

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: Hercules Incorporated Research Center
Facility Address: 500 Hercules Road, Wilmington, DE 19808-1599
Facility EPA ID #: DED 001 315 647

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?

X 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, 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”**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)?

	<u>Yes</u>	<u>No</u>	<u>?</u>	<u>Rationale / Key Contaminants</u>
Groundwater	X			For contaminants discussion, see details below.
Air (indoors) ²		X		
Surface Soil (e.g., <2 ft)	X			
Surface Water		X		
Sediment	X			
Subsurf. Soil (e.g., >2 ft)	X			
Air (outdoors)		X		

_____ 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):

Hercules Research Center is a 45-acre facility, consisting of research and product development laboratories for Hercules’ worldwide chemical operations. The area undergoing RCRA Corrective Action (CA) investigation or corrective measures is located in the facility’s eastern area, in the Red Clay Creek flood plain. CA investigations began over a decade ago, and should conclude within the next two years. Currently there are five Solid Waste Management Units (SMWUs) and four Areas of Concern (AOC) undergoing study or corrective measures. The following SWMUs are included in the total, however are not discussed in the soil discussion below: SWMU 9A/15 is closed and in Post Closure ground water monitoring, therefore, soil contamination has been addressed. AOC D is the site of a fuel oil spill that has been cleaned up, and soil contamination has been addressed. SWMU 8/9C is a former landfill that is scheduled to be capped within the next two years and is included in the soil discussion below.

1. Groundwater: About 30 shallow, overburden wells (temporary and permanent) have been installed, and four deeper, bedrock wells (production wells) were used for data collection. Shallow ground water samples associated with SWMUs/AOCs contained the following contaminants at levels above human health based levels: volatile organic compounds (VOCs) (benzene, chlorobenzene, cis-1,2-DCE, vinyl chloride), several pesticides (Aldrin, Dieldrin, DDD, DDE, DDT, a-BHC, b-BHC), polynuclear aromatic hydrocarbons (PAHs), PCBs and some metals. The 4 production wells (bedrock) contained 3 VOCs (TCE, PCE, Vinyl chloride) above drinking water standards (MCLs). The production well water undergoes treatment to reduce VOC to below MCLs prior to use as facility drinking water and operations use. The facility also uses public water. The bedrock aquifer will be investigated further during the Phase II RFI investigation.

2. Indoor Air: Workers may visit buildings in the SWMU/AOC area, but no workers stay in the area.

3. Surface Soil: Several contaminants were found at levels above human health based levels and/or EPA risk based concentrations for residential exposures at six of the nine SWMUs/AOCs. The primary contaminants of concern are pesticides (toxaphene, 4,4-DDT, 4,4-DDE), PCBs (Arochlor 1254, 1260), PAHs, some metals. For the burn pad at SWMU 8/9C contaminants of concern include ten pesticides, three herbicides, PCBs, VOCs, PAHs and some metals.

4. Surface Water: On-site, the Fire Water Emergency Pond is located in AOC F, and off-site, Red Clay Creek. One sample from the pond contained no contaminants above health based levels, but a sample from the pipe and pipe outfall showed trace pesticides (a-BHC, dieldrin). Of the six surface water samples collected on Red Clay Creek, only one contained low levels of benzene and chlorobenzene (below health based levels).

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5. Sediment: Sediment from the Fire Water Emergency Pond will be sampled during the Phase II RFI. Of eight sediment samples collected from the Red Clay Creek, a few contained trace levels of pesticides (DDD, DDE, DDT) and PCBs. Sediment collected from landfill runoff areas contained PCBs above health based levels.

6. Subsurface Soil: Several contaminants were found above human health based levels in many of the SWMUs/AOCs: PCBs, DDT, toxaphene, metals (arsenic, beryllium, chromium).

7. Outdoor Air: Hercules has a Delaware Air Permit that limits chemical air emissions.

References:

1. Verification Investigation and Focused RCRA Facility Investigation Report (ERM), 4/2/93.
2. RCRA Facility Investigation Report, Vol. 1 + 2 (ERM), 4/4/97.
3. Corrective Measures Study SWMU 8/9C (ERM), 4/4/97.

Footnotes:

“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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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 ³
Groundwater	<u>No</u>	<u>Yes</u>	<u>N/A</u>	<u>Yes</u>	<u>No</u>	<u>No</u>	<u>N/A</u>
Air (indoors)							
Soil (surface, e.g., <2 ft)	<u>No</u>	<u>No</u>	<u>N/A</u>	<u>Yes</u>	<u>No</u>	<u>No</u>	<u>N/A</u>
Surface Water							
Sediment	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>Yes</u>	<u>Yes</u>	<u>Yes</u>	<u>N/A</u>
Soil (subsurface e.g., >2 ft)	<u>No</u>	<u>No</u>	<u>N/A</u>	<u>Yes</u>	<u>No</u>	<u>No</u>	<u>N/A</u>
Air (outdoors)							

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):

1. Groundwater: shallow ground water is not used, and water from bedrock used for drinking water undergoes treatment to meet drinking water standards and is monitored annually by the Delaware Division of Public Health. Drinking fountains have carbon filters, however, a potential exposure pathway exists if water is consumed from a tap without filtration or filtration is faulty. Exposures would be incidental and, based on DE data, VOC tap levels are consistently below MCLs. Shallow ground water exposure for construction workers or environmental workers is possible, however no construction is currently planned and adherence to the OSHA Health and Safety Plan would control exposure.
2. Surface soil exposures: Hercules workers work indoors and do not have contact with surface soils in the CA area. For contractors: currently, no construction is planned. It is possible that contractors may contact soils during the Phase II RFI work and cap installation at the former landfill (SWMU 8/9C). However, assuming the OSHA Health and Safety Plans are followed, contractors will be protected from soil exposures.

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3. Sediment: a few samples located around SWMU 8/9C contained PCBs above risk based concentrations. During capping, contractors could be exposed, however adherence to the OSHA Health and Safety Plan would control exposure. Trespassers only would have access to SWMU 8/9C, as the rest of the site is enclosed in a chain link fence with three strands of barbed wire on top, with an access gate attendant. The landfill is covered with a layer of soil and dense vegetation. Sediment exposure to trespassers on/around the landfill is unlikely and would not pose a significant health risk. Workers do not contact Fire Pond sediments, and Red Clay Creek sediment exposure (local residents, and recreational users) would be incidental and insignificant.
4. Subsurface soil: Contractor exposure could occur during the Phase II RFI and landfill capping work, however, these workers are trained to avoid exposure, with a OSHA Health and Safety Plan to control exposure.

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

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): [See Rationale and References discussion under Question 3.](#)

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.

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

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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.

