

**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: [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 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 #6 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, GPRAs). 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”**¹ 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)?

	Yes	No	?	Rationale / Key Contaminants
Surface Soil (e.g., <2 ft)		X		See below and Section 4.1 of the Washington Works CA-725 report.
Subsurface Soil (e.g., >2 ft)		X		See below and Section 4.2 of the Washington Works CA-725 report
Groundwater	X			Trichloroethene, tetrachloroethene, and C-8; see below and Section 4.3 of the Washington Works CA-725 report
Surface Water		X		See below and Section 4.4 of the Washington Works CA-725 report
Sediment		X		See below and Section 4.5 of the Washington Works CA-725 report
Air (indoors)		X		See below and Section 4.6 of the Washington Works CA-725 report
Air (outdoors)		X		See below and Section 4.7 of the Washington Works CA-725 report

_____ 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.

X 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):

Surface and Subsurface Soils: Organic compounds (volatile and semi-volatile) in surface and subsurface soil were compared to USEPA Region III Soil Industrial RBCs. Overall, volatile organic constituents (VOCs) and semi-volatile organic constituents (SVOCs) were not considered a potential concern. RCRA metals concentrations in surface soil were compared to USEPA Region III Soil Industrial RBCs, Voluntary Remediation and Redevelopment Act (VRRRA) De Minimis Standards (WVDEP, 1998), literature-based West Virginia background data from the VRRRA Guidance Manual, Table 2-3 (WVDEP, 1998) and site-specific background concentrations (DuPont, 1992; 1999). While arsenic did exceed the health-based concentration, the detected concentrations were only slightly above background concentrations. Overall, metals in surface soils were not considered a potential concern. C-8 concentrations measured in soil were compared to the C-8 Assessment of Toxicity Team (CATT)-established C-8 screening criteria of 240 mg/kg for soils (WVDEP, 2002). C-8 concentrations measured in surface and subsurface soil samples were all well below the CATT-established C-8 screening criteria of 240 mg/kg for soils (WVDEP, 2002). C-8 in soils was not considered to be a potential concern. In summary, since no constituents in surface and subsurface soils were identified as a potential concern, surface soil was not considered to be a “contaminated media” for the EI.

Footnotes:

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 appropriately protective risk-based “levels” (for the media, that identify risks within the acceptable risk range).

² 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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Groundwater: 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 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. Furthermore, no constituents exceeding screening criteria were found in offsite potable water.

Surface Water: The Ohio River bounds the Washington Works facility on the north side. The Riverbank Landfill and Anaerobic Digestion Ponds SWMUs run parallel to the river along the riverbank. Normal pool elevation for the Ohio River at Washington, WV, is higher than the elevations of both the perched groundwater zones and the primary site aquifer, indicating a gradient from the river to the perched zones and then to the primary site aquifer. Groundwater impacted by the RBL/ADP does not flow to the river; therefore, surface water in the Ohio River is not impacted by these SWMUs. There are only two other naturally occurring surface-water bodies (creeks) on-site at the Washington Works facility. These two creeks are not located near any of the four SWMUs on site. It is unlikely that impacted groundwater recharges these two creeks because depth to groundwater in the alluvial aquifer ranges from approximately 34 to 80 feet below ground surface. Therefore, none of the surface-water bodies are reasonably suspected to be impacted above appropriate screening criteria due to association with a SWMU or with other SWMU-impacted media.

Sediment: No sediment from surface-water bodies on-site has been sampled from the Washington Works facility. However, because no surface-water bodies are reasonably suspected to be impacted above appropriate screening criteria due to association with a SWMU or with other SWMU-impacted media, sediments from these surface-water bodies are also not reasonably suspected to be impacted.

Air (Indoor): No indoor air has been sampled at the Washington Works facility. Groundwater contains trichloroethene and tetrachloroethene at levels that exceed screening criteria. In addition, several other VOCs and SVOCs were detected in groundwater (Table 4.1 of the RFI report; DuPont, 1999). These constituents are listed in Table 1 of USEPA's *Draft Guidance For Evaluating the Vapor Intrusion to Indoor Air Pathway From Groundwater and Soils, November 2002*. Therefore, screening levels for these constituents were developed using the methodology from the subsurface vapor guidance and OSHA PELs as well the American Conference of Governmental Industrial Hygienist (ACGIH) threshold limit values (TLVs), using the calculations described in Appendix D of the draft guidance (USEPA, 2002). The maximum concentrations of VOCs and SVOCs detected in groundwater were compared to the screening levels calculated, and did not exceed them. In addition, depth to groundwater in the alluvial aquifer is around 60 feet bgs, and the silty clay overlying the alluvial would impede vapor migration upward from the alluvial aquifer. Therefore, vapor intrusion of VOCs and SVOCs from groundwater to indoor air is not expected to be a potential concern.

Air (Outdoor): Outdoor air sampling has not been performed at the Washington Works facility. However, this pathways is not considered to be a significant exposure pathway from the four SWMUs because surface and subsurface soils are not a concern; therefore, volatility and dust generation are not a concern. Stack emissions from the facility are not considered in this evaluation because they are monitored and regulated under a WVDEP air permit.

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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)

Contaminated Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food
Soil (surface, e.g., <2 ft)	Media unimpacted						
Soil (subsurface e.g., >2 ft)	Media unimpacted						
Groundwater	No	Yes	No	Yes	No	No	No
Surface Water	Media unimpacted						
Sediment	Media unimpacted						
Air (indoors) ¹	Media unimpacted						
Air (outdoors) ¹	Media unimpacted						

Instructions for Summary Exposure Pathway Evaluation Table

1. Strikeout specific Media including Human Receptors’ spaces for Media which are not (“contaminated”) as identified in #2 above.
2. Enter “yes” or “no” for potential “completeness” under each “Contaminated” Media – Human Receptor combination (Pathway).
3. Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

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).

 X 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):

Potential human receptors include:

- (1) **Workers:** Workers who sample groundwater have the potential to be directly exposed to impacted groundwater in the perched groundwater zone and to impacted groundwater in the alluvial aquifer located to the west of the groundwater mound/divide.

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

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- (2) **Construction workers:** Construction workers on-site could potentially be exposed to impacted groundwater in the perched groundwater zone and to impacted groundwater in the alluvial aquifer located to the west of the groundwater mound/divide.

Potential Exposure Pathways by Media:

- (1) **Groundwater:** Direct exposure to trichloroethene, tetrachloroethene, and C-8 impacted groundwater in the perched groundwater zone and in the alluvial aquifer located to the west of the groundwater mound/divide via dermal contact or inhalation of VOCs is a complete exposure pathway for workers or construction workers. The workers who might have direct contact with groundwater are those individuals that sample the wells or possibly workers or construction workers if excavation activities were to be conducted to depths great enough to reach groundwater.

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1. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **“significant”**⁴ (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)?

 X

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):

Direct exposure to trichloroethene, tetrachloroethene, and C-8 impacted groundwater in the perched groundwater zone and in alluvial aquifer located to the west of the groundwater mound/divide via dermal contact or inhalation of VOCs is a complete exposure pathway for workers or construction workers. Intrusive activities at and near the RBL/ADP and BG are very limited in general because the RBL/APD and BG are recognized as RCRA-managed SWMUs. The workers who might have direct contact with groundwater are those individuals that sample the wells or possibly workers or construction workers if excavation activities were to be conducted to depths great enough to reach the perched groundwater zone (12 to 16 feet bgs) in the area of the RBL/ADP. It is very unlikely that construction activities around the BG would be conducted deep enough to reach groundwater in the alluvial aquifer located at 60 feet bgs. However, for all of these workers, frequency and duration of exposure is low because groundwater sampling is only done on a quarterly basis and because of institutional controls in place at the site (HASPs, monitoring equipment, and personal protection equipment, etc.). Although the concentrations of VOCs and C-8 for wells in the perched groundwater zone and in the alluvial aquifer located to the west of the groundwater mound/divide are above screening criteria, the expected human exposure frequency and duration are very low. Therefore, dermal contact or VOC inhalation exposure to VOC and C-8 impacted groundwater is not considered to be significant for workers and construction workers.

⁴ 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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2. 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):

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

