

US EPA ARCHIVE DOCUMENT

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION**Interim Final 2/5/99****RCRA Corrective Action****Environmental Indicator (EI) RCRIS code (CA 725)****Current Human Exposures Under Control**

Facility Name: [DuPont East Chicago Facility](#)
Facility Address: [5215 Kennedy Avenue, East Chicago, Indiana](#)
Facility EPA #: [IND 005 174 254](#)

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 EIs 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" 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)?

Media	Yes	No	?	Rationale/Key Contaminants
Groundwater	✓			Metals and some organics have been identified as constituents of potential concern (COPCs) in site-wide groundwater (Tables 5- 8).
Air (indoors) ²		✓		Volatile organic compounds (VOCs) have been detected in groundwater at the site. However, locations where VOCs exceed screening levels do not extend under occupied buildings on- and off-site (Sec 5.2.3).
Surface Soil (e.g., <2 ft)	✓			Organics and metals exceeded screening levels in surface soil SWMUs and AOCs (Table 9).
Surface Water		✓		Not considered a media of concern. See rationale for more information
Sediment		✓		Not considered a media of concern. See rationale for more information
Subsurface Soil (e.g., >2 ft)	✓			Organics and metals exceeded screening levels in surface soil SWMUs and AOCs (Table 9).
Air (outdoors)	✓			COPCs in outdoor air include: arsenic and lead (Section 5.2.3)

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):

For the purposes of explanation, the DuPont East Chicago site is divided into four distinct areas described as follows:

- 1) Area 1 - The Active Manufacturing Area (the southwest quadrant of the site.)
- 2) Area 2 - The Waste Disposal Area (the northern half of the site)
- 3) Area 3 – The Previously Active Manufacturing Area (the southeast quadrant of the site)
- 4) Area 4 – The Natural Area – an area east of the site owned by DuPont, but never used for any manufacturing or disposal activities.

Data Set for EI Evaluation

Site data evaluated for this step included: Groundwater samples collected from between five and eight rounds of monitoring (depending on location) between November 1999 and November 2003; Sump water samples collected in 1990 and November 2004 from Riley Park basements; Shallow soil samples (less than 2 feet deep) and subsurface soil samples (within 12 feet bgs) collected during the 1999 Phase I RFI and 2003 Phase II RFI from 52 SWMUs and AOCs; and, Shallow soil samples collected from residential yards in Riley Park.

Screening levels used to evaluate site data

Concentrations of constituents detected in the EI evaluation data set were compared to appropriate screening levels to assess potential impact to human health and the environment and to identify COPCs. The following screening levels were utilized during the evaluation:

- ☐ Groundwater – Shallow groundwater is not used for drinking water or irrigation on or near the site; therefore, there are no appropriate risk-based levels for screening. However, groundwater from Pool A flows to the north toward Riley Park where some contact may occur with basement water. As a result, constituents detected in groundwater were compared to Indiana Groundwater Standards (IGS) or federal Maximum Contaminant Levels (MCLs). USEPA Region IX Preliminary Remediation Goals (PRGs) for Tap Water were used where IGS/MCLs were unavailable. The PRG represents a combined exposure including inhalation of volatile compounds and ingestion for residential tap water. For the purposes of this evaluation, PRGs were based on an excess cancer risk of 10^{-6} (1 in 1 million) and a hazard quotient for noncancer effects of 0.1 to account for additivity (USEPA Region IX, 2002).

- Groundwater from Pool B may discharge to the East Branch of the Grand Calumet River. Therefore, groundwater concentrations were also compared to Indiana Water Quality Standards Tier I and Tier II Values for the Great Lakes Basin (IAWQS) (327 IAC 2) or federal Ambient Water Quality Criteria (AWQC) (40 CFR Part 131) where IAWQS were unavailable. The surface water quality criteria were based on protection of human health (nondrinking water and fish consumption). If criteria were not available from either source, then concentrations were compared to the IGS/MCL.

- ☐ Soil – On-site surface and subsurface soil concentrations were compared to USEPA Region IX PRGs for industrial soil. Off-site surface soil concentrations from Riley Park were compared to background concentrations from samples collected in areas not impacted by sump water discharges. The PRG represents a combined exposure including inhalation of particulates and volatile compounds, dermal absorption, and ingestion. For the purposes of this evaluation, PRGs were based on an excess cancer risk of 10^{-6} (1 in 1 million) and a hazard quotient for noncancer effects of 0.1 to account for additivity (USEPA Region IX, 2002).

- ☐ Indoor Air - Because the site is industrial, the OSHA permissible exposure levels (PELs) and the American Conference of Governmental Industrial Hygienist (ACGIH) threshold limit values (TLVs) were used to develop appropriate indoor air target concentrations for potential on-site exposure rather than the residential indoor air target concentrations

provided in the draft guidance. Table 4 presents the equation used to develop the screening criteria and the occupational screening levels used in the equation.

Constituents of Potential Concern

Groundwater: For the purpose of the evaluation, groundwater was evaluated by groundwater flow components (Pool A or Pool B) rather than by SWMU or AOC. Groundwater expressed as seeps near the on-site landfill was also included in the evaluation. Previous environmental investigations conducted at the site have identified two VOCs and 16 inorganics as COPCs in Pool A groundwater. Arsenic is the primary COPC in Pool A groundwater. An interim remedial measure (IRM) has been installed along a portion of the northern site boundary to address migration of arsenic-contaminated groundwater toward Riley Park. Two VOCs, one pesticide and 16 inorganics have been identified as COPCs in Pool B groundwater.

Indoor Air: An evaluation of the vapor intrusion to indoor air from groundwater and soil pathways was conducted for the East Chicago facility following the principles outlined in the draft Guidance (*Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, Subsurface Vapor Intrusion Guidance, November 2002*). The evaluation concluded that the potential for vapor intrusion into buildings at the site or off-site is incomplete under current land use conditions, because locations where these constituents are present in groundwater do not extend under or within 100 feet of occupied buildings.

Surface soil: The previous environmental investigations at the DuPont East Chicago facility have identified three VOCs, three pesticides/polychlorinated biphenyls (PCBs) and ten inorganics as COPCs in surface soil. The primary locations of these exceedances under current conditions occur in areas that have limited access; are located in remote portions of the site away from active manufacturing activities; or are covered by soil, gravel, concrete, or construction debris. Detected arsenic concentrations in Riley Park surface soil were either below or within the range of control (background) samples collected, indicating no appreciable accumulation of arsenic in soil near the location of periodic sump discharge. As a result, Riley Park surface soil was excluded as a media of concern.

Surface Water and Sediment: Sediment along and within the East Branch of the Grand Calumet System was not evaluated as part of this EI analysis because it is being managed under the Natural Resource Damage Assessment (NRDA) settlement. Surface water data for the purpose of exposure assessment has not been collected in the East Branch of the Grand Calumet System. However, exposure to surface water in the East Branch of the Grand Calumet System was evaluated for the EI analysis as part of the groundwater to surface water discharge pathway.

Subsurface soil: The previous environmental investigations at the DuPont East Chicago facility have identified one VOC and nine inorganics as COPCs in subsurface soil. COPCs would be accessible only during intrusive activities.

Air (outdoors): For the purposes of assessing inhalation exposures via the soil-to-air pathway, the pathway-specific industrial soil PRG values provided in the USEPA Region IX PRG intercal tables were utilized. Constituents that exceeded the pathway-specific soil PRGs were retained for evaluation in the EI determination (arsenic and lead).

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 organic compounds) 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)

"Contaminated" Media	Resident	Worker	Day-Care	Construction	Tres-Passer	Recreation	Food³
Groundwater	Yes	No	No	Yes	Yes	No	No
Air (indoors) ²							
Surface Soil (e.g., <2 ft)	No	Yes	No	Yes	Yes	No	No
Surface Water							
Sediment							
Subsurface Soil (e.g., >2 ft)	No	No	No	Yes	No	No	No
Air (outdoors)	No	Yes	No	Yes	Yes	No	No

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). N/L = Not Likely

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):

Potential human receptors include (Section 6.1):

(1) On-site Industrial Workers: A portion of the DuPont East Chicago Facility is an active heavy industrial facility, and this use will continue (Figure 2). The industrial worker is potentially exposed to constituents in surface soil (0 to 2 feet bgs).

(2) On-site Construction/Excavation Workers: The on-site construction/excavation worker is potentially exposed to constituents in all environmental media while repairing subsurface utility lines, performing remedial activities or short-term construction. Subsurface soil depths for direct contact exposures by this receptor are defined as 2 to 12 feet bgs based on past activity at the facility and the location of utilities on-site. Groundwater occurs at depths ranging from 3 to 10 feet bgs at the site; therefore, direct contact with groundwater may also occur during intrusive activities

(3) On-site Restoration Worker: Restoration workers at the Natural Area may come into direct contact with contaminated media while removing exotic species, seeding, planting and while conducting species surveys. Therefore, on-site restoration workers are potential receptors. The restoration worker is potentially exposed to constituents in surface soil (0 to 2 feet bgs).

(4) On-site Trespasser: The main operating area of the site (including the previously active manufacturing area) is fenced and guarded, and access is controlled and limited to authorized personnel only. Trespassing, although sporadic, has occurred within the previously active manufacturing area. The on-site trespasser is assumed to be a youth aged 7 to 16 years. The on-site trespasser is potentially exposed to constituents in surface soil (0 to 2 feet bgs) at the site and groundwater expressed as seeps near the on-site landfill.

(5) Riley Park Resident - Groundwater is not used for domestic water supply, including irrigation, in the Riley Park area. If contact with facility-related constituents were to occur, it would be restricted primarily to basement water potentially affected by groundwater discharges and limited to a small subset of property owners in the southern part of the community (CH2M Hill, 1991). During the door-to-door survey conducted by CH2M Hill in 1991, 13 residences reported basement water due to a high water table that was not adequately removed by sump pumps. The amount of water in the basements ranged from seeps to several inches and occurred rarely or during heavy rains. Therefore, off-site adult and child (age zero to six years) residents exposed to basement sump water were considered potential receptors.

Recreational users of the East Branch of the Grand Calumet System are virtually nonexistent. Land access to the stream banks on the site is limited due to site security, vegetation, marshy areas, and steep embankments. Water access to the stream (in particular the reach adjacent to the site) is also limited due to the lack of public launching areas and the presence of low bridges spanning the river channel. To the extent that recreators may use the area, such use would be restricted to warm weather months. However, the general appearance of the waterway and riparian areas, fish advisory warnings, and the abundant water recreation opportunities at nearby more aesthetically desirable areas (e.g., Lake Michigan) would discourage use. Therefore, recreational users of the East Branch were not considered potential receptors.

Sensitive receptors (e.g., daycare) are not located on or adjacent to the site. Therefore, these receptors were not considered potential receptors.

Complete Exposure Pathways by Media (Section 6.2):

(1) Groundwater: The potential for exposure is low because groundwater is not used on-site for potable or industrial purposes and residential users have not been identified within a one-mile radius of the site. However, due to the shallow depth of groundwater in some portions of the site, exposure may occur during construction/excavation activities. In addition, the potential exists for occasional exposure to intermittent seeps near the on-site landfill during infrequent trespassing activities. The potential also exists for Riley Park residents to contact groundwater constituents present in basement sump water.

Potentially complete exposure pathways may include: on-site trespasser and off-site Riley Park resident: - incidental ingestion of and dermal contact with groundwater; and on-site

construction/excavation worker - incidental ingestion of and dermal contact with groundwater, and inhalation of vapor phase chemicals released from groundwater to a confined space (trench).

(2) Surface Soil: The potential for exposure to contaminants in surface soils is limited to on-site receptors because impacted soils are contained within the facility boundaries. Even on-site, the potential for exposure is low for most receptors under current conditions because the principal areas of surface soil contamination have limited access; are located in remote portions of the site away from active manufacturing activities; or are covered by soil, gravel, concrete, or construction debris. Furthermore, repair and extension of perimeter fencing along the previously active manufacturing area further limits site access. The receptor with the greatest potential for exposure is the current/future on-site construction/excavation worker, where a greater likelihood of direct contact with impacted soil is associated with intrusive activities.

Potentially complete exposure pathways may include the following: on-site industrial worker, on-site trespasser, on-site construction/excavation worker and on-site restoration worker: incidental ingestion of and dermal contact with surface soil and inhalation of soil-derived particulates and vapors.

(3) Subsurface Soil: Because subsurface soil contamination is only present on-site, and exposure to subsurface soil is only achieved during excavation and construction activities, the only potential receptor is the on-site construction/excavation worker.

Potentially complete exposure pathways may include incidental ingestion of and dermal contact with subsurface soil and inhalation of soil-derived particulates and vapors.

Incomplete Exposure Pathways by Media (Section 6.3):

(1) **Groundwater:** Groundwater is not used on-site for potable or industrial uses. Therefore, direct contact (ingestion or dermal contact) with groundwater for on-site industrial workers is incomplete. Potential exists for groundwater to discharge into the East Branch of the Grand Calumet. However, due to the effect of mixing zone dilution into the river and solute transport effects, overall exposure to this discharge is insignificant (DuPont, 2000). In addition, no likely potential receptors for the stream have been identified (see Section 6.3.1). Exposure pathways associated with food are incomplete.

(2) **Soil:** Since the day-to-day operations of the on-site industrial worker do not include intrusive activities, direct contact (ingestion or dermal contact) with subsurface soil is not anticipated and is incomplete. Likewise, if surface soil contamination exists in an area of the site, which is not routinely accessible to on-site industrial workers due to institutional or physical controls (e.g., locked areas or asphalt caps), then exposure pathways in those areas are incomplete as well. Exposure pathways associated with food are incomplete.

Footnotes:

³Crops are not grown, and animals are not raised for consumption on the DuPont Site

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- 4 Can the exposures from any of the complete pathways identified in #3 be reasonably expected to be "significant" (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):

The following complete exposure pathways were evaluated in Step Four of the EI determination process:

Ground water: Under current land use conditions, groundwater is not used on-site for potable or industrial uses. Under future land use conditions, a deed restriction prohibiting the use of shallow groundwater will be put in place for the site. Due to the shallow depth of groundwater in some portions of the site, exposure may occur during construction/ excavation activities. Likewise, the potential exists for occasional exposure to intermittent seeps near the on-site landfill during infrequent trespassing activities. In the risk assessment, no unacceptable health risks (cancer risk range of 1×10^{-6} to 1×10^{-4} and total HI of less than 1) from exposure to shallow groundwater were identified for these potential receptors. Cancer and non cancer health effects due to incidental ingestion of and dermal contact with groundwater in sump pumps in the basement of residents in Riley park area was found to be below 1×10^{-6} and 1 respectively.

Surface soil: No unacceptable health risks were identified for routine workers from surface soil in active manufacturing area (Exposure area 1). There are no current on-site industrial worker exposures to commercial/Industrial Re- Development area and restricted Use Areas (Exposure area 2). Overall risk due to exposure for future on-site industrial workers and trespassers to surface soil in this area is also considered to be insignificant.

Subsurface soil: Under both current and future land use conditions, the receptor with the greatest potential for exposure is the on-site construction/excavation worker, where a greater likelihood of direct contact with impacted surface and subsurface soil is associated with intrusive activities. Several units in exposure area 2 exceed cumulative cancer risk of 1×10^{-4} due to number of contaminants and have been identified for remedy evaluation.

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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):

Risk characterization of exposure **Area 2** (described in Question 1 as the Waste Management Area) reveals that construction/excavation worker are at significant cancer risk associated with incidental ingestion of and dermal contact with subsurface soil and inhalation of soil derived particulates and vapor. The non-cancer hazard associated with sub-surface lead contamination is significantly high. With regard to the onsite construction/ excavation worker, DuPont has an established excavation permitting program in place at the site, which would continue in the future to ensure that appropriate measures are taken for personnel protection should such subsurface activity encounter impacted soils. Based on this health and safety plan, the significant exposure due to subsurface contamination is found to be acceptable.

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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 (and 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 the DuPont East Chicago facility, EPA ID # IND 005 174 254, located at 5215 Kennedy Avenue in East Chicago, Indiana 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
(print) Brian P. Freeman
(title) Senior Chemist, Corrective Action Project Manager

Date 12/21/2004

Supervisor
(print)
(title)
US EPA Region 5

Date

Locations where References may be found

US EPA Region 5
Federal Records Center
77 W. Jackson, 7th Floor
Chicago, IL 60604

Corrective Action Files
Waste Pesticides and Toxics Division
RCRA Enforcement and Compliance Assurance Branch
Corrective Action Section
77 W. Jackson, DE-9J
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FINAL NOTE: The human exposures EI is a qualitative screening of exposures and the determinations within this document should not be used as the sole basis for restricting the scope of more detailed (e.g., site-specific) assessments of risk.

