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: Shell Chemical Company & Shell Deer Park Refining Company
Facility Address: 5900 State Hwy 225
Facility EPA ID #: TXD 067285973

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?

__X__ If yes - check here and continue with #2 below.

_____ If no - re-evaluate existing data, or

_____ If data are not available, skip to #8 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" EI

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 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 "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 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).

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?

__X__ 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):

Appropriate Protective Levels

Key Constituents	TNRCC's Maximum Specific Concentration (MSC) for Groundwater Protection Standard For Industrial Site Soil Samples (GWP-Ind)	Groundwater Protection Standards (GWPS) For Groundwater Samples
• Benzene	0.5 mg/kg	208 ug/l
• Toluene	100 mg/kg	1,000 ug/l
• Ethylbenzene	70 mg/kg	700 ug/l
• Xylene	1,000 mg/kg	10,000 ug/l
• 1,2,3-Trichloropropane	0.0041 mg/kg	10 ug/l
• 1,2-Dichloropropane	0.5 mg/kg	5 ug/l
• Fluorene	410 mg/kg	N/A
• Phenol	6,100 mg/kg	N/A
• Acetone	1,000 mg/kg	100 ug/l
• Chloroform	N/A	100 ug/l
• Trichloroethene	N/A	5 ug/l
• 1,2-Dichloroethene	N/A	5 ug/l

In the RFI, only two constituents (benzene and 1,2,3-trichloropropane) were detected at concentrations above their respective groundwater protective MSCs for industrial site soil samples. Seven other constituents (toluene, ethylbenzene, xylene, 1,2-dichloropropane, fluorene, phenol, and acetone) were present in the soil but at concentrations below groundwater protective MSC levels. Soil samples were not analyzed for chloroform, trichloroethene, and 1,2-dichloroethene; however, these constituents have been detected in the groundwater beneath the Aeration Basins/Well 270 area (Units K and P) at concentrations above their respective GWPS.

In the RFI, benzene exceeded the MSC in Units D, K, and P, and 1,2,3-trichloropropane exceeded the MSC in Units K and P. The area encompassing Unit D is currently being managed under the Corrective Action Program for the Oil Patch groundwater plume, and the area encompassing Units K and P is being managed under the Corrective Action Program for the SEWMA Aeration Basins/Well 270 Area. In the Oil Patch Area, four constituents (benzene, toluene, ethylbenzene, and xylene) have been detected in groundwater at concentrations above their respective GWPS. In the SEWMA Aeration Basins/Well 270 Area, seven constituents (benzene, 1,2,3-TCP, 1,2-DCP, acetone, chloroform, TCE, and 1,2-DCE) have been detected in groundwater at concentrations above their respective GWPS.

Although groundwater beneath some of the SWMUs has been impacted above appropriately protective levels, it can not be conclusively determined at this time whether the SWMUs are a source of the organics in groundwater or whether the organics are a result of more widespread historical contamination in the area. Organic contamination in soil in these areas is consistent with known groundwater plumes identified and being addressed in the groundwater Compliance Plan. Additional data collection and analysis of soils in the vicinity of the SWMUs is continuing.

References:

- **RCRA Facility Investigation, Shell Oil Company, Deer Park, Texas. Fugro Environmental, Inc., October 1996.**
- **Phase II RCRA Facility Investigation Report, Shell Deer Park Site. Parsons Engineering Science, Inc., May 1999.**
- **Groundwater Semi-Annual Report, Shell Deer Park Refining Company and Chemical Plant, EPA I.D. Number TXD067285973, Compliance Plan Number CP-50099-001, July 1999.**

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).

3. Has the **migration of contaminated groundwater stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

_X_ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2]).

_____ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) - skip to #8 and enter "NO" status code, after providing an explanation.

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

Rationale and Reference(s):

The areas with "contaminated" groundwater are currently being managed under the Corrective Action Program of the existing groundwater Compliance Plan (Number CP-50099-001). Corrective actions in these areas include hydraulic containment of groundwater and monitored natural attenuation.

References:

- **RCRA Facility Investigation, Shell Oil Company, Deer Park, Texas. Fugro Environmental, Inc., October 1996.**
- **Phase II RCRA Facility Investigation Report, Shell Deer Park Site. Parsons Engineering Science, Inc., May 1999.**

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[2] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

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

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

__X__ 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):

The areas with "contaminated" groundwater are currently being managed under the Corrective Action Program of the existing groundwater Compliance Plan (Number CP-50099-001). Corrective actions in these areas include hydraulic containment of groundwater and monitored natural attenuation to prevent impact to surface water bodies.

References:

- **RCRA Facility Investigation, Shell Oil Company, Deer Park, Texas. Fugro Environmental, Inc., October 1996.**
- **Phase II RCRA Facility Investigation Report, Shell Deer Park Site. Parsons Engineering Science, Inc., May 1999.**

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 no 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 eco-systems 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 eco-system.

_____ 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):___

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 eco-systems 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 EI 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):

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[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?"

__X__ 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):_____

Monitoring wells in the vicinity of the SWMUs are monitored semi-annually as part of the existing groundwater Compliance Plan Number CP-50099-001.

8. 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).

__X__ 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 Shell Chemical Company facility, EPA ID #TXD067285973, SWRN 30007, located in Deer Park, TX. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted 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.

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

_____ IN - More information is needed to make a determination.

(1) Incomplete information
(2) Reports in house, yet to be reviewed
(3) Unfamiliar site

For "NO" or "IN" determination, expected date of "YE" determination _____

Completed by (signature) Maureen M Hatfield Date 01/13/00
(print) Maureen Hatfield
(title) Project Manager

Supervisor (signature) Cathy Remmert Date Jan 24, 2000
(print) Cathy Remmert
(title) Supervisor
(EPA Region or State) TNRCC

Locations where References may be found:

see attached

If "YE" Code is assigned then attach a copy of database, highlight the reports which support"YE"determination.

Contact telephone and e-mail numbers

(name) Ms. Janice Wendel.
(phone #) 713-246-1068
(e-mail) jwendel@shell.com