

**Documentation of Environmental Indicator Determination
in accordance with EPA Interim Final Guidance 2/5/99**

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

Migration of Contaminated Groundwater Under Control

Facility Name: _____Chevron Chemical Company_____

Facility Address: _____6103 Ortho Way, Fort Madison, Iowa 52627_____

Facility EPA ID #: _____IAD005173992_____

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 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 EIs 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 EIs 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 groundwater 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 Determination 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):

There are three small contaminated groundwater plumes in the shallow groundwater at the facility. The contaminants of concern are: xylene, ethyl benzene, benzene, beryllium, chromium, nickel, phenol, cadmium, silvex, disulfoton, chlordane, and 2,4,-D (dichlorophenoxyacetic acid). The following is a list of each contaminant followed by the most recent maximum concentration found in a groundwater monitoring well: xylene - 107,000 ug/l; ethyl benzene - 11,000 ug/l; benzene - 73 ug/l; beryllium - .53 ug/l; chromium - .97 ug/l; nickel - 38 ug/l; phenol - not detected; cadmium - .54 ug/l; silvex - 4,900 ug/l; disulfoton - not detected; chlordane - not detected; 2,4-D - 10 ug/l [See RFI Report approved March 24, 1998, focusing primarily on documents dated February 2, 1993 and September 2, 1993, and last two rounds of groundwater sampling dated July 8, 1999 and October 5, 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):

There are three small contaminated groundwater plumes in the shallow groundwater at the facility. The shallow groundwater became contaminated over 20 years ago. The contaminants of concern are: xylene, ethyl benzene, benzene, beryllium, chromium, nickel, phenol, cadmium, silvex, disulfoton, chlordane, and 2,4,-D (dichlorophenoxyacetic acid). The following is a list of each contaminant followed by the most recent maximum concentration found in a groundwater monitoring well: xylene - 107,000 ug/l; ethyl benzene - 11,000 ug/l; benzene - 73 ug/l; beryllium - .53 ug/l; chromium - .97 ug/l; nickel - 38 ug/l; phenol - not detected; cadmium - .54 ug/l; silvex - 4,900 ug/l; disulfoton - not detected; chlordane - not detected; 2,4-D - 10 ug/l. Given the rate of movement of the shallow groundwater, the groundwater recharge rate, and the verification sampling conducted from 1992 to the present, it appears that the plumes have reached steady-state and are not migrating [See RFI Report approved March 24, 1998, focusing primarily on documents dated February 2, 1993 and September 2, 1993, and last two rounds of groundwater sampling dated July 8, 1999 and October 5, 1999].

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.

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):

One of the three small contaminated groundwater plumes discharge into a cooling water pond which has an NPDES discharge permit and which subsequently discharges into the Mississippi River [See RFI Report approved March 24, 1998, focusing primarily on documents dated February 2, 1993 and September 2, 1993, and last two rounds of groundwater sampling dated July 8, 1999 and October 5, 1999].

5. Is the **discharge** of “contaminated” groundwater into surface water likely to be “**insignificant**” (i.e., the maximum concentration³ of each contaminant discharging into surface water is less than 10 times the appropriate groundwater “level,” and there are no other conditions (e.g., the nature or 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 concentration³ 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 concentration³ 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 concentrations³ greater than 100 times the 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):

The discharge of contaminated groundwater into the cooling water pond is only slightly above MCLs, 53 ug/l silvex in monitoring well CH33S, which sets adjacent to the cooling water pond. In light of the small amount of contaminated groundwater discharged into the pond versus the amount of cooling water drawn from the Mississippi River and discharged to the pond and subsequently discharged back to the Mississippi River, such discharge of contaminated groundwater would be deemed insignificant [See RFI Report approved March 24, 1998, focusing primarily on documents dated February 2, 1993 and September 2, 1993, and last two rounds of groundwater sampling dated July 8, 1999 and October 5, 1999]. The MCL for silvex is 50 ug/l. The Iowa Department of Natural Resources reviewed the groundwater information and concluded "From the sampling provided and the groundwater flow information contained in other reports, the slow discharge of several plumes would not appear to cause a violation of Iowa's Water Quality Standards." [See 12-19-95 letter from IDNR]. The source of this groundwater contamination was excavated and properly disposed [See RFI Report approved March 24, 1998, focusing primarily on documents dated February 2, 1993 and September 2, 1993].

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 eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented⁴)?

_____ 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 specialist(s), 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 cannot 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?”

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):

Long term groundwater monitoring will be conducted to assure that contaminated groundwater naturally attenuates, does not migrate, and does not pose a significant risk. Also, a deed notice will be placed on the property identifying areas of groundwater

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contamination and where information regarding such contamination can be found [See Draft Statement of Basis and documents dated October 19, 1998, May 14, 1999, July 30, 1999, and October 5, 1999].

