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:	Union Carbide Corporation, Technical Center
Facility Address:	3200 Kanawha Turnpike, South Charleston, WV 25303
Facility EPA ID #:	WVD060682291

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).

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			Contaminants detected above groundwater RBCs are benzene, bis(2-chloroisopropyl)ether, di-n-octyl phthalate, arsenic, barium, cadmium, and lead.
Air (indoors) [2]		X		Not Applicable – No structures exist above SWMUs or above the area of groundwater contamination.
Surface Soil (e.g., <2 ft)	X			The only contaminant detected above RBC is arsenic.
Surface Water		X		No contaminants detected above the National Recommended Water Quality Criteria at Outfall 008.
Sediment		X		Not Applicable – The only sediment at the Technical Center is in Ward Branch. As noted above, no contaminants were detected in surface water above Water Quality Criteria at Outfall 008.
Subsurf. Soil (e.g., >2 ft)	X			The only contaminant detected above RBC is arsenic.
Air (outdoors)		X		SWMU 4 (Ward B Landfill) is the only SWMU considered to represent a potential risk from inhalation of particulates. This SWMU has had additional capping material added to mitigate this potential risk.

___ 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):

For specific concentrations of constituents above Groundwater RBCs, refer to Tables 13 and 18 of the RFI Report, Union Carbide Corporation Technical Center (Key Environmental, Inc., June 2001)

For specific concentrations of constituent above Industrial Soil RBCs in surface and subsurface soil, refer to Tables 5 and 10 of the RFI Report, Union Carbide Corporation Technical Center (Key Environmental, Inc., June 2001)

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.

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]
	NO	YES	NO	YES	NO	NO	NO
~~Air (indoors)~~	--	--	--	--	--	--	--
Soil (surface, e.g., <2 ft)	NO	NO	NO	YES	NO	NO	NO
~~Surface Water~~	--	--	--	--	--	--	--
~~Sediment~~	--	--	--	--	--	--	--
Soil (subsurface e.g., >2	NO	NO	NO	YES	NO	NO	NO
~~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):

A Site Conceptual Exposure Model (SCEM) was developed as part of the RFI process. Based upon comparison of site soil, groundwater, and surface water concentrations with regulatory screening limits, constituents of interest (COIs) were identified for media of interest in each area of investigation. Potential exposure pathways and receptors for each area of investigation were then evaluated for each media of interest. From this process, complete exposure pathways and associated receptors were identified. It should be noted that the trespasser exposure pathways identified in the RFI Report have been eliminated with the additional capping, regrading, reseeding, and drainage ditch piping that were completed in 2002. In addition, the only potential worker exposure is to personnel who sample groundwater from the Technical Center monitoring wells. However, procedures are in place (e.g., use of appropriate personal protective equipment) to control the risk of exposure. Refer to Tables 21 through 25 of the RFI Report, Union Carbide Corporation Technical Center (Key Environmental, Inc., June 2001) for references.

[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):

The only potential exposures are ingestion, inhalation, and dermal contact for construction workers (e.g. during excavation) and/or O&M workers (e.g. during sampling activities). These potential exposures are deemed to be controlled because these workers are covered under Dow's health and safety procedures and site-specific health and safety plans (HASPs), when necessary. The HASP provides for evaluations of potential hazards and exposures and specifies appropriate personal protective equipment (PPE) to minimize or eliminate these hazards and exposures. In addition, other administrative controls are in place at the Technical Center to further minimize or eliminate exposures. These administrative controls include a hazard identification program, safe work permits, excavation permits, etc.

Several engineering controls are also in place. These include capping of former waste management units and other waste isolation measures (e.g., drainage ditch piping at Ballfield area). Regular inspections of the perimeter fencing are conducted to ensure that gates are properly locked, the fencing is not damaged and no unauthorized personnel enter the site. No Trespassing signs are also posted at regular intervals along the perimeter fencing. Unauthorized site access is further controlled via 24-hour surveillance by security personnel.

[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

Rationale and Reference(s):

Note: Not Applicable – No "significant" (i.e. potentially "unacceptable") exposures for any complete exposure pathway. See Item #4

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):

__X__ 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 **UCC Technical Center, EPA ID # WVD060682291, located at 3200 Kanawha Turnpike in South Charleston, West Virginia** 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: (signature) /s/ Date: 5/19/03

(print) Denis M. Zielinski

(title) Senior RPM

Supervisor: (signature) /s/ Date: 5/22/03

(print) Robert E. Greaves

(title) Chief, RCRA Operations Branch

(EPA Region or State) EPA Region III

Locations where References may be found:

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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.