

**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:** Occidental Chemical Corporation  
**Facility Address:** 1657 River Road, Delaware City, Delaware 19720  
**Facility EPA ID #:** DED 00 391 3266

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, 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).

**Current Human Exposures Under Control  
Environmental Indicator (EI) RCRIS code (CA725)**

Page 2

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **“contaminated”**<sup>1</sup> 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	<b>X</b>			<b>Benzene, chlorobenzene, carbon tetrachloride, mercury, arsenic.</b>
Air (indoors) <sup>2</sup>		X		No indoor air pathway associated with SWMUs.
Surface Soil (e.g., <2 ft)	<b>X</b>			<b>Mercury, arsenic, vinyl chloride, hexachlorobenzene.</b>
Surface Water	<b>X</b>			<b>Mercury, arsenic, chlorobenzene, carbon tetrachloride.</b>
Sediment	<b>X</b>			<b>Mercury, arsenic, tetrachloroethene, benzo(a)pyrene.</b>
Subsurf. Soil (e.g., >2 ft)	<b>X</b>			<b>Mercury, 1,4-dichlorobenzene, arsenic, lead.</b>
Air (outdoors)		X		No known or reasonably suspected impacts above risk based levels from SWMUs.

----- 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):** **1.** Groundwater has been sampled at the site since 1993 when the RFI project began. The Final Phase II RFI Report dated December 2000 (EPA Approved 5/11/01) provides the most recent data indicating that groundwater is impacted in specific portions of the site above MCLs and EPA Region III tapwater RBCs. The key contaminants found to be present above these levels are described on Table 3-5, Table 4-7, Table 4-8 and in Section 9 (Addendum to Report) of the Final Phase II RFI Report dated December 2000. **2.** No indoor air pathways are associated with the SWMUs subject to investigation during the RFI. **3.** RFI data indicates that soils in specific portions of site are impacted above levels considered appropriate for industrial workers. The key contaminants found to be present above EPA Region III RBCs based on industrial exposure are described on Table 3-1 and Tables 4-2 through 4-6, as well as in Section 9 (Addendum Report) of the December 2000 Final Phase II RFI Report. **4.** Surface water impacts - RFI data indicates that surface water in specific portions of the site is impacted above levels of concern for industrial workers and ecological receptors. The key contaminants found present above these levels are described on Tables 4-9, 4-12, 4-15 and 4-20 and in Section 9 of the Final Phase II RFI Report dated December 2000.

**Current Human Exposures Under Control**  
**Environmental Indicator (EI) RCRIS code (CA725)**

Page 3

5. Sediment impacts - RFI data indicates that sediment is impacted in specific portions of the site above EPA Region III RBCs for industrial exposure (direct contact) and above risk-based criteria for ecological receptors. The key contaminants found to be present above these levels are described on Tables 4-3, 4-5, 4-10, 4-13, 4-16, 4-18 and in Section 9 of the Final Phase II RFI Report dated December 2000. 6. Subsurface soils - see note #3 above - subsurface soil findings included in #3. 7. Based on known groundwater and soil/sediment contaminant concentrations, no outdoor air concentrations are known or reasonably expected to be above appropriate risk based levels.

Footnotes:

<sup>1</sup> “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).

<sup>2</sup> 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.

**Current Human Exposures Under Control**  
**Environmental Indicator (EI) RCRIS code (CA725)**

Page 4

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)

<b><u>“Contaminated” Media</u></b>	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food <sup>3</sup>
Groundwater	No	No	No	Yes			No
Soil (surface, e.g., <2 ft)		Yes		Yes			
Surface Water		Yes		Yes	Yes	Yes	
Sediment		Yes		Yes	Yes	Yes	
Soil (subsurface e.g., >2 ft)		Yes		Yes			

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.** Although contaminants are present in groundwater at concentrations that exceed risk-based levels for both industrial and residential use, the groundwater pathway is not applicable for daycare, trespassers and food due to current and future site use as industrial. Groundwater pathway for workers is complete, but workers are expected to control exposure using protective gear and following site-specific health and safety plan and plant safety procedures. Groundwater pathway for residents is not complete since public water supply is readily available in the area and would be expected to be used for drinking water. The nearest residential wells are located approximately 1.5 miles northwest of the site and Red Lion Creek which may act as a hydrogeologic barrier to preclude any potential site-related impacts to these wells. See Final Phase II RFI Report dated December 2000.

**Current Human Exposures Under Control**  
**Environmental Indicator (EI) RCRIS code (CA725)**

Page 5

**2.** Contaminants are present in site soils at concentrations exceeding EPA Region III RBCs based on industrial exposure. The soil pathway is complete for onsite workers (environmental study and construction) in specific portions of the site. Onsite workers are expected to control exposure using protective gear and following site-specific health and safety plan (See IM Health and Safety Plan dated 9/13/01) and plant safety procedures. See Final Phase II RFI Report dated December 2000. **3.** Contaminants are present in surface water and sediments in specific portions of the site (OxyChem tributary, Red Lion Creek, Marsh area). Exposure by onsite workers (environmental study) and recreational users can occur, but onsite workers are expected to control exposure using protective gear and following site-specific health and safety plan. Exposure by recreational users (or trespassers) of Red Lion Creek may occur but is limited in duration and frequency. See Final Phase II RFI Report dated December 2000.

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

**Current Human Exposures Under Control**  
**Environmental Indicator (EI) RCRIS code (CA725)**

Page 6

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **“significant”**<sup>4</sup> (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):** 1. Exposures are not reasonably expected to be significant for the complete pathways identified in #3 based on the continued industrial operations at the site. In the plant process area surface aggregate and paving serve as a means to manage worker exposure to surface and subsurface soil contamination by minimizing the dermal contact and inhalation pathways under routine conditions. In the waste management areas worker exposure is minimized through clay cap and soil cover over the units posing the greatest risk. During construction or remediation work at the site, onsite workers are expected to further control exposure using personal protective gear and following site specific health and safety procedures. See Final Phase II RFI Report dated December 2000 and IM Health and Safety Plan dated 9/13/01.

Interim Measures (“IM”) were completed to remove contaminants present above levels of concern in portions of the site that are used on a routine basis by onsite workers. See the Post Remediation Report for the Sand Blast Grit Area dated June 17, 2002 (including related correspondence dated July 23, 2002) and the Post Remediation Report for the Stormwater Drainage Channels and Outfalls 003 and 004 dated July 26, 2002 (including revised portion dated 8/27/02). Additional measures were taken to address worker exposure during excavations conducted inside the process area of the plant: See the IM Process Area Excavation Procedure dated June 18, 2002 (approved by EPA on 7/19/02).

**Current Human Exposures Under Control**  
**Environmental Indicator (EI) RCRIS code (CA725)**

Page 7

2. Exposure to contaminated surface water and sediment in Red Lion Creek and the OxyChem Tributary can occur, but is not expected to be significant. The creek is a very shallow, ponded area with minimal flow due to the tide gates that exist at Mile 62 of the Delaware River. Available evidence indicates that fishing and other recreational uses of the Creek are logistically too difficult to result in significant exposure. Although occasional recreational fishing may occur from the Route 9 bridge on Red Lion Creek, there is very limited access to the Creek (and Tributary), and private property and dense swamp exist in the areas adjacent to the facility. These conditions, as well as the following factors; limited access to fishable parts of the creek, poor fish and recreational habitat, industrial surroundings, nearby alternatives for fishing, and fish consumption advisory currently in existence for chlorinated benzenes in Red Lion Creek, support the determination that exposure is not expected to be significant in this portion of the site. See Final Phase II RFI Report dated December 2000.

<sup>4</sup> 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.

**Current Human Exposures Under Control**  
**Environmental Indicator (EI) RCRIS code (CA725)**

Page 8

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): \_\_\_\_\_

