

US EPA ARCHIVE DOCUMENT

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Migration of Contaminated Groundwater Under Control

Facility Name: Ashland Chemical Calumet City , Illinois Distribution
Facility Address: 142nd & Paxton Ave, Calumet City , Illinois
Facility EPA ID #: ILD 043 369 446

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).

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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?

 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): Based on the RA and the RFI data, the area of groundwater contamination is localized to SWMU- F6 at the Ashland facility. SWMU-F6, remains the only area where ethylbenzene and styrene have been detected and exceeded standards. During the Release Assessment (RA) investigation in 1999 and 2002, six groundwater monitoring wells were installed at the facility: MW-101, and MW-102 at the Ashland plant site area, and MW-103, MW-104, MW-105, and MW-106 at the Fina site area. Contaminated soils were also excavated from some areas. Groundwater samples were collected from the six new monitoring wells and the existing onsite wells. Ethylbenzene and styrene were detected only in MW-106 at a concentration of 3,900ppb and 930ppb. See Table below.

Compound	Illinois Class I Groundwater Standards	Max. Detected	Exceedance Location
VOCs (ug/l)			
Ethylbenzene	700	3,900	MW-106
Styrene	100	930	MW-106

COMPOUND	MW-04 (1998)	MW-04 (2002)	MW-05 (1988)	MW-05 (2002)	MW-106 (2002)
Styrene	1800ppb	ND	11ppb	ND	930ppb
Ethylbenzene	80ppb	ND	ND	ND	3,900ppb

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).

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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)?

 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): Although only one round of groundwater sampling has been conducted in MW-106, testing and analysis of sediment and surface water samples retrieved from the Little Calumet River, downgradient of MW-106 did not detect these two compounds. The Little Calumet River could potentially be acting as a barrier.

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?

 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): Groundwater flows north toward Little Calumet River and discharges to the Little Calumet River. Therefore, groundwater to surface water is a complete pathway.

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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 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 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.

___ **X** ___ 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 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): Ethylbenzene exceeded the surface water standard. See Table below

Chemical	10 x Surface Water Quality Criteria (chronic)	Actual Groundwater Con.
Ethylbenzene	140ppb	3,900ppb
Styrene	2,000ppb	930ppb

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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 implemented⁴)?

___ **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 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): Since the shallow ground is not used as a drinking water source, a Tier 2 groundwater modeling using only ethylbenzene and styrene was conducted by the facility to estimate the groundwater concentrations that could potentially reach the immediate downgradient receptor (i.e., the Little Calumet River). The highest concentrations of these chemicals from the soil borings were used in the model. The evaluation was conducted in accordance with Section 742.810. Because the nearest downgradient receptor is the Little Calumet River, the modeled groundwater concentrations were compared to applicable surface water quality criteria. The surface water quality criteria were obtained from the Bureau of Water of the Illinois EPA. The modeled ethylbenzene and styrene concentrations in the groundwater at the groundwater surface water interface were estimated to be 12 ug/L and 6 ug/L respectively. All the modeled results are below the surface water criteria given in 35 IAC 302 or provided by the Bureau of Water (BOW) of the IEPA. In addition, subsequent surface water sampling results indicate non detect for both constituents. Therefore, the elevated groundwater concentrations at the site would not adversely impact the Little Calumet River.

These results should be qualified in that direct comparison of groundwater concentrations to surface water criteria does not take into account the effects of dilution, dispersion, volatilization, and biodegradation once the groundwater reaches the river. These processes significantly decrease constituent concentrations in surface water. Therefore, the groundwater concentrations at the site would not adversely impact the Little Calumet River. See table

Chemical	Source Concentration (Soil borings)	Location	Modeled GW concentration	Surface Water criteria. (Acute level)	Surface Water criteria (chronic level)
Ethylbenzene	5,400ppb	BH-106	12ppb	150ppb	14ppb
Styrene	3,200ppb	BH- 106	6ppb	2,500ppb	200ppb

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.

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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?”

 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.

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1. 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).

Completed by (signature) _____ Date _____
 (print) Jonathan Adenuga
 (title) _____

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