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:	**DuPont Beaumont Works**
Facility Address:	**Highway 347, Beaumont, Texas**
Facility EPA ID #:	**TXD008081101**
TCEQ Solid Waste Registration ID #:	**30010**

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 #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).

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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):

Data Set for EI Evaluation

Site data evaluated for this step included groundwater samples collected from between January 2005 through July 2007 at 132 locations and data collected from 10 locations collected in a perched, discontinuous water zone called the shallow dredge sand in February and May 2006 (Figure 7). Groundwater sampling was conducted as part of the corrective action monitoring for Compliance Plan CP-50166.

Screening Levels Used to Evaluate Site Data

Groundwater within the upper flow system is not used for drinking water on or near the site; and, the discontinuous dredge sands contain perched groundwater, which is unlikely to be a sustainable source of groundwater. However, as a conservative measure, constituents detected in groundwater were compared to Texas medium-specific concentrations (MSCs) for industrial use (GW-Ind). The MSCs are based on Federal Maximum Contaminant Levels (MCLs), where applicable, or calculated using risk-based equations based on exposure via groundwater ingestion.

Constituents of Potential Concern in Groundwater: For the purpose of the evaluation and consistent with corrective action monitoring, groundwater was evaluated by waste management area (WMA) rather than by SWMU or AOC (Figure 7). Monitoring well locations are detailed in Figure 8. Constituents with maximum concentrations greater than the MSC were retained and identified as constituents of potential concern (COPCs). Tables 1 - 8 detail the evaluation. As presented in the tables, twelve volatile organic compounds (VOCs), two semivolatile organic compounds (SVOCs) and three metals were identified as COPCs in groundwater. Nine VOCs and seven metals were identified as COPCs in shallow dredge sand water.

[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).

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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)?

__√__ 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):
Constituent concentrations have remained stable or decreased at each of the six WMAs as supported by maps and trend charts presented in the Semi-Annual Groundwater Monitoring Reports. For instance, the area of carbon tetrachloride concentrations exceeding the MSCs is limited mainly to the central portion of the facility with two smaller, isolated areas in the western portion of the site associated with the Hypalon® Landfill and West WMAs. The main plume has remained relatively stable over the past 10 to 15 years for which analytical data are available (DuPont CRG, 2007a). In addition, groundwater recovery systems maintain groundwater containment along the site perimeter in the upper flow system aquifer. Therefore, COPCs in this system are not being transported from the area.

References:

DuPont CRG. 2007. Semiannual Groundwater Monitoring Report, January through June 2007. DuPont Beaumont Works Industrial Park, Beaumont, Texas.

[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.

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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):

Complex groundwater flow regimes exist at the site. However, the shallow groundwater flow direction at the site is generally toward the Neches River or surrounding wetlands. The site-wide potentiometric surface map from the most recent semi-annual groundwater monitoring report is depicted in Figure 9.

As previously noted, COPCs in upper flow system groundwater is contained on site by the groundwater recovery systems. As a result, no off-site migration of COPCs in upper flow system groundwater is occurring. However, the discontinuous dredge sands that contain perched groundwater, present in portions of the West WMA and Wastewater Treatment Basins WMA, may discharge to the Neches River. The sand is interpreted to be dredge spoils disposed of by the Army Corps of Engineers, because it often lies directly over marsh deposits, and does not appear to be naturally deposited. The shallow dredge sand water is unlikely to be a sustainable source of groundwater.

Per Title 30, Chapter 307 of the Texas Administrative Code (Texas Surface Water Quality Standards [TSWQS]), the portion of the Neches River bordering the plant, which is tidally influenced, is designated for contact recreation and of intermediate aquatic life use (i.e., very low abundance of sensitive species, moderate diversity, moderate species richness, and moderately imbalanced trophic structure). The stream segment is sometimes used for sport fishing but is not classified in the TSWQS as a drinking water source.

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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 judgment/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):
A multi-tiered risk-based screening approach was used to evaluate shallow dredge sand water discharge to surface water (Neches River). Maximum detected concentrations in six perimeter observation well locations in the West (OW-506, OW-512 and OW-513) and Wastewater Treatment Basins WMAs (OW-16-01, OW-16-02, OW-16-03) were first compared to appropriate groundwater criteria (i.e., MSCs). Observation well locations are detailed in Figure 8. Constituents whose maximum detected concentration exceeded the screening criteria were then compared to the MSC GW-Ind with an applied conservative dilution factor of 10 to account for groundwater and surface water interaction. The use of a conservative dilution attenuation factor (DAF) is consistent with current EI guidance and the 1996 Advanced Notice of Proposed Rule Making (ANPRM) regarding establishing point of compliance for surface water discharges.

Those constituents, whose maximum detected concentration exceeded 10 times the screening criteria, were retained for evaluation in Step Six. The results of these two screening steps indicate that one VOC (tetrachloroethene) and one metal (total lead) were in excess of 10 times the screening criteria in the West WMA (Table 9). No exceedances were noted in the Wastewater Treatment Basins WMA.

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

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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):
Step six of the EI process addresses the acceptability of discharge of COPC-containing groundwater to surface waters. For this step, only constituents, whose maximum detected concentration was in exceedance of 10 times the MSC, as identified in Step Five, were retained for the evaluation.

An evaluation of groundwater release to the Neches River using a simple groundwater flux model was performed in order to determine whether or not concentrations of COPCs in shallow dredge sand water in the West WMA are likely to result in exceedances of relevant surface water quality criteria in the river. The surface water quality criteria used in the evaluation were based on the lower of the TSWQS values as defined in 30 TAC 307.6 for protection of saltwater organisms (chronic) and protection of human health (fish consumption). The groundwater flux was calculated using the following conservative assumptions and site-specific hydraulic information.

[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.

- Groundwater flux was calculated using a simple mass balance equation as adapted from USEPA's Exposure Assessment Methods Handbook (USEPA, 1989) and the Texas Risk Reduction Program (TCEQ, 2002);
- Maximum detected concentrations observed in three perimeter monitoring wells sampled in May 2006;
- A hydraulic conductivity value of 2.83 feet /day was assumed for the dredge sand. A gradient of 0.005 foot/foot was calculated from the May 2006 observation well sampling; and
- The Neches River flow was estimated using the 7-day, 2-year flow rate (7Q2), which is protective of both human and ecological receptors. Normal flow in the Neches River is greater than the 7Q2 flow used in this evaluation. Therefore, under most flow conditions, mixing will be greater and concentrations in the river will be lower than those estimated.

Table 10 details the evaluation and conservative assumptions utilized in the calculations. As shown in the table, groundwater concentrations when modeled to surface water do not exceed surface water screening criteria. As a result, the groundwater discharge to surface water is considered acceptable. Over time while attenuation and degradation of COPCs takes place current concentrations measured in groundwater will diminish further reducing modeled discharge concentrations.

References:

USEPA. 1989. *Exposure Assessment Methods Handbook.* EPA/600. September.

TCEQ. December 2002. *Determining PCLs for Surface Water and Sediment.* TCEQ Regulatory Guidance: RG-366/TRRP-24 (Revised).

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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 that 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):

As presented in the Compliance Plan portion of the Hazardous Waste Permit, groundwater sampling at Beaumont Works will continue on a semiannual basis. Groundwater samples will be analyzed for indicator constituents specific to each WMA at reporting limits at least as low as their respective MSC. Point of compliance and background wells have been established in the Compliance Plan. A potentiometric surface map of groundwater elevations will be created for each event using water levels measured prior to sampling activities. Concentration trend graphs and isoconcentration maps will also be created for key indicator constituents (carbon tetrachloride, chloroform and tetrachloroethene). These graphs and maps will be included in each semiannual report submitted to TCEQ.

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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).

√ 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 **DuPont Beaumont Works**, EPA ID # **TXD008081101**, located at **Highway 347, Beaumont, Texas**. 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.

Completed by (signature) Scott Settemeyer Date 2/3/09

(print) Scott Settemeyer

(title) Project Manager

Supervisor (signature) Joyce Sirota Date 2/4/09

(print) Joyce SIROTA

(title) Team Leader

Texas Commission on Environmental Quality

Locations where References may be found:

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