DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action Environmental Indicator (EI) RCRIS code (CA725)

Current Human Exposures 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 soil, groundwater, surface water/sediments, and air, 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.

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 (AOCs), contaminated with one or more of the constituents as depicted on Page 4, 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.

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. These corrective actions will be discussed further in the remainder of this document.

(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 "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "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 "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

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. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **"contaminated"**¹ above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	Yes	No	?	Rationale / Key Contaminants
Groundwater	Х			Applicable Screening Standards Exceeded
Air (indoors) ^{2}		Х		Air sampling results are below acceptable limits
Surface Soil (e.g., <2 ft)	Х			Applicable Screening Standards Exceeded
Surface Water		Х		Investigation Results are below acceptable limits
Sediment		Х		Investigation Results are below acceptable limits
Subsurf. Soil (e.g., >2 ft)	Х			Applicable Screening Standards Exceeded
Air (outdoors)		Х		Air sampling results are below acceptable limits

If no (for all media) - skip to #6, and enter "YE," status code after providing or citing appropriate
"levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

X If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

If unknown (for any media) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

The Human Health and Ecological Risk Assessment (HHERA), dated March 2005, identified groundwater, surface soil, and subsurface soil as media of concern with constituent concentrations that exceeded the risk-based screening criteria presented in EPA Region VI Human-Health Medium-Specific Screening Levels (HHMSSLs) table, dated December 13, 2004.

Note: The March 2005 HHERA presents modeled outdoor and indoor air concentrations that were estimated to pose unacceptable risks to onsite workers. However, indoor and outdoor air samples were collected as part of the Phase III Investigation. The results were either nondetect or below the applicable risk criterion.

References:

- 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

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 appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

² Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

- Human Health & Ecological Risk Assessment, March 2005
- Phase III Facility Investigation Report and Risk Assessment, in progress

EXCEEDANCE SUMMARY FOR GROUNDWATER*

Analyte	Screening	Area
	Standard (ppm)	
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	A-10 to A-12, A15&16, A-19, FD-1, FD-4, Railroad, U.Tail Brine Pond, Back Ditch
1,2-Dibromoethane (EDB)	0.00005	A-10 to A-12, A11, A12, A15&16, A-19, FD-4, Railroad, U. Tail Brine Pond, Back Ditch
1,2-Dichloroethane (EDC)	0.005	A-10 to A-12, A11, A-19, A4, FD-1, FD-4, L Tail Brine Pond, Railroad, U Tail Brine Pond, A15&16, Back Ditch
1,2-Dichloropropane	0.005	A15&16, A-19, Back Ditch, FD-4, Railroad, FD-1
1,4-Dichlorobenzene	0.075	A1
1-Bromo-2-chloroethane (BCE)	0.48	A11, A-19, FD-1, FD-4, Railroad, U Tail Brine Pond A10, A15&16, Back Ditch
2-Chloroethylvinylether	0.029	A15&16, Back Ditch
Bromodichloromethane	0.0033	A15&16, Railroad, A-11
Bromoform	0.0261	A-10 to A-12, A11, A15&16, A2, A4, A-1 & A7
Bromomethane	0.1	A-19
Chloride	250	A7, A13, A15&16, A-19, Back Ditch, U Tail Brine Pond, A11, A12, FD-1, FD-3, FD-4 L Tail Brine Pond, Railroad
Chlorobenzene	0.1	A1, FD-1
Chloroethane	0.0039	A13
Chloroform	0.075	A15&16, L tail Brine Pond, Railroad, U Tail Brine Pond, FD-1
Chromium (total)	0.1	A13
Dibromochloromethane	0.0024	A15&16
Dibromomethane	0.061	A1, A10, A15&16, A2, A4, A11
Methylene chloride	0.0043	A13, A15&16, A-19, Back Ditch
Tetrachloroethene	0.005	Railroad

EXCEEDANCE SUMMARY FOR SOIL*

Analyte	Screening Standard (ppm)	Area
1,1,2-Trichloroethane	0.018	U Tail Brine Pond
1,2,3-Trichloropropane	0.0034	FD-1, L Tail Brine Pond, U Tail Brine Pond
1,2-Dibromo-3-chloropropane (DBCP)	0.0216	A-5, A11, A-10, A15&16, A-19, L Tail Brine Pond, Railroad, U Tail Brine Pond, FD-1, Back Ditch, Rain Water Pond
1,2-Dibromoethane (EDB)	0.01168	A-10, A-11, A-12, A15&A16, A-19, A-2, FD-1, FD-4, Railroad, U Tail Brine Pond, Back Ditch
1,2-Dichloroethane (EDC)	0.02	A-10, A-19, A-2, A-3, A-4, FD-1, FD-4, L Tail Brine Pond, Railroad, U Tail Brine Pond, Back Ditch, Rain Water Pond
1,2-Dichloropropane	0.02	A-19, FD-4
1-Bromo-2-chloroethane (BCE)	0.216	A-10, A-19, Railroad, U Tail Brine Pond, Back Ditch, Rain Water Pond, L Tail Brine Pond
Arsenic	1.8	Back Ditch
Benzene	0.04	U Tail Brine Pond, Rain Water Pond, Railroad
Bromoform	0.8	A-5
Methylene chloride	0.02	A-15 & A-16, A-19, L Tail Brine Pond, Railroad, U Tail Brine Pond
Tetrachloroethene	0.06	Railroad
Vinyl chloride	0.014	U Tail Brine Pond
Acrylonitrile	0.015	Railroad

*Based on results from the Phase I & II Investigations

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Potential Human Receptors (Under Current Conditions)

<u>"Contaminated"</u> <u>Media"</u>	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food
Groundwater	NO	NO	NO	YES	NO	NO	NO
Air (indoors)	Х	Х	Х	Х	Х	Х	Х
Soil (surface, e.g., <2 ft)	NO	YES	NO	YES	YES	NO	NO
Surface Water	X	X	Х	Х	X	X	Х
Sediment	Х	X	Х	Х	Х	Х	Х
Soil (subsurface e.g., >2 ft)	NO	NO	NO	YES	NO	NO	NO
Air (outdoors)	X	X	X	X	X	X	X

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated" as identified in #2 above.

2. enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media -Human Receptor combinations (Pathways) do not have check spaces ("____"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional <u>Pathway Evaluation Work Sheet</u> to analyze major pathways).

X If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

Based on the sampling results, surface water, sediment, and air (indoor and outdoor) are not contaminated.

Groundwater – The direct-contact exposure pathways for groundwater are complete for an on-site construction worker.

Surface soil – The direct- contact exposure pathways for surface soil are complete for an on-site worker, construction worker and potential trespasser.

Subsurface soil – The direct-contact exposure pathways for subsurface soil are complete for an on-site construction worker.

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be "**significant**"³ (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

X If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and Reference(s):

The major chemicals of concern (COCs) identified at the site include chlorides, 1,2-dibromo-3-chloropropane (DBCP), 1-bromo-2-chloroethane (BCE), 1,2-dibromoethane (EDB) and 1,2-dichloroethane (EDC). The impacted areas include A-2, A-3, A-4, A-5, A-10, A-11, A-13, A-15 & 16, A-19, Railroad-Process Area, Back Ditch, Upper Tail Brine Pond, Lower Tail Brine Pond, South Feeder Ditch and Smith's Branch.

The March 2005 HHERA is currently being revised to include the recent Phase III Investigation data and to incorporate ADEQ comments dated May 18, 2005. Based upon calculated risk estimates, the following "significant" exposures have been identified:

- AOCs with noncancer hazards greater than acceptable levels (i.e., HI>1.0) for a construction worker include the A19, RR-Process Area, Back Ditch, and Upper Tail Brine Pond. Incidental ingestion of soil (surface and subsurface) containing EDB and DBCP contributes to the majority of these noncancer hazards.
- AOCs with cancer risks that exceed the highest acceptable risk level (i.e., 10⁻⁴) for a construction worker include A19, RR-Process Area, Back Ditch, and Upper Tail Brine Pond. Incidental ingestion of soil (surface and subsurface) containing EDB and DBCP contributes to the majority of the cancer risks for construction workers in these areas.
- Risk estimates for construction-worker direct-contact exposures to groundwater indicate potential noncancer hazards and cancer risks greater than acceptable limits (i.e., HI of 1.0 and a cancer risk of 10⁻⁴, respectively).

There are no exposures from any other complete exposure pathways that can be reasonably expected to be "significant" (based on risk calculations using site data gathered to date).

5. Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

³ If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

- X If yes (all "significant" exposures have been shown to be within acceptable limits) continue and enter "YE" after summarizing <u>and</u> referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).
- If no (there are current exposures that can be reasonably expected to be "unacceptable")- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale and Reference(s):

- Surface soil – Surface soils at the site are generally not contaminated, with the exception of the RR-Process Area and Back Ditch Area. All surface soils in regular work areas are covered with concrete.

Access to the RR-Process and Back Ditch Areas is restricted via institutional and administrative controls to prevent direct contact to surface soils by on-site workers include excavation permits and safety procedures that require appropriate personal protective equipment (PPE).

- Groundwater & Subsurface Soil - Groundwater contamination is limited to the uppermost groundwater. This groundwater is not used for any beneficial uses on-site and in the vicinity.

Institutional and administrative controls currently in place at the West Plant prevent direct exposure to contaminated groundwater and subsurface soil by on-site construction workers. Construction workers are required to follow established procedures, obtain permits, and wear appropriate PPE if soil is to be disturbed. Additionally, security measures including fencing and on-site security personnel prevent trespassers from entering the site.

- Albemarle has an industrial hygiene program that addresses exposure to site COCs. This program is included in the site Health and Safety Plan.

Migration of Contaminated Groundwater Under Control Environmental Indicator (EI) RCRIS code (CA750) Page 8

(CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

- X YE Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the <u>Albermarle West Plant</u> facility, EPA ID # <u>ARD 982558561</u>, located at <u>Magnolia, Arkansas</u> under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.
 - NO "Current Human Exposures" are NOT "Under Control."
 - IN More information is needed to make a determination.

Completed by	(signature)	[Signed]	Date	09/22/05
	(print)	Derick G. Warrick, PE		
	(title)	Engineering Supervisor		
Supervisor	(signature)	[Signed]	Date	09/22/05
	(print)	Tammie Hynum		
	(title)	Active Sites Branch Manager		
	(EPA Regio	n or State) ADEO (Arkansas)		

Locations where References may be found:

- 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
- Human Health & Ecological Risk Assessment, March 2005
- Phase III Facility Investigation Report and Risk Assessment, in progress

Contact telephone and e-mail numbers

(name)	Derick G. Warrick, PE
(phone #)	501-682-0838
(e-mail)	Warrick@adeq.state.ar.us

FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.

Migration of Contaminated Groundwater Under Control Environmental Indicator (EI) RCRIS code (CA750) Page 8

Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

Х YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Albermarle West Plant facility, EPA ID # ARD 982558561, located at Magnolia, Arkansas under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

NO - "Current Human Exposures" are NOT "Under Control."

IN - More information is needed to make a determination.

Completed by	(signature)	<u>Much G. Karrick</u>	Date 9/22/05
	(title)	Engineering Supervisor	
Supervisor	(signature) (print)	<u>Jammie Stam</u> Tammie Hynum	Date 9/22/05
	(title)	Active Sites Branch Manager	
	(EPA Regi	on or State) ADEO (Arkansas)	

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(name)	Derick G. Warrick, PE	-
(phone #)	501-682-0838	
(e-mail)	Warrick@adeq.state.ar.us	

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