

**DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION**  
**RCRA Corrective Action**  
**Environmental Indicator (EI) RCRIS code (CA725)**

**Current Human Exposures Under Control**

**Facility Name:**       The Dow Chemical Company, Texas Operations    
**Facility Address:**     2301 N. Brazosport Blvd., Freeport, TX 77541    
**Facility EPA ID #:**     TXD008092793  

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**

**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 nearterm 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”**<sup>1</sup> 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	<u>  X  </u>	<u>    </u>	<u>    </u>	<u>Assessments/Chlorinated Organics</u>
Air (indoors) <sup>2</sup>	<u>    </u>	<u>  X  </u>	<u>    </u>	<u>Industrial hygiene program</u>
Surface Soil (e.g., <2 ft)	<u>    </u>	<u>  X  </u>	<u>    </u>	<u>Assessments/Process knowledge</u>
Surface Water	<u>    </u>	<u>  X  </u>	<u>    </u>	<u>Assessments</u>
Sediment	<u>  X  </u>	<u>    </u>	<u>    </u>	<u>Assessments/Chlorinated Organics</u>
Subsurf. Soil (e.g., >2 ft)	<u>  X  </u>	<u>    </u>	<u>    </u>	<u>Assessments/Chlorinated Organics</u>
Air (outdoors)	<u>    </u>	<u>  X  </u>	<u>    </u>	<u>Assessments/industrial hygiene program</u>

- 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):

See Pages 2B and 2C.

Footnotes:

<sup>1</sup> “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).  
<sup>2</sup> 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.

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2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be “contaminated”<sup>1</sup> 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)?

**Rationale and Reference(s):**

An analysis of potential receptors was submitted in May 2000 as part of the application for a modification of the TCEQ Compliance Plan. This information can be found in Sections 6.3.2.1 *Applicable Receptors*, and 6.3.2.2 *Points of Exposure* in Volume 3 of the application. Rationale and additional references are included below.

**Groundwater and Subsurface Soil** - Documentation of contamination in the subsurface soils and groundwater has been submitted to the TCEQ in many corrective action investigation reports (RFI/CMS) since 1989. This information was summarized in the TCEQ Compliance Plan application initially submitted in May 2000 and amended in submittals dated April 5, 2001; April 19, 2001; August 30, 2001; and September 29, 2001. This application included requests for approval of Facility Operations Areas (FOAs) for the Plant A and Plant B Sites. The Facility Operations Area concept allows a facility to address exposure pathways in an alternative manner to that prescribed by the Texas Risk Reduction Program. These requests were approved with issuance of a revised compliance plan on March 29, 2004. Additional documentation regarding contamination levels in groundwater has been submitted to the TCEQ in the semi-annual reports as required by Compliance Plan No. CP-50161001, including March 29, 2004, July 26, 2004 and December 13, 2004. A specific list of hazardous constituents detected in groundwater at the facility may be found in Table II. 5 of the Compliance plan application form submitted in the April 5, 2001 revision to the May 2000 compliance plan modification application. A summary of the occurrences of contaminated ground water beyond the facility boundary was submitted September 30, 2004.

**Air (indoors and outdoors)** – The Freeport facility has conducted an extensive industrial hygiene program onsite for more than 30 years. This program includes both personal and area monitoring for COCs that may be found at the site and is protective of onsite workers. The qualifying criteria for a FOA states:

“The facility must be able to document that the worker health and safety program meets or exceeds requirements of the Occupational Safety and Health Administration (OSHA) as demonstrated by:

(A) its OSHA compliance history, or

(B) results of evaluation by a third party certified industrial hygienist and safety specialist.”

The Freeport facility continues to meet this requirement for the Plant A and Plant B FOAs by a third party evaluation. The Oyster Creek Site is recognized as a OSHA Voluntary protection Program STAR site. A description of the Worker Health Program is included in Volume 3 of the May 2000 application as Section 6.10.

For the Slaughter Road Area south of Plant B, Dow performed soil vapor sampling and modeling to demonstrate that human health is protected. Attachment J of the September 2001 revision to Volume 13 of the compliance plan application contains information on indoor and outdoor air for the Slaughter Road Area.

**Surface Soil** – There is no evidence of surface soil contamination offsite. Onsite a combination of programs is used to protect against any potential surface soil contamination. The facility has employed an aggressive program to respond to spills or other discovered soil contamination and remove near surface contamination. This practice is formalized in the *Spill Tracking and Response Plan* and the *Soil Action Response Plan* that were submitted to TCEQ in the May 2000 application to modify the compliance plan. The plans are located in Sections 6.11 and 6.12 of the application.

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**Rationale and References (continued):**

**Surface Water** – Based on a review of groundwater data collected in historical investigations, contamination levels have not exceeded the Ground Water Protection Standards established by the compliance plan in areas where open groundwater-to- surface- water migration pathways exist. An additional assessment of surface water bodies, *Dow Plant A and Plant B Tier 2 SLERA*, is being completed. This new assessment of the site includes information that no significant impact is occurring to surface water bodies.

**Sediment** – The onsite point of exposure (POE) would be the sediments in the Barge Canal within the Plant A and B FOA boundaries. The offsite POE would be the sediments in the Brazos River, Freeport Harbor, and the Barge Canal where the Plant A and B FOA boundaries intersect the Barge Canal. However, TCEQ guidance states that there will not be a human health POE to sediment where the surface water body is more than 2 meters in depth. The Brazos River, Freeport Harbor, and the Barge Canal are greater than 2 meters in depth.

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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

Contaminated Media	Potential <b>Human Receptors</b> (Under Current Conditions)						
	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food <sup>3</sup>
Groundwater	__No__	__No__	__No__	__No__			__No__
Air (indoors)	_____	_____	_____				
Soil (surface, e.g., <2 ft)	_____	_____	_____	_____	_____	_____	_____
Surface Water	_____	_____	_____	_____	_____	_____	_____
Sediment	__No__	__No__			__No__	__No__	__No__
Soil (subsurface e.g., >2 ft)				__No__			__No__
Air (outdoors)	_____	_____	_____	_____	_____	_____	_____

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 Pathway Evaluation Work Sheet to analyze major pathways).

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):**

See Page 3B.

<sup>3</sup> Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

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**Rationale and Reference(s):**

A thorough evaluation of potential exposure pathways related to contamination within the FOA boundary is documented in Section 6.3 of the Compliance Plan Application originally submitted in May 2000 and revised in April 2001. Documentation of potential exposure pathway evaluations for the Slaughter Road Area is documented in the compliance plan application revision for Volume 12, Attachments C and J, submitted in September 2001.

**Groundwater** – There are no onsite residents or daycare centers. As indicated on page 2B, the Freeport facility has a comprehensive worker health and safety program. This program is applicable to Dow workers and contractors that are working on the site and includes construction projects. The program is designed to prevent exposure of onsite workers to COCs in groundwater. The depth of the affected groundwater bearing units also limits potential exposure. No food crops or animals are raised onsite. The salinity also further limits the usability of the groundwater and any potential effect on foods.

Offsite in the Slaughter Road Area the depth, the salinity and City of Freeport prohibitions on wells also prevent human receptors from being exposed to the groundwater.

**Sediment** - The onsite point of exposure (POE) is potentially the sediments in the Barge Canal within the Plant A and B FOA boundaries. This pathway is protected by the worker Health and Safety plans. The offsite POE is potentially the sediments in the Brazos River, Freeport Harbor, and the Barge Canal where the Plant A and B FOA boundaries intersect the Barge Canal. However, TCEQ guidance states that there will not be a human health POE to sediment where the surface water body is more than 2 meters in depth. The Brazos River, Freeport Harbor, and the Barge Canal are greater than 2 meters in depth.

**Subsurface soil** – As indicated above for groundwater, the facility's worker health and safety plan is designed to prevent exposure to hazardous substances including during construction projects. No food crops or animals are raised onsite. Offsite in the Slaughter Road Area, the contamination is confined to groundwater. Therefore, there is no potential exposure from subsurface soils.





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- 6. 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):

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 Dow Chemical Company, Texas Operations Facility, EPA ID # **TXD008092793**, located at 2301 N. Brazosport Blvd, Freeport, TX. 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) \_\_\_\_\_ Date 12/30/04 \_\_\_\_\_  
(print) Mark E. Erwin  
(title) Project Manager

Supervisor (signature) \_\_\_\_\_ Date 12/30/04 \_\_\_\_\_  
(print) Cathy Remmert  
(title) Supervisor  
(EPA Region or State) Texas Commission on Environmental Quality

Locations where References may be found:

**TCEQ Central Records, Austin, Texas**

Contact telephone and e-mail numbers

**Project Manager listed above  
(512) 239-2343  
corract@tceq.state.tx.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.**

SWR #30.06

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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) *Mark E. Erwin* Date 12/30/04  
(print) Mark E. Erwin  
(title) Project Manager

Supervisor (signature) *Cathy Renneert* Date 12/30/04  
(print) Cathy Renneert  
(title) Supervisor  
(EPA Region or State) Texas Commission on Environmental Quality

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*Handwritten note:*  
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