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:	Albemarle West Plant
Facility Address:	Magnolia, Arkansas
Facility EPA ID #:	ARD 982558561

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 #6 and enter"IN" (more information needed) status code.

BACKGROUND

The West Plant facility is located in Columbia County on U.S. Highway 371 South, approximately 3 miles west of Magnolia, Arkansas. The facility is located in Sec. 18, T17N, R12W of the USGS Waldo 7.5 minute quadrangle. Figure 1-1 shows the facility's property boundary.

The West Plant facility was initially constructed by Dow and began operation in 1967. Historically, the facility has manufactured bromine and bromine-related products by extracting bromide from brine recovered from the Smackover Formation.

In 1987, Dow sold the West Plant facility to Ethyl Corporation (Ethyl). In 1994, Albemarle was formed from the specialty chemicals division of Ethyl. As one of the conditions of the sale of the facility, Dow retained ownership of specific portions of land that had been used for the disposal of materials and equipment. In addition, Dow retained ownership of the equipment comprising a groundwater remediation system and the financial liability for any groundwater, soils or surface water contaminated by former Dow activities at the facility. In preparation of the transfer of the West Plant to Ethyl, Dow conducted a "Pre-Sale Environmental Assessment" of the site in 1987. The assessment identified 20 areas where waste material had been managed in the past. Several areas of concern, contaminated with one or more of the constituents previously mentioned, were identified from the assessment and other investigations.

In 1987, Dow also sold its calcium-bromide production unit to Tetra Corporation (Tetra). This transaction took place prior to the sale of the West Plant to Ethyl. Since the sale, the calcium-bromide unit has never been operated. There are no Tetra personnel at the plant site and there is no activity at the production unit.

In 1987, Dow retained the rights to its foamed polystyrene (Styrofoam Reg.) products. Ethyl operated the foamed polystyrene plant for Dow for a short period of time, then converted the facilities for the production of a foamed polyimide product. This operation was sold by Albemarle to the ImiTech Corporation. The equipment and property associated with this unit are currently owned and operated by ImiTech. The property boundaries of the units owned by Tetra and ImiTech are depicted in Figure 1-2. Also shown in the figure is the boundary of the property retained by Dow.

Beginning in the mid 1970's, Dow began investigating soil and groundwater conditions at the West Plant facility.

Since that time, corrective actions progressed at both the south side and north side of the facility.

(1999 West Plant Document of Current Conditions, October 1999)

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):

Phases I, II & III of the Facility Investigation included sampling of groundwater in areas suspected of being contaminated. Constituents that exceed the appropriate risk-based screening standards are listed in the attached table.

1999 West Plant Document of Current Conditions, October 1999
West Plant Corrective Action Annual Progress Reports 2002-2004 (submitted March 2003, February 2004, January 2005)
Facility Investigation Report Phase I & II, March 2005

Facility Investigation Report, Phase III September 2006
Human Health & Ecological Risk Assessment, September 2006

[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).

EXCEEDANCE SUMMARY FOR GROUNDWATER

Analyte	Screening Standard (ppm)	Area
1,2,4-Trichlorobenzene	0 07	Back Ditch
1,2,4-Trimethylbenzene	0.0012	Railroad
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	A-10, A-12, A15&16, A-19, FD-1, FD-3, FD-4, FD-5, Railroad, U.Tail Brine Pond, Back Ditch
1,2-Dibromoethane (EDB)	0.00005	A-10, A-11, A-12, A-15&16, A-19, FD-3, FD-4, FD-5, Railroad, U. Tail Brine Pond, Back Ditch
1,2-Dichloroethane (EDC)	0 005	A-10, A-11, A-12, A-19, A-4, FD-1, FD-3, FD-4, FD-5, L Tail Brine Pond, Railroad, U Tail Brine Pond, Back Ditch
1,2-Dichloroethene	0.0055	Railroad
1,2-Dichloropropane	0.005	A-15&16, Back Ditch, Railroad, FD-1, FD-3, FD-4
1,3,5-Trimethylbenzene	0.0012	Railroad
1,3-Dichlorobenzene	0.0014	Back Ditch
1,3-Dichloropropane	0.002	Back Ditch
1,4-Dichlorobenzene	0.075	A1
1-Bromo-2-chloroethane (BCE)	0 00005	A-10, A-11, FD-1, FD-4, FD-5, Railroad, U Tail Brine Pond, Back Ditch
2-Chloroethylvinylether	0.00019	Back Ditch, FD-4, FD-5
Methyl isobutyl ketone (MIBK)	0.2	Railroad
Acrolein	0.0000042	Railroad
Acrylonitrile	0.000039	Railroad
Benzene	0.005	Railroad
Bromodichloromethane	0.00018	Railroad, A-11, A-15&16, A-19, FD-3, FD-4, FD-5
Bromoform	0.0085	A-1, A-2, A-4, A-7, A-11, A-12, A-19, FD-3, FD-4, FD-5, Railroad
Bromomethane	0.00087	A-12, A-13, Back Ditch, FD-3
Carbon Disulfide	0.1	Back Ditch
Chloride	250	A-7, A-10, A-11, A-12, A-13, A-15, A-19, FD-1, FD-3, FD-4, FD-5, Railroad, L Tail Brine Pond, U Tail Brine Pond, Back Ditch
Chlorobenzene	0.1	FD-1, A-1, Railroad
Chloroethane	0.0039	A13
Chloroform	0.00017	A-12, A-16, FD-1, FD-3, FD-4, FD-5, Railroad
Chloromethane	0.0021	A-12
Chromium (total)	0 1	A-13
Dibromochloromethane	0.00013	A-12, FD-4, FD-5, Railroad
Dibromomethane	0.0061	A-1, A-2, A-4, A-7, A-10, A-11, A-12, A-19, FD-4
Dichlorodifluoromethane	0.039	A-13, A-17
Hexachlorobutadiene	0.00086	Back Ditch
Iodomethane	0.001	A-12, FD-3, Back Ditch
Methylene chloride	0.005	A-13, A-19, Back Ditch, FD-3, FD-4
Naphthalene	0.00062	A-17, FD-4, Railroad
Nickel	0.073	A-13
n-Propylbenzene	0.0061	Railroad
sec-Butylbenzene	0.0061	Railroad
tert-Butylbenzene	0.0061	Railroad
Tetrachloroethene	0.005	Back Ditch, Railroad
Vinyl Chloride	0.002	Railroad

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):

Contaminated Groundwater is collected via the French Drains surrounding the site.
Continued groundwater sampling monitors for the migration of contaminated groundwater beyond the French Drains.
Soil and groundwater data collected from the August 2005 Phase III Facility Investigation revealed that the groundwater and soil limits have been defined. Nature of geology and physical characteristics of constituents do not allow impacted groundwater to enter a surface water body, except for the SE corner of the property where constituent concentrations are less than 10X its MCL prior to entering the surface water body (Dismuke Branch).

1999 West Plant Document of Current Conditions, October 1999
West Plant Corrective Action Annual Progress Reports 2002-2004 (submitted March 2003, February 2004, January 2005)
Facility Investigation Report Phase I & II, March 2005

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Human Health & Ecological Risk Assessment, September 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.

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):

Contaminated groundwater at the site is intercepted by the existing French drains. Groundwater sampling is conducted to monitor for the migration of contaminated groundwater beyond the French drains. Nature of geology and physical characteristics of constituents do not allow impacted groundwater to enter a surface water body, except for the SE corner of the facility where the constituent concentrations are less than 10X its MCL prior to entering the surface water body (Dismuke Branch).
1999 West Plant Document of Current Conditions, October 1999
West Plant Corrective Action Annual Progress Reports 2002-2004 (submitted March 2003, February 2004, January 2005)
Facility Investigation Report Phase I & II, March 2005

Facility Investigation Report, Phase III September 2006
Human Health & Ecological Risk Assessment, September 2006

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)?

X 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.

___ 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):
See page 3, the table "EXCEEDANCE SUMMARY FOR GROUNDWATER"

[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 implemented[4])?

___ 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):

_____
_____
_____
_____
_____

[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):

Data will continue to be collected from monitoring wells downgradient and upgradient of the groundwater leachate system to monitor "existing area of contaminated groundwater".

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 **Albemarle West Plant** facility, EPA ID # **ARD 982558561**, located at **Magnolia, Arkansas**. 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/State 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) [signature] Date 9/25/06
(print) Brian Wakelyn
(title) Geology Supervisor

Supervisor (signature) [signature] Date 9-25-06
(print) Tammie Hynum
(title) Technical Branch Manager
(EPA Region or State) AR

Locations where References may be found:
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