

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

**RCRA Corrective Action
Environmental Indicator (EI) RCRA Info Code (CA750)**

Migration of Contaminated Groundwater Under Control

Facility Name: **Solutia Inc. J.F. Queeny Plant**
Facility Address: **201 Russell Blvd., St. Louis, MO 63104**
Facility EPA ID #: **MOD 004 954111**

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?

 ü 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.

The following SWMUs and AOCs were considered in completing this EI.

<u>SWMUs</u>	<u>AOCs</u>
WW Building Area	KK Building Area
Former Boiler Slag Accumulation Area	Former Lab Waste Filtration Unit
Former FF Building Area	
VV Building Area	
Former Acetanilides Production Area	
Former Quarry Area	
Former Coal Storage Yard	
Former Bulk Chemical Storage Area	

These areas are identified in the attached **Figure A-1 (Appendix A)**. The SWMUs/AOCs are also further described in **Appendix A**. Groundwater is being addressed on a site-wide basis. The primary source of information concerning these SWMUs/AOCs and groundwater can be found in the report, "RFI Data Gap Investigation Report", Solutia Inc., dated July 2002. **Appendix B** includes a list of other relevant site investigation reports. **Figure A-2** shows the location of monitoring wells and piezometers currently at the facility.

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 RCRA Info national database ONLY as long as they remain true (i.e., RCRA Info 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 [e.g., Maximum Contaminant Levels (MCLs), the maximum permissible level of a contaminant in water delivered to any user of a public water system under the Safe Drinking Water Act]) 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):

Table C-1 in **Appendix C** (revised from Table 4-4 of the RFI Data Gap Investigation Report, July 2002) identifies analytes in groundwater samples that exceed screening criteria (e.g., MCLs). The tables are organized by hydrostratigraphic zone. **Figure A-2** identifies the wells by zone. MCLs are applicable standards for public water supplies. However, groundwater at the facility, and within the entire City of St. Louis, is not used as such. Solutia therefore does not believe that MCLs are relevant “levels” in the context of this EI. Solutia believes that the primary issue with respect to groundwater is via migration to surface water (Mississippi River) and potential effects there. This has been a fundamental premise of RFI activities (e.g., Data Gap Work Plan) over the past several years. As such, the applicable “levels” should be protective of aquatic receptors, as well as other designated uses for the river. An iterative ecological screening process was conducted in the Data Gap investigation, which included comparing site data to relevant surface water screening criteria and taking into account such factors as frequency of detection, mobility and toxicity. The results of this assessment indicated that four constituents posed a potential concern: benzene, chlorobenzene, 1,4-dichlorobenzene and xylenes.

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)?

_____ 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.

___ü___ If unknown - skip to #8 and enter “IN” status code.

Rationale and Reference(s):

The migration of contaminated groundwater at the facility is believed to have stabilized for the following reasons.

- The extent of impact has been characterized via groundwater monitoring and investigations conducted over the past approximately 20 years. The “existing area of contaminated groundwater” has been characterized for risk evaluation and risk management purposes. There are a few areas where Solutia believes additional data are needed in this regard, and work is in progress to obtain the additional information.
- The primary migration of groundwater from the site is toward the Mississippi River (located approximately 300 feet to 1100 feet from the facility)(**Figure 1**). The river provides a hydraulic barrier to further migration downgradient of the facility.
- Over the past approximately 20 years, the majority of manufacturing activities has ceased, processes have been dismantled, and areas have been covered to minimize surface water infiltration.
- The results of groundwater modeling and preliminary results of natural attenuation monitoring confirm that natural processes are actively reducing constituent concentrations.
- The plant has a groundwater protection plan, which includes regular video inspection of sewers, voluntary groundwater monitoring, dismantling of idled facilities, removal of the majority of USTs, etc., in order to minimize the potential for ongoing releases to groundwater.

Modeling conducted as part of the Data Gap investigation predicted groundwater concentrations of benzene, chlorobenzene, 1,4-dichlorobenzene and xylenes potentially discharging to the Mississippi River northeast and southeast of the site (RFI Data Gap Investigation Report, July, 2002). This information is summarized in the table on the following page (modified from the Data Gap Investigation Report, July 2002).

Parameter	Units	Southern Section	Northern Section	Ecological Screening Value (mg/L)
Benzene	mg/L	0.013	0.0001	0.053 ²
Chlorobenzene	mg/L	0.526	0.268	0.195 ²
1,4-Dichlorobenzene	mg/L	---	0.0001	0.0112 ²
Xylene	mg/L	0.001	0.004	0.0018 ³

Parameter	Units	Southern Section	Northern Section	Ecological Screening Value (mg/L)
Groundwater Flow	cfs ¹	0.9	0.8	---

¹Denotes cubic feet per second

²Freshwater surface water screening values, USEPA Region 4 (2001)

³Ambient Water Quality Criteria and Final Chronic Values from Ecotox Threshold EcoUpdate, USEPA 1996

Modeled concentrations of benzene and 1,4-dichlorobenzene potentially discharging to the river are below the conservative, ecological-based screening criteria and would not pose a significant concern. The modeled concentrations of chlorobenzene and xylenes potentially discharging to the river slightly exceed these screening criteria (by approximately 2 times), however this would be considered “insignificant” as defined in this EI as the predicted concentrations are within 10 times the screening criteria. Further, potential receptor populations are limited by the continual fluctuations in the river that prohibit significant habitat development. Lastly, groundwater flow containing chlorobenzene and xylenes is cumulatively predicted to be less than 2 cubic feet per second (cfs), whereas flow in the Mississippi is hundreds to thousands of cfs, even in a narrow area along the shoreline.

The results of post-Data Gap groundwater monitoring data in the former Bulk Chemical Storage Area (southeastern portion of site) indicated a variability in groundwater conditions that is not yet fully understood. Solutia is currently developing a work plan to better understand the groundwater dynamics in this area and potential implications with respect to ecological concerns.

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):

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):

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?"

_____ 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):

8. Check the appropriate RCRA Info 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 _____ facility, EPA ID # _____, located at _____. 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.

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

Completed by: (Signature) Original signed by Vin Journey Date September 30, 2002
(Print) Vin Journey, R.G.
(Title) Environmental Engineer II

Supervisor: (Signature) Original signed by Richard A. Nussbaum Date September 30, 2002
(Print) Rich Nussbaum, P.E., R.G.
(Title) Corrective Action Unit Chief
(EPA Region or State) State of Missouri

Locations where References may be found:

Hazardous Waste Program: Solutia, Inc. (Queeny) TSD Files located at 1738 E. Elm Street, Jefferson City, MO 65101.

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