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 East Chicago Indiana Facility**
Facility Address: **5215 Kennedy Avenue in East Chicago, Indiana**
Facility EPA ID #: **IND005174254**

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).

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?

__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):

The site groundwater analytical data from December 1997 through March 2004 were reviewed. The analytical constituents monitored included the following: antimony, arsenic, barium, cadmium, chromium, copper, lead, nickel, selenium, vanadium, and zinc. The groundwater analytical results associated with Pool A (groundwater north of the divide) were compared to EPA Maximum Contaminant Levels (MCLs). The groundwater analytical results associated with Pool B (groundwater south of the divide) were compared to the Indiana Ambient Water Quality Standard (IAWQS) for either Human Health or Chronic Aquatic Life, whichever value was lower.

In Pool A arsenic, nickel, and zinc were the only groundwater constituents to exceed the MCLs. The arsenic concentrations in Pool A ranged from below MCL (0.01 mg/l) to a concentration high of 2.43 mg/l. Nickel concentrations ranged from below MCL (0.073 mg/l) to a concentration high of 0.146 mg/l. Zinc concentrations ranged from below Secondary MCL (5 mg/l) to a concentration high of 48.9 mg/l; see Section 5.3 for more detail).

In Pool B four constituents exceeded the IAWQS within a limited number of monitor wells. In monitor well MW-13, the following three constituents exceeded the IAWQS: chromium, lead, and vanadium. Exceedences of these three constituents were limited to MW-13. In all other Pool B wells, these three constituents were well below the IAWQS.

The only other constituent to exceed the IAWQS was arsenic. The IAWQS Chronic Aquatic value for arsenic is 0.1479 mg/l. This level was consistently exceeded in wells MW-03 (with a concentration high of 17.9 in June 1999) and MW-15 (with a concentration high of 0.561 mg/l in November 1999.

[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):

YES	Western Half Pool A	The groundwater contaminants associated with the western half of Pool A is prevented from migrating off-site by a permeable reactive barrier (PRB). See Section 5.2 for more detail.
YES	Eastern Half Pool A	The constituents associated with the eastern half of Pool A groundwater is prevented from further migration by the presence of a groundwater depression that is associated with the sewer system underlying Riley Park. See Section 5.2 for more detail.
YES	Pool B	The groundwater contaminants associated with Pool B are prevented from further migration by the presence of the Grand Calumet River; the groundwater in Pool B discharges to the Grand Calumet River.

[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?

__X__ 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):

NO	Western Half Pool A	The groundwater associated with the western half of Pool A is treated by a PRB.
NO	Eastern Half Pool A	The groundwater east of the PRB contains constituent concentrations that exceed MCLs for arsenic, nickel, and zinc. However, this plume discharges to the downgradient sewer system associated with Riley Park. From the sewer system the water is sent to the City of East Chicago Treatment Facility. The groundwater constituent concentrations associated with Riley Park were sampled in November of 2004 and were below current drinking water standards for metals.
YES	Pool B	The groundwater associated with Pool B discharges to the Grand Calumet River.

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)?

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_____ 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.

__X__ 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):

Constituent concentrations in well MW-13 (chromium, lead, and vanadium) are less than 10 times the IAWQS. However, the arsenic concentrations detected in well MW-03 are greater than 10 times the IAWQS.

[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 acceptabl**e" (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])?

__X__ 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 acceptabl**e") - 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):

A groundwater to surface water interface dilution factor was applied to the IAWQS values to account for the interaction of groundwater to surface water. Comparing the groundwater constituent concentrations to the adjusted IAWQS value determined that no constituents were in exceedence. Sampling of surface water in the Grand Calumet River in June of 2005 by EPA staff both upstream and downstream of the DuPont facility yielded concentrations of lead, arsenic and zinc below current drinking water maximum contaminant limits (MCLs).

DuPont will select and implement a remedy in the CMS/CMI phase of this project, to remove source metals contaminants from groundwater before entering the Grand Calumet River

[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):

Perimeter monitoring wells and PRB specific wells will be monitored by DuPont on a regular basis to ensure that plume concentrations and plume widths remain stabilize. A copy of the current site groundwater monitoring program which is being performed voluntarily, can be found in Appendix A of the Environmental Indicator Report submitted by DuPont. The USEPA acknowledges that dissolved metal ground-water loads will be sorbed onto existing fine-grained organic rich soils in the Grand Calumet River, therefore we anticipate that additional remediation and monitoring will be needed to prevent recontamination of sediments after the anticipated dredging of the river is complete.

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 **DuPont East Chicago Indiana Facility**, EPA ID# **IND005174254**, located **5215 Kennedy Avenue in East Chicago, Indiana**. 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) Date 6/15/05

(print) Brian P. Freeman

(title) Sr. Chemist, Corrective Action Project Manager.

Supervisor (signature) Date

(print) George Hamper

(title) Chief, WPTD/ECAB Corrective Action Section

(EPA Region or State) Region 5

Locations where References may be found:

DuPont East Chicago Corrective Action Files
Federal Records Center
US EPA Region 5
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