.

Based on the third-year (2019) results at SWMU 49, the latest four quarters of sampling data suggest that carbon tetrachloride and trichloroethene concentrations are fairly stable with relatively mildly or seasonal fluctuations. The presence of chloroform suggests that degradation of CT is occurring in groundwater. TCE concentrations remain stable across the SWMU49, and although its breakdown product, cis-1,2-dichloroethene, is present at the site, there appears to be no substantive correlation between the two.

Based on sixth year (2019) sampling report, contaminant concentrations and biological indicator parameters measured in groundwater at SWMU 54, MNA processes are reducing the concentrations of 2,4,6-TNT and RDX. Breakdown products of 2,4,6-TNT (including 2-Amino-4,6-dinitrotoluene and 4-amino-2,6-dinitrotoluene) and RDX (including DNX, MNX and TNX) is further evidence that biological degradation is occurring at SWMU 54. Perchlorate concentrations have shown a steady decline and are currently below the groundwater remedial goal of 10.9 ug/L.

Financial Assurance: Pursuant to the Permit, VDEQ recognizes that the federal government is self-insured and is exempt from the financial assurance requirement.

Reporting Requirements/Compliance: RFAAP submits two (2) annual MNA Sampling reports and annual Installation Restoration Program (IRP) Area inspection reports both of which have been received for 2019. The Facility is currently in compliance with conditions and requirements set forth in the Permit.

Mapping: RFAAP will provide geographic information systems (GIS) mapping data in conjunction with developing a facility Institutional Control Plan (ICP) in 2020. All areas with specific ICs or ECs will be mapped including the 4600-acre entire facility, SWMUs 13, 40, 41, 43, 45, 48, 49, 51, 54 SSAs 30, 72, 77, 79 and the Southeast Hillside Area of the ARSAR.

Conclusions and Recommendations No institutional or engineering control deficiencies were identified. EPA has determined that the remedy institutional and engineering controls have been fully implemented. The remedy remains effective in being protective of human health and the environment.

Attachments:

Figure 1: Aerial Map of RFAAP

Picture 1: Army Reserve Small Arms Range

Picture 2: SSA 72 - Oleum Plant Acidic Wastewater Sump

Picture 3: SSAs 30 and 79 - Asbestos Disposal Trenches #1 and #2

Picture 4: SSAs 30 and 79 - Asbestos Disposal Trenches #1 and #2

Picture 5: SWMU 40 - Landfill Nitro Area

Picture 6: SWMU 43 – Sanitary Landfill #2

Picture 7: SWMU 43 – Sanitary Landfill #2

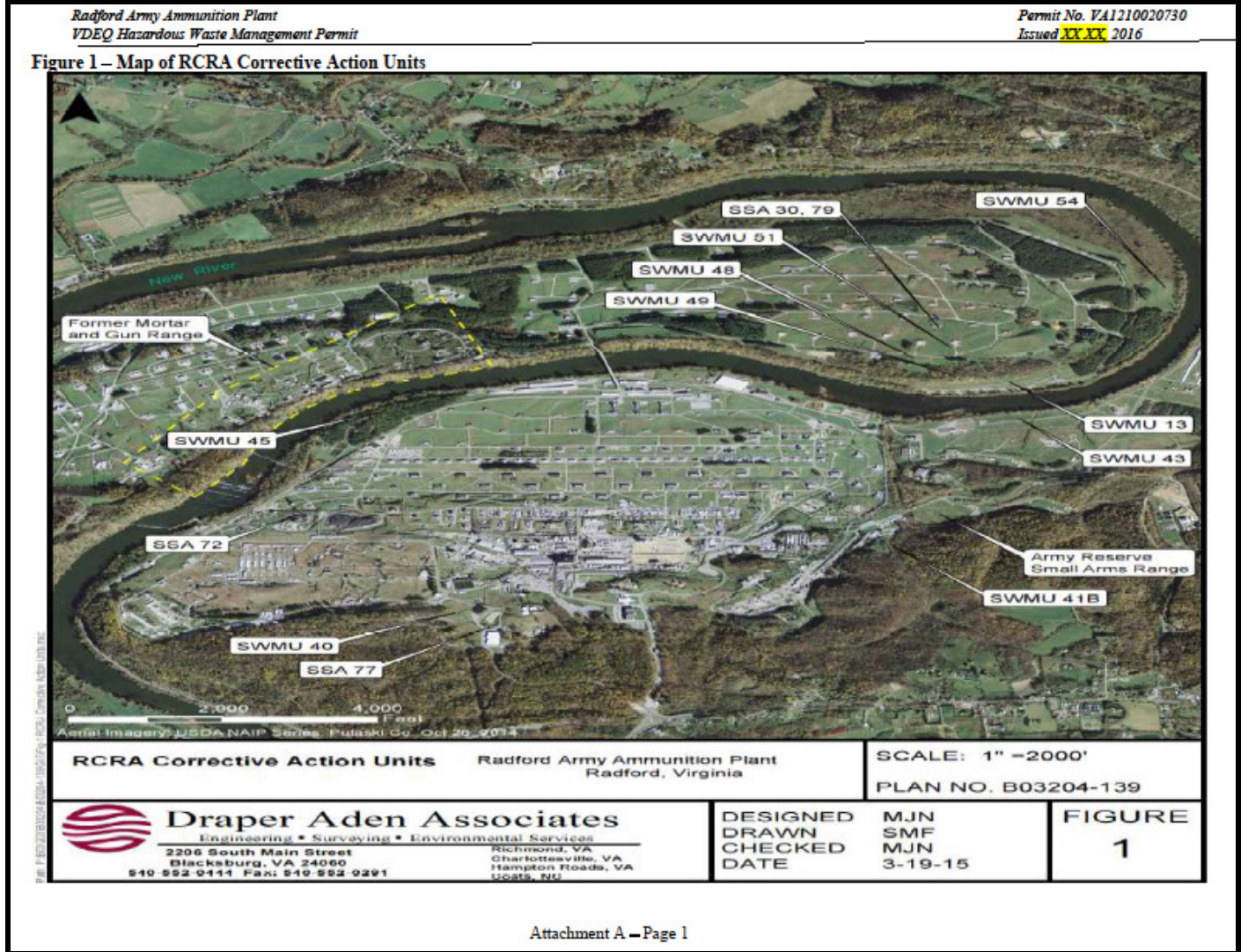
Picture 8: SWMU 45 – Landfill #3

Picture 9: SWMU 49 - Red Water Ash Burial #2

Picture 10: SWMU 51 – TNT Waste Neutralization Pits

Picture 11: SWMU 54 – Propellant Burning Ash Burial

Figure 1: Aerial Map of RFAAP



Picture 1: Army Reserve Small Arms Range



Picture 2: SSA 72 - Oleum Plant Acidic Wastewater Sump



Picture 3: SSAs 30 and 79 - Asbestos Disposal Trenches #1 and #2



Picture 4: SSAs 30 and 79 - Asbestos Disposal Trenches #1 and #2



Picture 5: SWMU 40 - Landfill Nitro Area



Picture 6: SWMU 43 – Sanitary Landfill #2



Picture 7: SWMU 43 – Sanitary Landfill #2



Picture 8: SWMU 45 – Landfill #3



Picture 9: SWMU 49 - Red Water Ash Burial #2



Picture 10: SWMU 51 – TNT Waste Neutralization Pits



Picture 11: SWMU 54 – Propellant Burning Ash Burial

