

**DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION**  
Interim Final 2/5/99  
**RCRA Corrective Action**  
**Environmental Indicator (EI) RCRIS code (CA725)**  
**Current Human Exposures Under Control**

**Facility Name:** Radford Army Ammunition Plant  
**Facility Address:** Route 114, Radford, Virginia 24141-0100  
**Facility EPA ID #:** VA1210 020730

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

- If yes - check here and continue with #2 below.
- If no - re-evaluate existing data, or
- if data are not available, skip to #8 and enter "IN" (more information needed) status code.

**BACKGROUND**

**Definition of Environmental Indicators (for the RCRA Corrective Action)**

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

**Definition of "Current Human Exposures Under Control" EI**

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

**Relationship of EI to Final Remedies**

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

**Duration / Applicability of EI Determinations**

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

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2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **“contaminated”**<sup>1</sup> above appropriately protective risk-based “levels” (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	<u>Yes</u>	<u>No</u>	<u>?</u>	<u>Rationale / Key Contaminants</u>
Groundwater	X			Inorganics, VOCs, perchlorate
Air (indoors) <sup>2</sup>		X		
Surface Soil (e.g., <2 ft)	X			Inorganics, Pesticides, PCBs, VOCs, Explosives
Surface Water		X		
Sediment		X		
Subsurf. Soil (e.g., >2 ft)	X			Inorganics, Pesticides, PCBs, VOCs, Explosives
Air (outdoors)		X		

- If no (for all media) - skip to #6, and enter “YE,” status code after providing or citing appropriate “levels,” and referencing sufficient supporting documentation demonstrating that these “levels” are not exceeded.
- If yes (for any media) - continue after identifying key contaminants in each “contaminated” medium, citing appropriate “levels” (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.
- If unknown (for any media) - skip to #6 and enter “IN” status code.

**Rationale and Reference(s):**

Requirements for the corrective action process were specified in a RCRA permit issued by the EPA in 1989 (No. VA1210020730). On October 31, 2000, the permit was reissued. The reissued permit currently governs corrective action at the Facility. Various investigations and actions have been completed and reports have been submitted to the EPA and the Commonwealth of Virginia, since 1989 related to Corrective Action investigations of SWMUs, AOCs, and SSAs (collectively referred to as Corrective Action Units). Additionally the Radford Army Arsenal has separate permits issued by the Commonwealth of Virginia to manage operations pertaining to RCRA Subpart C, D and X. Virginia regulates four closed RCRA Hazardous Waste Management Units via a Post-Closure Care Permit. The following website contains a repository of all the reports generated to fulfill the Permit requirements for investigations completed to date at the site: <http://www.radfordaarp.org/inforepo/online-index.htm>.

Groundwater is routinely monitored at five units permitted by Virginia: i.e. Open Burning Ground (OBG, HWMU 13); HWMU-5; HWMU-7; HWMU-10; HWMU-16. The OBG is in a regulated unit corrective action program for exceedances of groundwater protection standards for perchlorate and carbon tetrachloride. HWMU-5 is in a corrective action program for trichloroethene (TCE) and cobalt – Monitored Natural Attenuation is the approved remedy. Groundwater has been sampled and characterized from Corrective Action Units across the site as part of the site-wide Corrective Action investigation. A few units reported groundwater contamination at levels that would affect human health.

Similar to groundwater, soil was sampled and characterized at many of the Corrective Action Units across the site. Hundreds of soil samples, both surface and subsurface were collected from less than two dozen of the Units. Much of the gross contamination was excavated and properly disposed of; however, there are a few remaining Units containing soil contamination at levels that would affect human health. Four of the Virginia permitted units are closed landfills and therefore contain waste. The Permit governing activities at the OBG requires soil sampling and currently HWMU-13 continues to be in compliance with the limits for metal and organics established in the Permit.

Releases to air, from the incinerators and the OBG are regulated by the operating permits. Emissions from the incinerators are largely regulated under the Air Program under the MACT. A Notice of Violation was issued to the Arsenal for an exceedance of their lead standard occurring on January 8, 2010. The Arsenal is currently in compliance, having satisfied

the requirements of the Schedule of Compliance (Appendix A) of a March 22, 2012 consent order issued by Virginia's Department of Environmental Quality (DEQ). Similarly, the DEQ has issued warning letters regarding chromium feed rate violations at the OBG that resulted in emissions exceeding allowable rates established under the Permit. The OBG is currently in compliance with the Permit.

Footnotes:

<sup>1</sup> "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

<sup>2</sup> Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

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3. Are there **complete pathways** between “contamination” and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

**Summary Exposure Pathway Evaluation Table**

Potential **Human Receptors** (Under Current Conditions)

<b><u>“Contaminated” Media</u></b>	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food <sup>3</sup>
Groundwater	N	N	N	N			N
<del>Air (indoors)</del>							
Soil (surface, e.g., <2 ft)	N	N	N	N	N	N	N
<del>Surface Water</del>							
<del>Sediment</del>							
Soil (subsurface e.g., >2 ft)				N	N	N	N
<del>Air (outdoors)</del>							

Instructions for Summary Exposure Pathway Evaluation Table:

- Strike-out specific Media including Human Receptors’ spaces for Media which are not “contaminated” as identified in #2 above.
- enter “yes” or “no” for potential “completeness” under each “Contaminated” Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential “Contaminated” Media - Human Receptor combinations (Pathways) do not have check spaces (“\_\_\_”). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

- If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter “YE” status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).
- If yes (pathways are complete for any “Contaminated” Media - Human Receptor combination) - continue after providing supporting explanation.
- If unknown (for any “Contaminated” Media - Human Receptor combination) - skip to #6 and enter “IN” status code.

Rationale and Reference(s):

The Radford Arsenal is an industrial site with controlled access. Based on security, and access control measures, unauthorized personnel are prevented from coming into contact with potentially contaminated surficial and subsurficial soils. Groundwater is not used for any purpose.

Exposure pathways to contaminated soils and groundwater are controlled by several means including controlling access, providing soil and synthetic covers to ensure no contaminated materials are exposed, maintaining vegetative growth to

<sup>3</sup> Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

provide stability and erosion control, implementation of Health and Safety Plans when excavation or construction activities occur – collectively these controls are called Institutional and Engineering Controls.

In April 2012 EPA issued a Final Decision and Response to Comments document that included a 2011 Statement of Basis wherein remedies were selected, with public input, for the majority of the Corrective Action Units on the site. EPA selected No Further Action for 64 units based on audit, operational history, and investigations where the data demonstrated the units present no unacceptable risk to human health or the environment. EPA selected Engineering Controls that are physical designs or structures used to manage environmental or health risks by placing a barrier between the contamination and the rest of the site, to limit exposure pathways as components of the Final Remedy for three units. EPA has selected Institutional Controls, which are non-engineered instruments that help to minimize the potential for human exposure to contamination, as components of the Final Remedy for SWMU 40, and SSAs 30 and 79 and as the Final Remedy for SWMUs 13, 41B, 43, 45, 51 and SSAs 72 and 77. The specific Institutional Controls implemented at the specific Units are groundwater use prohibitions, residential development prohibitions, and managed soil excavations. Remaining units without a selected remedy have been investigated and are nearing completion, meaning remedies are currently being selected. None of the remaining units pose a threat to human health or the environment. The Virginia regulated units are all in compliance with their various Permits and therefore pose no risk to human health or the environment.

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4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **“significant”**<sup>4</sup> (i.e., potentially “unacceptable” because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable “levels” (used to identify the “contamination”); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable “levels”) could result in greater than acceptable risks)?
- If no (exposures can not be reasonably expected to be significant (i.e., potentially “unacceptable”) for any complete exposure pathway) - skip to #6 and enter “YE” status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”
  - If yes (exposures could be reasonably expected to be “significant” (i.e., potentially “unacceptable”) for any complete exposure pathway) - continue after providing a description (of each potentially “unacceptable” exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”
  - If unknown (for any complete pathway) - skip to #6 and enter “IN” status code

Rationale and Reference(s):

<sup>4</sup> If there is any question on whether the identified exposures are “significant” (i.e., potentially “unacceptable”) consult a human health Risk Assessment specialist with appropriate education, training and experience.

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5. Can the “significant” **exposures** (identified in #4) be shown to be within **acceptable** limits?
- If yes (all “significant” exposures have been shown to be within acceptable limits) - continue and enter “YE” after summarizing and referencing documentation justifying why all “significant” exposures to “contamination” are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).
  - If no - (there are current exposures that can be reasonably expected to be “unacceptable”)- continue and enter “NO” status code after providing a description of each potentially “unacceptable” exposure.
  - If unknown (for any potentially “unacceptable” exposure) - continue and enter “IN” status code.

Rationale and Reference(s):

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6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI (event code CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

- YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Radford Army Arsenal Plant facility, EPA ID # VA 1210020730, located at Route 114, Radford, VA 24141-0100 under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.
- NO - "Current Human Exposures" are NOT "Under Control."
- IN - More information is needed to make a determination.

Completed by (signature) \_\_\_\_\_ Date 7/17/12  
 (print) Erich Weissbart  
 (title) Project Manager

Supervisor (signature) \_\_\_\_\_ Date 7/17/12  
 (print) Luis Pizarro  
 (title) Associate Director  
EPA Region III

Locations where References may be found:

US EPA Region III  
Waste & Chemicals Management Division  
1650 Arch Street  
Philadelphia, PA 19103

<http://www.radfordaapirp.org/inforepo/online-index.htm>

<http://www.radfordaapirp.org/invest/iap-current%20year.htm>

<http://www.epa.gov/reg3wcmd/ca/va/webpages/va1210020730.html>

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