

**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: [DuPont Washington Works](#)
Facility Address: [State Road 892, DuPont Road, Washington, WV, 26181](#)
Facility EPA ID #: [WVD 04 587 5291](#)

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?

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?

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 B skip to #8 and enter “IN” status code.

Rationale and Reference(s):

The results for organic compounds (volatile and semi-volatile) in groundwater samples were compared to Federal MCLs or USEPA Region III Tap Water Risk-based Concentrations (RBCs) for compounds with no MCL. C-8 concentrations measured in groundwater and surface water were compared to the C-8 Assessment of Toxicity Team (CATT)-established C-8 screening criteria of 150 ug/l (WVDEP, 2002). Trichloroethene, tetrachloroethene, and C-8 are the primary constituents, known to contaminate groundwater above appropriate screening criteria, that are associated with a SWMU or SWMUs. Trichloroethene, tetrachloroethene, and C-8 in groundwater are mainly located in the vicinity of the Riverbank Landfill and Anaerobic Digestion Ponds SWMUs, with higher C-8 concentrations detected in the perched groundwater zone when compared to the underlying site aquifer, and in the alluvial aquifer underneath and near the Burning Grounds SWMU. All wells that have constituents exceeding screening criteria are located to the west of the groundwater mound/divide in the alluvial aquifer. Groundwater pumped from production wells does not contain any

constituents exceeding screening criteria for tap water. As a result, process and potable water, supplied by production wells, do not contain any constituents exceeding screening criteria and are not a potential concern.

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”² as defined by the monitoring locations designated at the time of this determination)?

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”².

If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the “existing area of groundwater contamination”²) - 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):

Groundwater elevations indicate that groundwater flows from the Ohio River through the perched water table to the alluvial aquifer. Within the alluvial aquifer, groundwater flow is controlled by the pumping of on-site production wells.

Extensive groundwater modeling efforts have supported the groundwater elevations measured in the field and the interpreted directions of groundwater flow (DuPont, 2003c). One of the primary conclusions of the revised groundwater flow model (DuPont, 2003c) is that the majority of the groundwater in the alluvial aquifer at the Washington Works facility is currently being captured by the on-site pumping activities. The modeling also shows some limited off-site groundwater migration may be occurring in the northwest corner of the facility in response to pumping of production wells at General Electric, which is adjacent to the facility along

the western property boundary. However, groundwater flow directions show that water from the Ohio River discharging to the alluvial aquifer in this area would not pass near or through SWMU areas prior to migrating off-site towards General Electric. Concentrations of trichloroethene and tetrachloroethene are nondetectable in groundwater from the northwest corner of the facility. The maximum concentration of C-8 measured in groundwater from the northwest corner of the facility is an order of magnitude lower than the screening criteria. If groundwater containing low levels of C-8 were to migrate off-site towards GE, the groundwater would be captured by pumping of GE production wells. The maximum concentration of C-8 measured in groundwater from GE production wells is 1.87 ug/L, also more than an order of magnitude lower than the screening criteria (DuPont, 2003b).

Groundwater plumes for trichloroethene, tetrachloroethene, and C-8 have stabilized, as defined above, due to the pumping of on-site production wells. Pumping of on-site production wells will continue in the future because the current volumes of water consumed are critical to the manufacturing processes that operate at the Washington Works facility.

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?

_____ 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):

The Ohio River bounds the Washington Works facility on the north side of the property. Groundwater elevation data show that the elevation of the river is higher than the elevations measured in wells screened in both the perched groundwater zone and in the primary site aquifer indicating a gradient from the river to the perched zones and then to the primary site aquifer. Groundwater also flows directly from the river into the alluvial aquifer through the bottom of the riverbed where the Holocene silts and clays are absent (Figure 2). Recent groundwater modeling supports these groundwater flow directions (DuPont, 2003c). Groundwater does not flow to the river.

During the Verification Investigation (Figures 14 through 23; DuPont, 1992), two existing seeps were sampled at the northern edge of the RBL. One seep area (RBLL1) is located near the western end of the RBL while the other area (RBLL2) exists near the eastern end of the RBL. During the VI, a french drain and a carbon adsorption treatment system were installed at the RBLL1 seep. A french drain and an underground collection vessel have also been installed at the RBLL2 seep. Seep water is periodically pumped out of the vessel and is treated at the wastewater treatment facility on-site. Because of these engineering controls, these seeps no longer exist as surface features where groundwater discharges to surface water.

There are two other naturally occurring surface-water bodies on-site at the Washington Works facility: Pages Run crosses near the far southwestern side of the site and an unnamed tributary crosses near the far southeastern

side of the site. It is unlikely that groundwater recharges these two creeks because depth to groundwater in the alluvial aquifer ranges from approximately 34 to 80 feet below ground surface.

In summary, groundwater does not currently discharge to surface-water bodies at the Washington Works facility or to the Ohio 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)?

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):

Step 5 of the EI determination process was not completed due to a "No" determination at Step 4.

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 implemented⁴)?

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 sites 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.

⁵Rationale and Reference(s):

Step 6 of the EI determination process was not completed due to a “No” determination at Step 4.

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.

⁵ The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

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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):

DuPont submitted a RCRA Facility Investigation (RFI) report to USEPA Region III in June 1999. Additional groundwater monitoring of select wells for specific constituents on a semi-annual basis was recommended to ensure the continued protection of human health. Monitoring groundwater elevations was also recommended to ensure continued capture of site groundwater. DuPont will prepare a long-term groundwater monitoring plan upon direction from the USEPA Region III. Continued C-8 sampling of the six on-site production wells and of GE production well #3 was recommended made by the GIST after they evaluated the C-8 data summary report issued by DuPont (DuPont, 2003b). Quarterly sampling was recommended for a two year time period. This quarterly sampling will begin in 2Q04.

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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 - 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 [DuPont Washington Works facility](#), EPA ID # [WVD 04 587 5291](#), located at [State Road 892, DuPont Road, Washington, WV, 26181](#). 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 _____ Date 4/23/04

/s/

Bill Wentworth
Remedial Project Manager

Supervisor _____ Date 4/23/04

/s/

Robert E. Greaves
Chief, General Operations Branch, EPA Region III

References:

DuPont. *Revised Groundwater Flow Model, DuPont Washington Works, Washington, WV* January 2003. DuPont Corporate Remediation Group and URS Diamond.

DuPont. *Verification Investigation E.I. DuPont de Nemours Co. Washington Works* April 1992 (Vol. 1).

WVDEP. *Final Ammonium Perfluorooctanone (C8) Assessment of Toxicity Team (CATT) Report*. August 2002. West Virginia Department of Environmental Protection.

Locations where References may be found:

RCRA File Room
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