

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action

Environmental Indicator (EI) RCRIS code (CA750)

Migration of Contaminated Groundwater Under Control

Facility Name: BWX Technologies, Inc. (BWXT) Mt. Athos Site
Facility Address: Route 726 Mt. Athos Road, Lynchburg, Virginia 24505-0785
Facility EPA ID #: VAD 04 696 0449

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, 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?
- X 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 "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "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 "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

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. Is **groundwater** known or reasonably suspected to be “contaminated”¹ above appropriately protective “levels” (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

 X If yes - continue after identifying key contaminants, citing appropriate “levels,” and referencing supporting documentation.

_____ If no - skip to #8 and enter “YE” status code, after citing appropriate “levels,” and referencing supporting documentation to demonstrate that groundwater is not “contaminated.”

_____ If unknown - skip to #8 and enter “IN” status code.

Rationale and Reference(s): A Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) report for the Mt. Athos Site (BWXT, 1996) was approved by EPA Region III on September 13, 1996. Fourteen areas where known or potential releases of constituents may have occurred were investigated during the RFI. The study consisted of the evaluation of surface and subsurface soil, sediment, surface water, and groundwater samples. The RFI resulted in the delineation of three separate groundwater plumes containing chlorinated solvents. Groundwater within the plumes is contaminated with dissolved phase solvents, and no free phase solvents were identified during the investigation. The RFI concluded that all three groundwater plumes were contaminated with the chlorinated solvents trichloroethene (TCE), tetrachloroethene (PCE), and vinyl chloride at levels exceeding their respective federal drinking water MCLs, and warranting further evaluation in a corrective measures study (CMS). Significant contamination is limited to the shallow, surficial aquifer zone only. Contaminated source area soils were only associated with one of the plumes. These soils are currently being remediated using soil vapor extraction.

¹ 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 appropriate “levels” (appropriate for the protection of the groundwater resource and its beneficial uses).

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3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within “existing area of contaminated groundwater” as defined by the monitoring locations designated at the time of this determination)?²

 X If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the “existing area of groundwater contamination”).

_____ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the “existing area of groundwater contamination”) - skip to #8 and enter “NO” status code, after providing an explanation.

_____ If unknown - skip to #8 and enter “IN” status code.

Rationale and Reference(s): Due to the natural hydrologic confines of the Mt. Athos facility, groundwater within all three plumes flows slowly from the source areas towards the James River. Historical data from wells installed since 1986 documents that the extent of groundwater containing solvents has not changed significantly over time, and that the plumes are relatively stable. Significant groundwater contamination is limited to the shallow surficial aquifer zone which is comprised of alluvial sediments. Minor concentrations of solvents have been detected in fractured bedrock. Due to the limited extent and capacity of the fractures, the contamination in bedrock has been relatively insignificant. In addition, data from deep wells around the Mt. Athos area confirm that the James River is the baseline discharge point for all groundwater in the surficial and bedrock aquifer zones. Accordingly, vertical migration of groundwater at this site is contained. A program of semiannual groundwater monitoring is currently in-place to monitor the nature and extent and to confirm the plume is not actively spreading.

² “existing area of contaminated groundwater” is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of “contamination” that can and will be sampled/tested in the future to physically verify that all “contaminated” groundwater remains within this area, and that the further migration of “contaminated” groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

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4. Does “contaminated” groundwater **discharge** into **surface water** bodies?

 X If yes - continue after identifying potentially affected surface water bodies.

_____ If no - skip to #7 (and enter a “YE” status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater “contamination” does not enter surface water bodies.

_____ If unknown - skip to #8 and enter “IN” status code.

Rationale and Reference(s): As presented in the RFI report (BWXT, 1996) the BWXT facility occupies a topographically high area surrounded on three sides by the James River. Due to the natural hydrologic confines of the Mt. Athos facility, groundwater within all three of the three plumes flowing slowly from their source areas towards the James River. Groundwater within two of the plumes (Plumes “A” and “B”) eventually discharges naturally through the river bed into the river.

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5. Is the **discharge** of “contaminated” groundwater into surface water likely to be “**insignificant**” (i.e., the maximum concentration³ of each contaminant discharging into surface water is less than 10 times their appropriate groundwater “level,” and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

 X If yes - skip to #7 (and enter “YE” status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration³ of key contaminants discharged above their groundwater “level,” the value of the appropriate “level(s),” and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

----- If no - (the discharge of “contaminated” groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration³ of each contaminant discharged above its groundwater “level,” the value of the appropriate “level(s),” and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations³ greater than 100 times their appropriate groundwater “levels,” the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

----- If unknown - enter “IN” status code in #8.

Rationale and Reference(s): Sampling of surface water and sediments to investigate potential impacts from the groundwater plumes on the adjacent James River have been conducted by BWXT. These studies confirm that groundwater containing chlorinated solvents does flow naturally into the river, but the resulting concentrations found within sediments and surface water were relatively minor and did not result in an adverse impact to human health or the environment.

Specifically, pre-RFI aquatic studies and water quality samples collected from the James River did not identify any adverse impacts to water quality or aquatic life in the river (BWXT, 1996). These findings were further confirmed during an instream study of the James River conducted by BWXT between 1997 and 1998 (BWXT, 1999). The study documented that concentrations of solvents within surface water were below applicable surface water standards for human health. In addition, the study concluded that groundwater containing solvents migrating from the facility do not pose an unacceptable risk to benthic and aquatic communities in the James River.

³ As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

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6. Can the **discharge** of “contaminated” groundwater into surface water be shown to be “**currently acceptable**” (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented)?⁴

 X If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site’s surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment “levels,” as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

----- If no - (the discharge of “contaminated” groundwater can not be shown to be “**currently acceptable**”) - skip to #8 and enter “NO” status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

----- If unknown - skip to 8 and enter “IN” status code.

Rationale and Reference(s): Between 1997 and 1998, BWXT conducted an instream study to evaluate if groundwater containing volatile organic compounds (VOCs) migrating from the facility posed an unacceptable human health or ecological risk to the James River. The findings of the study are documented in the report “Report of Findings, James River Instream Study, BWX Technologies, Inc., Mt. Athos Site, Lynchburg, Virginia (BWXT, 1999). The study documented that there is no unacceptable risk to human health or to aquatic or benthic communities of the James River, and that no corrective measures to address the natural flow of groundwater to the river were warranted.

⁴ Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.



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7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the “existing area of contaminated groundwater?”

 X If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the “existing area of groundwater contamination.”

_____ If no - enter “NO” status code in #8.

_____ If unknown - enter “IN” status code in #8.

Rationale and Reference(s): A program of ongoing groundwater monitoring has been implemented at this site since 1987. Monitoring wells initially installed to investigate and delineate the extent of all three plumes were sampled on a quarterly basis between 1987 and 1996. After the approval of the RFI report (BWXT, 1996), the monitoring program was reduced to semiannual sampling based on the relatively slow rate of groundwater migration and historical stability of the plume. Semiannual sampling to confirm the extent and stability of the plume is ongoing as of 1999.

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8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), 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 YE-Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the **BWX Technologies, Inc. (BWXT) Mt. Athos Site** facility, EPA I.D. No. **VAD 04 696 0449**, located at **726 Mt. Athos Road, Lynchburg Virginia**. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

_____ NO - Unacceptable migration of contaminated groundwater is observed or expected.

_____ IN - More information is needed to make a determination.

Completed by (signature) _____ Date 02-25-00
 (print) Michael A. Jacobi
 (title) Remedial Project Manager

Supervisor (signature) _____ Date 02-25-00
 (print) Robert E. Greaves
 (title) Chief, General Operations Branch
 (EPA Region or State) EPA, Region 3

Locations where References may be found:

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