

DOCUMENTATION OF ENVIRONMENTAL Interim Final 2/5/99
INDICATOR DETERMINATION

**RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA-725)**

Current Human Exposures Under Control
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Facility Name: **DuPont Belle Plant**
Facility Address: **Belle, West Virginia**
Facility EPA ID #: **WVD005012851**

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 EIs are near-term objectives that are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRAs. The “Current Human Exposures Under Control” EI is for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and does 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 determination 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
Groundwater	X			Plant Area (AOC-A and SSS Area)- primary constituents exceeding screening criteria include benzene, toluene, ethylbenzene, 1,4-dioxane, PAHs and Arsenic. Mountain Area – primary constituents exceeding screening criteria include benzene, bis(2)ethylhexylphthalate, arsenic and barium. See Section 4.1 of the EI Determination Report (December 2003).
Air (indoors)		X		See below and Section 4.2 of the EI Determination Report (December 2003).
Surface Soil (e.g., <2 ft)	X			The primary constituent exceeding screening criteria in Plant and Mountains Areas is arsenic. See Section 4.3 of the EI Determination Report (December 2003).
Surface Water	X			Primary constituents exceeding screening criteria in Kanawha River water are PAHs and total arsenic. Surface water in the Mountain Area is not “contaminated”. See Section 4.4 of the EI Determination Report (December 2003).
Sediment	X			The primary constituent exceeding screening criteria in Mountains Area sediments is arsenic. Sediment quality in the Kanawha River is unknown. See Section 4.5 of the EI Determination Report (December 2003).
Subsurf. Soil (e.g., >2ft)	X			Primary constituents exceeding screening criteria in the Plant area (AOC-A and SSS Area) are benzene, PAHs, dibenzofuran, and arsenic. See Section 4.4 of the EI Determination Report (December 2003).
Air (Outdoors)		X		See below and Section 4.7 of the EI Determination 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):

Air (Indoors): The A Zone and B Zone aquifers in the residential area of Burning Springs Hollow (off-site) do contain organic compounds; however, the overlying C Zone aquifer is not impacted and the B/C aquitard is present overlying

¹ “Contamination” and “contaminated” describe 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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the impacted aquifers. Therefore, vapor intrusion into residences off-site but near the Mountain Area are not complete pathways. Volatile constituents have been reported in groundwater wells adjacent to occupied buildings at four areas in the Plant Area. Groundwater containing VOCs occurs within 100 feet of buildings 216, 238, 285, and 308. The evaluation of groundwater with respect to potential indoor air issues follows the principles in the draft EPA Guidance (*Draft Guidance Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, Subsurface Vapor Intrusion Guidance, November 2002*). The screening levels for volatile constituents were developed using the methodology from the subsurface vapor guidance and OSHA PELs as well as 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). These calculations are provided in Appendix A of the EI Determination Report. The maximum concentration of each VOC detected in groundwater near buildings 216, 238, 285, and 308 was compared to the calculated screening levels. Benzene near building 308 was the only constituent that exceeded the screening criteria when compared to the ACGIH TLV. The benzene exposure pathway was evaluated further by the Johnson & Ettinger (J&E) model. using the spreadsheet version of the J&E model (http://www.epa.gov/superfund/programs/risk/airmodel/johnson_ettinger.htm). The assessment consisted of using GW-Screen model for groundwater to predict the indoor air benzene concentrations in building 308. The predicted indoor air chemical concentrations were then compared to the 8-hour, time-weighted-average (TWA) TLVs published by the ACGIH. GW-Screen was run using a combination of site-specific and default input data, which are also summarized in Table 1. The resultant indoor air concentration predicted by GW-Screen for benzene, 274 ug/m³, is an order of magnitude lower than the respective TLV of 1595 ug/m³. Based on this screening, vapor intrusion of benzene from groundwater to indoor air is not expected to be a potential concern.

Air (Outdoors): Considering the previous results of the assessment of indoor air (i.e., no impact above standards), volatile emissions to outdoor air would not cause concentrations above standards because outdoor air involves substantially greater mixing and dilution with ambient air than was considered for indoor air. In addition, emissions to outdoor air typically result from direct emission of volatiles from impacted soil and emission of particulates containing non-volatiles. At the site, emission of impacted surface soil particulates is not a mechanism of concern because impacted surface soil areas are not subjected to vehicular traffic that would otherwise encourage dust generation. Further, impacted surface soil areas have coverings such as vegetation, gravel, asphalt, or concrete and are not coincident with areas where Belle employees reside for extended periods of time.

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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

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

³
Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out 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).

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):

Rationale and Reference(s):

RECEPTORS:

Residents: Groundwater is not known to be used for drinking water supply in Burning Springs Hollow nor in the residential properties surrounding the Plant Area. However, groundwater is used for domestic water supply in Upper

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

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Simmons Creek Hollow located east of the Mountain Area. Summary tables of the one-mile door-to-door well/water use survey are provided in Appendix B of the EI Determination Report (December 2003). Based on the well survey, most off-site wells at the Simmons Creek Hollow area are completed in the upper shallow (overburden) water-bearing zone, which is above the site's impacted bedrock aquifers. Groundwater gradients at the eastern portion of the Mountain Area indicate that groundwater flows to the south and southwest toward Scotts Run Hollow and away from upper Simmons Creek Hollow. One on-site well MW-58, located at the eastern portion of the site (Coal Bank Hollow), monitors three site aquifers, the A, B, and C Zones. Although benzene was detected in groundwater sampled from the lower two aquifers (A Zone and B Zone), no organic constituents (including benzene) were detected in the overlying C-Zone aquifer. Based on the groundwater flow direction and the sampling results from the overlying "clean" C-Zone aquifer, the off-site residents were not considered potential receptors. Due to fencing surrounding the both the Plant and Mountain Area and guarded gate-houses resident's access to the site is restricted. Therefore, off-site residents are also not considered to be potential receptors of surface soil in the Plant and Mountain Areas, sediment in the Mountain area, and subsurface soil in the Plant Area. Residential areas are not proximate to impacted surface water, therefore residential exposures to surface water are not a concern.

Workers: A portion of the Belle Plant (Plant Area) is an active industrial facility, and this use will continue into the future. There are some areas of exposed surface soil and Simmons Creek (surface water and sediment) runs through the Plant Area. On-site industrial workers are potential receptors.

Day-care Facility: There are no day care facilities at the site, nor at the properties immediately adjacent to the site. Therefore, this receptor is not applicable and this scenario is not considered further.

Construction Workers: The on-site construction worker is potentially exposed to constituents in all environmental media during the repair of subsurface utility lines. Subsurface soil depths for direct contact exposures by this receptor are defined as 2 to 12 feet bgs, based on past activity at the site and location of utilities on-site. Groundwater occurs at depths ranging from 3 to 17 feet bgs at the site. Direct contact with groundwater may also occur during intrusive activities in the active manufacturing area. Groundwater samplers are also potential receptors to impacted groundwater. Construction and utility workers may contact surface water and sediment in Simmons Creek. Potential exposure pathways include incidental ingestion and dermal contact with soils and sediment, inhalation of soil-derived particulates and vapors, incidental ingestion of and dermal contact with groundwater or surface water, and inhalation of vapor phase chemicals released from groundwater to confined space (trench) or outdoor air.

Trespassers: All of the Plant Area and Mountain Area SWMUs of the Belle Plant are fenced and guarded, and access is controlled and limited to authorized personnel only. Therefore, trespassers are not considered potential receptors to "contaminated" media and this scenario is not considered further.

Recreation: There are no recreational facilities within the Plant Area or the Mountains Area of the Belle Plant. Recreational use of the Kanawha River near the plant includes fishing and boating activities. Therefore, recreation users are considered to be potential receptors of "contaminated" surface water in the Kanawha River.

Food: There are no agricultural uses of the Plant or Mountain Area. Consumption of fish caught in the Kanawha River is possible. Because the Kanawha River water is considered to be a "contaminated" media, food (in the form of fish consumption) is a potential receptor.

CONTAMINATED MEDIA:

Groundwater: The workers who potentially have direct contact with groundwater in the Plant and Mountain Areas are those individuals that sample the wells or construction workers if excavation activities were to be conducted to depths great enough to reach groundwater. Belle Plant policy and land-use controls prohibit construction-related

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excavation activities in areas of suspected shallow groundwater contamination without appropriate health and safety measures that control exposure. Therefore, the exposure pathway between workers and construction workers and groundwater in the Plant and Mountain Areas is complete, but limited (see Sections 5.1.4 and 5.2.1 of EI Determination Report)

Surface Soil: The workers who potentially have direct contact with surface in the Plant and Mountain Areas are those individuals that sample soil or possibly workers or construction workers. Therefore, the exposure pathway between workers and surface soil in the Plant and Mountain Areas is complete, but limited. The Belle Plant is an active industrial facility. The property is expected to remain industrial in the foreseeable future. There is no on-site residential housing. Residential exposure to surface soil is not a concern. Access to both the Mountain and Plant Area portions of the site is controlled by a combination of fences and manned security gates, severely restricting access to these areas by trespassers or recreational users. On occasion both workers and construction workers could be exposed to surface soil at a few areas of the plant (see Section 5.2.2 of EI Determination Report).

Surface Water and Sediment (Kanawha River): Workers and construction workers who potentially have direct contact with surface water in the Kanawha River are individuals who sample river water and possibly those conducting activities along the riverbank of the Kanawha River. However, institutional controls and site health and safety practices followed by workers and construction workers, greatly reduce the possibility of exposure. Therefore, the exposure pathway between workers and Kanawha River surface water is complete, but limited. Recreational use and food (in the form of fish consumption from the river) are complete exposure pathways. Recreational users may have direct contact with river water and may consume fish. There were no exceedences of screening criteria in surface water sampled from the Mountain Area. Recreational users of the Kanawha River do not have a complete exposure pathway to sediments in the Kanawha River. Land access to the river is limited due to site security, fencing, the presence of vegetation and steep embankments. Water access to the river along the Belle Plant is also limited due to the lack of public launching areas in the reach adjacent to the site.

Surface Water and Sediment (Mountain Area): Surface water samples associated with sediments in the Mountain Area did not have any constituents detected that exceeded the screening criteria. Construction workers or samplers potentially have direct contact with sediment in the Mountain Area. Site health and safety practices followed by workers and construction workers, greatly reduce the possibility of exposure. Therefore, the exposure pathway between workers and sediments in the Mountain Area is complete, but limited.

Subsurface Soils: The workers who potentially have direct contact with subsurface soil in the Plant and Mountain Areas are those individuals that sample soil or possibly construction workers. Therefore, the exposure pathway between workers and subsurface soil in the Plant and Mountain Areas is complete, but limited. There is no on-site residential housing. Residential exposure to subsurface soil is not a concern. (see Sections 5.1.4 and 5.2.5 of EI Determination Report).

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4. 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):

Workers and Construction Workers Exposure to Groundwater in the Plant and Mountain Areas:

The on-site construction worker is potentially exposed to constituents in groundwater during subsurface utility repair in the Plant Area or during sampling of groundwater. The complete exposure pathway for the on-site construction worker includes incidental ingestion and dermal contact with groundwater. The Belle Plant policy prohibit worker and construction disturbance of the subsurface (and groundwater) without appropriate health and safety measures that control frequency and duration of exposure. Although some VOCs and SVOCs and arsenic exceed screening criteria in Plant Area groundwater, the limited duration and frequency of exposure result in the potential exposure being considered insignificant.

Workers and Construction Workers Exposure to Surface Soil in the Plant and Mountain Areas: All areas of impacted surface soil have ground covers that minimize worker and construction exposure to the impacted surface soil. Ground covers include vegetation (i.e., grass), gravel, asphalt, concrete, and engineered clean soil covers. Belle Plant policy and land-use controls prohibit worker or soil sampler disturbance of impacted surface soil areas without appropriate health and safety measures that control exposure. Accordingly, worker or construction worker exposure to surface soil is very limited in frequency and duration. Although arsenic concentrations exceed screening criteria in surface soil, the extremely limited duration and frequency of exposure result in the potential exposure being considered insignificant.

Workers and Construction Workers Exposure to Surface Water in the Kanawha River: Worker and construction worker contact with surface water in the Kanawha River is unlikely. If exposure does occur, it is incidental in nature and is not expected to involve prolonged, repeated exposure or consumption of the water. Accordingly, the limited frequency and duration of contact combined with the concentrations of PAHs being within the acceptable risk range, result in these exposures being considered insignificant.

Recreational and Food Exposure to Surface Water in the Kanawha River: Recreational and food exposure to surface water in the Kanawha River is a complete pathway. Direct contact with river water or consumption of fish from the river are possible exposure routes. However, frequency and duration of exposure are considered to be low due to the seasonal nature of recreation use and fishing activities. Combined with the concentrations of PAHs

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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.

exceedences being within the acceptable risk range, the low duration and frequency of exposure result in this exposure being considered insignificant.

Workers and Construction Workers Exposure to Sediment in the Mountain Area: Worker and construction worker contact with sediment in the Mountain Area is infrequent and is not expected to involve prolonged, repeated exposure due to appropriate health and safety measures that control frequency and duration of exposure. Although arsenic concentrations in sediment in the Mountain Area exceed the screening criteria, the low frequency and duration of potential contact result in this exposure being considered insignificant.

Construction Workers Exposure to Subsurface Soil in the Plant and Mountain Areas: The Belle Plant policy and land-use controls prohibit worker and construction disturbance of impacted subsurface soil areas without appropriate health and safety measures that control exposure. Accordingly, although incidental exposure is possible, such exposures are considered insignificant.

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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):

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

