

12/16/04

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: Occidental Chemical Corporation
Facility Address: 301 West DuPont Avenue, Belle, West Virginia, 25015
Facility EPA ID #: WVD 00 501 0277

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).

**Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)**

Page 2

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):

In accordance with the *Voluntary Ground Water Sampling Work Plan* (February 2002), two sampling events were completed at the Site in 2003 and 2004: 1) an annual comprehensive groundwater sampling event for volatile organics, semi-volatile organics and inorganics; and 2) a focused groundwater sampling program for volatile organics. The locations of the 53 Unit 2 and Unit 3 monitoring wells are shown on Figure 1 of the *Voluntary Groundwater Water Sampling Work Plan*. Data collected during the 2003 and 2004 sampling events are summarized in Tables A, B and C of the report entitled, *Documentation for Groundwater Environmental Indicator, Former Occidental Chemical Corporation Facility, Belle, West Virginia, September 2005*. Prior to 2002, groundwater data were collected during various site characterization activities.

Unit 2 and Unit 3 groundwater quality data were used to assess the stability of groundwater quality conditions. In addition to the tables mentioned above, graphs of groundwater quality in Unit 3 are presented in the report entitled, *Documentation for “Groundwater Environmental Indicator, Former Occidental Chemical Corporation Facility, Belle, West Virginia”, September 2005*. Groundwater at the Facility is impacted with several constituents above drinking water standards (i.e., MCLs and tap water RBCs for those constituents without MCLs). Constituents detected at the greatest concentrations in groundwater include: chloroform, carbon tetrachloride and methylene chloride.

Based on completed site characterization activities, groundwater sampling data and review of historic site uses, two source areas have been identified at the Site: the Production Source Area and Area 7. These two source areas are shown in the “*Documentation for Groundwater Environmental Indicator, Former Occidental Chemical Corporation Facility, Belle, West Virginia”, September 2005*. Interim Measures are being implemented for both of these areas.

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).

Migration of Contaminated Groundwater Under Control Environmental Indicator (EI) RCRIS code (CA750)

Page 3

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):

As shown graphically within the document entitled "Documentation for Groundwater Environmental Indicator, Former Occidental Chemical Corporation Facility, Belle, West Virginia, September 2005", total volatile organic constituents are stable or decreasing in a majority of the on-site monitoring wells. Several wells had fluctuating concentrations. One well, MW-25, shows an increasing trend; however, this well is located downgradient of the Production Source Area. The Production Source Area is currently undergoing enhanced in situ bioremediation as an interim remedial measure. The increasing trend observed at MW-25 is expected to be a short-term response caused by enhanced desorption/dissolution of certain chemical constituents. It is important to note that there are additional on-site wells downgradient of MW-25 which show stable concentration trends and that active remediation is occurring within the Production Source Area to reduce source concentrations. The progress of the remediation in the Production Source Area is described in the report entitled, "Production Source Area, In Situ Enhanced Reductive Dechlorination Interim Measures – Progress Report 1", dated August 26, 2005. Overall, the remediation in the Production Source Area is resulting in mass source removal in certain portions of this area.

Total semi-volatile organic constituents are stable or decreasing in a majority of the on-site monitoring wells. Several wells had fluctuating concentrations. A spike in semi-volatile organic concentrations was observed in the 2004 annual sampling event in MW-27. This well is located in Area 7. In May 2005, the "Area 7 Interim Remedial Measure Workplan" (Area 7 Workplan) was submitted to USEPA/WVDEP. This workplan proposed the installation of a containment system, consisting of a grouted sheet pile barrier wall and cap to isolate non-aqueous phase liquid and minimize groundwater flow through Area 7. Recent NAPL characterization efforts delineated the spatial extent of NAPL in Area 7. The location of the barrier wall is shown on Figure 3 of the Area 7 Workplan. Installation of 400 linear feet along the Kanawha River was completed by September 30, 2005. MW-27 is located within the proposed containment system. The entire barrier wall will be completed by December 2005. The impermeable cap will be constructed by Spring 2006.

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.

12/16/04

**Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)**

Page 4

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):

The Kanawha River bounds the property to the south and the Reynolds Branch bounds the property to the east as shown on Figures 1 and 2 of the Area 7 Workplan. Over the majority of the Facility, groundwater flows vertically downward through Units 1 and 2, replenishing Unit 3. Near the river, there is a limited groundwater flow from Unit 1 and 2 that discharges directly into the river. The flow in Unit 3 is essentially horizontal, discharging to the Kanawha River. Locally, where hydraulic gradients are downward from Unit 3 to the bedrock a limited vertical flow from Unit 3 gradually replenishes bedrock. Groundwater water contours from the overburden are presented on Figures 2-4 through 2-7 of "Production Source Area, In Situ Enhanced Reductive Dechlorination Interim Measures – Progress Report 1", dated August 26, 2005. Groundwater contours for the shallow bedrock are presented on Figure 3-16 of the "RCRA Facility Investigation Report", dated November 1996.

As described in the response to Question 3, a grouted sheet pile barrier wall is under construction in Area 7. With the completion of a portion of the wall along the River, the flow of groundwater through Area 7 has been significantly reduced. Upon completion of the containment system, it is estimated through modeling that the flow of groundwater through Area 7 will be reduced by 92%. The enhanced bioremediation treatment in the Production Source Area is reducing the flux of contaminants from the Production Source Area through enhanced reductive dechlorination.

**Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)
Page 5**

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.

✓ 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):

Several parameters in groundwater exceeded 10 times their MCL, RBC, or surface water criterion. Further discussion of the risk from these compounds is discussed in relation to Question #6.

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

**Migration of Contaminated Groundwater Under Control
Environmental Indicator (EI) RCRIS code (CA750)**

Page 6

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 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):

Potential exposure for recreational users of Reynolds Branch and the Kanawha River were evaluated and reported in the Human Health Risk Assessment for Surface Water and Sediment (August 2002). No significant risks were identified in this risk assessment. Phase I and Phase II Ecological Risk Assessments were completed which focused on potential risks to ecological receptors. Several hundred samples were collected as part of the human health and ecological risk assessment activities. The fish ingestion exposure pathway was not considered significant for the Reynolds Branch since this transient stream is frequently dry during the warm months and edible fish are not likely to be present. Because the results of the risk assessments were inconclusive and the Kanawha River is highly industrialized, it is difficult to attribute the presence of any of the constituents in the water bodies with practices that occurred at the former OxyChem facility.

Since the completion of the risk assessments, two interim remedial measures (enhanced bioremediation in the Production Source Area and the containment system in Area 7) have been implemented to significantly reduce the flux of contaminants into the Kanawha River. Upon completion of the containment system with an impermeable cap in Area 7, it is estimated through

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.

12/16/04

modeling, that the flow of groundwater through Area 7 will be reduced by 92%. Additional monitoring and sampling will be completed to assess the continued performance of the interim remedial measures.

