HZ/RC/TE

# 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: Air Force Plant 3
Facility Address: Tulsa, Oklahoma
Facility EPA ID #: OK 9570000001

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 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).

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 | X | | | (see below) |
| Air (indoors) [2] | | X | | (see below) |
| Surface Soil (e.g., <2 ft) | | X | | (see below) |
| Surface Water | | X | | (see below) |
| Sediment | | X | | (see below) |
| Subsurf. Soil (e.g.,>2 ft) | | X | | (see below) |
| Air (outdoors) | | X | | (see below) |

_____ 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): *IRP RCRA Facility Investigation, January 1996 (Earth Tech, Inc.); IRP Phase II RCRA Facility Investigation, November 1998 (Earth Tech, Inc.); and IRP Baseline Risk Assessment for SWMUs 5 & 8 and AOC 1, August 1998 (Earth Tech, Inc.).*

| *Media* | *Contaminant* | *Max Detected* | *Location* |
|---|---|---|---|
| *Groundwater* | *1,1–DCA* | *1,400 µg/L* | *5-5* |
| *Groundwater* | *2,3–DCA* | *270 µg/L* | *8-8* |
| *Groundwater* | *1,1–DCE* | *2,900 µg/L* | *8-17* |
| *Groundwater* | *cis–1,2–DCE* | *3,300 µg/L* | *8-8* |
| *Groundwater* | *1,1,1–TCA* | *940 µg/L* | *8-17* |
| *Groundwater* | *TCE* | *24,000 µg/L* | *8-20* |
| *Groundwater* | *Methylene chloride* | *1,100 µg/L* | *8-17* |
| *Groundwater* | *Vinyl chloride* | *270 µg/L* | *8-DG2* |

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 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.

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-On Site/Off Site)

| **"Contaminated" Media** | Residents | Workers | Day-Care | Construction | Trespassers | Recreation | Food[3] |
|---|---|---|---|---|---|---|---|
| Groundwater | N | N | N | Y | N | N | N |
| ~~Air (indoor)~~ | ___ | ___ | ___ | ___ | ___ | ___ | ___ |
| ~~Soil (surface, e.g.<2 ft.)~~ | ___ | ___ | ___ | ___ | ___ | ___ | ___ |
| Surface water | N | N | N | N | N | Y | N |
| ~~Sediment~~ | ___ | ___ | ___ | ___ | ___ | ___ | ___ |
| ~~Soil (subsurface, e.g.>2 ft)~~ | ___ | ___ | ___ | ___ | ___ | ___ | ___ |
| ~~Air (outdoor)~~ | ___ | ___ | ___ | ___ | ___ | ___ | ___ |

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).

__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): *Groundwater resources in Tulsa County are unfavorable for development as potable water. The soils that contain the shallow water-bearing zone underlying AFP 3 yield an insufficient quantity of groundwater to be considered a practical source of water. The shale and limestone that underlie these soils in the*

*vicinity of AFP 3 also yield only small quantities of groundwater. Because the shallow water bearing zone and the shallowest groundwater in bedrock do not serve as a municipal or residential drinking water supply, current residents will not be exposed to groundwater contaminants. Because of the poor water yield in the shallow and bedrock water-bearing zones and the presence of a municipal water supply system for the City of Tulsa, it is unlikely that groundwater will be used as a residential, agricultural, or industrial water supply in the future.*

*However, because construction workers could potentially come in contact with contaminated groundwater during excavation activities, the Groundwater – Construction Worker pathway is considered complete. Additionally, because groundwater discharges to Mingo Creek to the east of AFP 3, the Surface Water – Recreational User pathway is also considered complete. As a result these two pathways were evaluated in the IRP Baseline Risk Assessment (Earth Tech, Inc., August 1998).*

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

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **"significant"**[4] (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)?

__X__ 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."

_____ 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 IRP Baseline Risk Assessment determined that the following receptors are at potential risk from the listed pathways; 1) future on-site construction workers at SWMU 5 are at potential risk from absorption of 1,1-DCE and TCE in the groundwater ($9 \times 10^{-5}$) and inhalation of 1,1-DCE and TCE from groundwater ($4 \times 10^{-5}$) and 2) future recreational users of Mingo Creek from the ingestion of 1,1-DCE in contaminated fish ($6 \times 10^{-6}$). It should be noted that the ODEQ generally considers carcinogenic risk within the range of $10^{-6}$ to $10^{-5}$ to be acceptable. This range of risk should achieve protection of the potentially affected population in the area because conservative assumptions regarding exposure patterns have been included in the risk assessment.*

*The noncarcinogenic Hazard Index gives an indication of the potential for adverse non-carcinogenic health effects. The total reasonable maximum case hazard Index that exceed 1.0 (which indicate a potential for advers non-carcinogenic health effects) are for the future on-site construction workers at SWMU 5. The groundwater pathway and TCE contribute to an HI of 30 due to dermal absorption and an HI of 3 due to inhalation of TCE. During construction of the interceptor trench at SWMU 5 in may 1995, the only visible groundwater flow into the trench was from a thin zone (approximately one-foot thick) of partially weathered shale at the overburden–bedrock interface. Groundwater flow in this zone is interpreted to be the result of significantly higher permeabilities in the weathered shale than in the overlying residual silty clay soils. If construction takes place it is unlikely that any planned excavation would be deep enough to encounter this zone. As a result, the volume of groundwater to which construction workers could be exposed would be minimal.*

[4] 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.

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

____ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and 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): _____
_____
_____

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 Air Force Plant 3 facility, EPA ID # OK9570000001, located in Tulsa, Oklahoma 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) Robert Replogle Date 12/30/05
(print) Robert Replogle
(title) Environmental Protection Specialist

Supervisor (signature) Date 1/5/06
(print) Donald Hensch
(title) Engineering Manager, RCRA
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Locations where References may be found:

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**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.**