DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)

Migration of Contaminated Groundwater 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 the groundwater media, 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 "Migration of Contaminated Groundwater Under Control" E1

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "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 E1 are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of E1 Determinations

EI Determination status codes should remain in RCRIS national databases 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. Is groundwater known or reasonably suspected to be "**contaminated**" [1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

_____ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

__✓__ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

As discussed in the Addendum to the Revised RCRA Facility Investigation (RFI) Workplan (10 OCT 95), only three wells exhibited groundwater contamination that exceeded the TNRCC RRR GW-ADJ Standard 2 criteria (30 TAC §335, Subchapter S, June 1993) and required Standard 3 closure with No Further Action. Groundwater contamination in SWMU T (Mixed Acid/Residue Oil Pond), AOC No. 1 (Leaking Underground Storage Tank) and SA CG (South Fire Training Area) was closed by the TNRCC (Letter from Paul S. Lewis to R. E. O'Bryan dated 13 NOV 95) as Standard 3 with No Further Action. Contaminants of concern were benzene, 1,1-dichloroethene, and vinyl chloride in AOC No.1, 1,1-dichloroethene in SA CG and 1,1-dichloroethene in SWMU T. All remaining groundwater in the facility had been demonstrated to meet a TNRCC Standard 1 and Standard 2 Closure in the Revised RFI Workplan (06 APR 95).

Closure of the three wells was based upon the data presented in the Addendum for groundwater modeling and a baseline risk assessment.

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 are 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 which 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 appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

4. Does "contaminated" groundwater discharge into surface water bodies?

_____ If yes - continue after identifying potentially affected surface water bodies.

_____ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

5. Is the discharge of "contaminated" groundwater into surface water likely to be "insignificant" (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level", and there are not other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or ecosystems at these concentrations)?

_____ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or ecosystem.

_____ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

_____ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

[3] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be **"currently acceptable"** (i.e., not cause impacts to surface water, sediments or ecosystems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

_____ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR
2) providing or referencing an interim-assessment[5] appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the E1 determination.

_____ If no - (the discharge of "contaminated" groundwater can not be shown to be **"currently acceptable"**) - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

_____ If unknown - skip to 8 and enter "IN" status code.

Rationale and Reference(s):

[4] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

[5] The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

7. Will groundwater monitoring/measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

_____ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

_____ If no - enter "NO" status code in #8.

_____ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

B Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

__✓__ YE - Yes. "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Union Carbide Corporation facility, EPA ID #TXD008114092, located at Brownsville, Texas. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted *(REFER TO NOTE BELOW)* to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater". This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

Note: ***Per closure letter from Paul S. Lewis (TNRCC) to R. E. O'Bryan (UCC) dated 13 NOV 95, the site was closed with No Further Action and groundwater monitoring is not required.***

____ NO - Unacceptable migration of contaminated groundwater is observed or expected.

____ 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. Facility map is located in Attachment C.

Contact telephone and e-mail numbers

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