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
Facility Address: Brownsville, Texas
Facility EPA ID #: TXD008114092

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 E1 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 E1 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" above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from release subject to RCRA Corrective Actions (from SWMUs, RUs or AOCs)?

	Yes	No	?	Rationale/Key Contaminants
Groundwater		✓		See References listed in Attachment A
Air (indoors) [2]		✓		See References listed in Attachment A
Surface Soil (e.g., <2 ft)		✓		See References listed in Attachment A
Surface Water		✓		See References listed in Attachment A
Sediment		✓		See References listed in Attachment A
Subsurface. Soil (e.g., > 2 ft)		✓		See References listed in Attachment A
Air (outdoors)		✓		See References listed in Attachment A

__✓__ 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):

A revised RCRA Facility Investigation (RFI) Workplan (06 APR 93) describing the results of a five year site investigation of the Union Carbide (UCC) Brownsville, Texas facility was submitted to the Texas Natural Resource Conservation Commission (TNRCC). Analytical data from the facility was evaluated against rules and standards promulgated in 30 TAC § 335, Subpart S (June 1993). The TNRCC concurred with the UCC recommendation of No Further Action for units/areas with sample analyses that indicated concentrations below TNRCC Risk Reduction Rule Standard 1 and Standard 2 Industrial Criteria (letter from Paul S. Lewis to R. E. O'Bryan dated 27 JUL 95; see Attachment B). TNRCC requested additional data or explanation for units/areas that were reported to contain soil and/or groundwater concentrations above TNRCC RRR Standard 2 Industrial Criteria. An Addendum to the Revised RFI Workplan (10 OCT 95) addressed these units/areas. TNRCC concurred with the UCC recommendation of closure under TNRCC RRR Standard 2 Industrial Criteria except for the groundwater in three units (letter from Paul S. Lewis to R. E. O'Bryan dated 13 NOV 95; see Attachment B). The groundwater in SWMU T "Mixed Acid/Residue Oil Pond", Special Area CG "South Fire Training Area", and Area of Concern No. 1 "Leaking Underground Storage Tank was closed under TRNCC RRR Standard 3 Criteria with No Further Action.

The closures for the three areas (SWMU T, AOC No. 1 and SA CG) were based upon data presented in the groundwater risk assessments and fate and transport modeling as discussed in the Addendum to the Revised RFI Workplan.

Off-site groundwater transport (fenceline concentrations) was simulated using the Analytical Transient 1-2-3 Dimensional Model (AT123D) and model results were verified against actual downgradient groundwater contaminant concentrations. As a conservative approach to contaminant transport, no biodegradation was assumed to occur. The AT123D modeling results predicted that contaminant plumes do not reach the nearest fenceline above TNRCC Standard 2 Criteria in the next 60 years.

The Brownsville Navigation District where the facility is located is industrial in nature and will remain so. After the approval of the RFI Workplans in November 1993, the facility was deed recorded for industrial use. Current land use in the area is industrial only. Within a 2-mile radius of the facility, there are no water-supply wells or reservoirs

compatible for drinking water supply and there are no ecologically vital areas. The groundwater within the 2-mile radius is saline (> 10,000 mg/L TDS) and has been designated as Class III. Due to the thick clay overburden there is no predicted release of volatiles into the atmosphere. Overlying soils were found to be below Standard 2 criteria and no waste was left in place so groundwater is not likely to be further contaminated by the soils. An evaluation of the site conditions indicated that the only plausible scenarios for human exposure to contaminated groundwater were through construction activities that expose workers to the groundwater through incidental inhalation and dermal contact. The risk assessment evaluated worker exposure to inhalation or dermal contact with groundwater brought up with borings for deep concrete pilings or during the excavation of trenches. The risk due to inhalation of volatiles from contaminated groundwater was 1.63E-05 and the risk due to dermal exposure was 5.96E-09. The overall risk for the site was 1.63E-05 that is well within EPA's recommended risk level for industrial areas (10^{-4} to 10^{-6}).

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]
Groundwater							
Air (indoors)							
Soil (surface, e.g. < 2 ft)							
Surface Water							
Sediment							
Soil (subsurface, e.g., >2 ft)							
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).

____ 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):

[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)?

____ 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):

[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):

6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA 725), 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 Union Carbide Corporation facility, EPA ID # TXD008114092, located at Brownsville, Texas 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) _____ Date 04 NOV 99

(print) Robert E. O'Bryan

(title) Remediation Program Manager Union Carbide Corporation

Supervisor (signature) Tom Wong Date 4 NOV 99

(print) Tom Wong

(title) HSE Manager – Union Carbide Corporation

(EPA Region or State) EPA Region VI (Texas)

Locations where References may be found:

See attached Table of Reference Documents in Attachment A and copies of TNRCC and EPA correspondence in Attachment B. A map of the facility is contained in Attachment C.

Contact telephone and e-mail numbers

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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.