Submittal Date 11/30/2007

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: Former GM Delco Plant 5
Facility Address: 1723 North Washington Street, Kokomo, Indiana
Facility EPA ID #: IND 000 806 844

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			TCE, cis-1,2-DCE, PCE, and vinyl chloride
Air (indoors)[2]		X		
Surface Soil (e.g., <2 ft)	X			PCE and lead
Surface Water		X		
Sediment		X		
Subsurf. Soil (e.g., >2 ft)	X			TCE, PCE, and vinyl chloride
Air (outdoors)		X		

_____ 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 the following page]

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.

The presence of "contamination" is identified based on comparison of site characterization data for soil, groundwater, and soil gas samples with generic risk-based and other appropriately protective screening criteria. The screening criteria and the results of the comparison of site characterization data with these criteria are discussed below.

The screening criteria used to identify "contamination" in soil are derived from the USEPA Region 9 Preliminary Remediation Goals (PRGs) for industrial soil (USEPA 2004). These PRG-based screening criteria were derived using a target cancer risk of 10^{-5} for carcinogenic constituents and a target hazard quotient (HQ) of 1 for non-carcinogenic constituents.

The screening criteria used to identify "contamination" from the most recent groundwater data in all groundwater-bearing units are drinking water criteria based on maximum contaminant levels (MCLs) promulgated under the Safe Drinking Water Act, and similarly-derived drinking water concentration limits for chemicals that lack MCLs. Drinking water limits for chemicals that lack MCLs are derived from USEPA Region 9 PRGs for ingestion of tap water at a target cancer risk of 10^{-5} and a target HQ of 1. Although drinking water criteria are used for identifying "contamination", potable water at and around the Facility is supplied by the American Water Company, which has a well field located 1.1 miles northwest (upgradient) of the Facility and another well field located 1.5 miles southeast (downgradient) of the Facility. Based on water well logs from the American Water Company, the well field to the northwest extracts groundwater from sand and gravel units (which may be connected to S2 and S3) and the well field to the southeast extracts groundwater predominantly from the bedrock aquifer (which may be connected to B1).

The screening criteria used to identify "contamination" in soil gas are the generic soil gas screening levels that the Indiana Department of Environmental Management (IDEM) is using to decide whether further vapor intrusion investigation is warranted at a site (IDEM 2006). No soil gas concentration exceeds these screening levels.

No free-phase nonaqueous-phase liquid (NAPL) has been observed during the field investigations.

The presence of some constituents in on-site soil at AOIs 3, 5, 6, and 7 and on- and off-site groundwater is considered to meet the definition of "contamination" when the highest constituent concentrations in these areas are compared with the screening criteria. The attached tables, Table 2-1b and Table 2-2b, outline the soil and groundwater concentrations that exceed screening criteria.

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)

"Contaminated" Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food[3]
Groundwater	Yes	Yes	No	Yes			No
~~Air (indoors)~~	-	-	-				
Soil (surface, e.g., <2 ft)	No	Yes	No	Yes	Yes	No	No
~~Surface Water~~	-	-			-	-	-
~~Sediment~~	-	-			-	-	-
Soil (subsurface e.g., >2 ft)				Yes			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).

__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):

[See the following page]

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

The Facility is not currently used or occupied. As discussed in the DOCC, demolition of the buildings, including the removal of floor slabs, was completed in 1993 and the majority of the Facility is currently a vacant grass field except for a 4.3 acre asphalt parking lot, a small concrete slab at AOI 5, and a dead end road (Spraker Street) in the northern portion of the Facility. Thus, exposure of on-site receptors to constituents via volatilization and inhalation of vapors in indoor air is not possible. Additionally, potable water at and around the Facility is supplied by the American Water Company. The American Water Company has not reported cis-1-2- DCE, or any other groundwater contaminate, at concentrations above the MCLs according to its 2006 Water Quality Report. Therefore, the potential for exposure to contamination via usage of groundwater as a drinking water supply does not currently exist at or around the Facility.

Current on-site and off-site receptors are as follows:

<u>On-site</u>
Landscapers who mow the grass are the only workers anticipated to be periodically at the Facility. It is also possible that utility maintenance workers may occasionally be on-site to service or repair underground utilities. Access by trespassers is possible, as the Facility is unfenced.

Potential exposure of trespassers and landscapers to constituents in surface soil via direct contact and in subsurface soil and groundwater in the upper-most saturated zones (P1 and S1) via volatilization into outdoor air is possible under current conditions. Potential exposure of maintenance workers via contact with surface and subsurface soil and groundwater in the P1 zone (which has only been found on-site during the RFI groundwater investigation) is possible during excavations.

<u>Off-site</u>
Potential off-site exposure to constituents in groundwater in the upper-most saturated zone (S1) via volatilization into occupied buildings (residential or commercial/industrial) or into outdoor air is possible. Maintenance worker exposure to contaminated groundwater in S1 is not reasonably expected, since S1 is deeper than reasonably expected excavation depths.

No potential on-site or off-site exposure to contaminated groundwater in I2, S2, S3, and B1 is possible for the following reasons: no well withdraws groundwater from these units where contaminated groundwater has been found during the investigation completed to date; these units are deeper than reasonably expected excavation depths; and volatile constituents in these units cannot volatilize into the unsaturated zone and migrate into indoor air.

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):

[See the following page]

[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.

The significance of potential exposures to soil and groundwater at the areas listed in Question 2 is discussed below:

On-site Landscapers and Trespassers

The upper-bound estimates of cumulative cancer and noncancer risks for each area identified as having soil contamination, which are based on the maximum detected concentration and the conservative exposure factors for evaluation of routine workers in generic commercial/industrial settings, are within USEPA's cancer risk limit of 10^{-4} and HI limit of 1, respectively, except AOI 3. These estimates are used as highly conservative surrogate estimates for trespassers and landscapers who are expected to have exposures that are at least an order of magnitude lower. Thus, the upper-bound cumulative cancer risk estimate of 3×10^{-4} at AOI 3 should be interpreted to mean that trespasser and landscaper exposures are insignificant. However, calculations were performed to correct the assumption in the vapor emission calculation that the maximum trichloroethene (TCE) concentration at AOI 3 (1,900 mg/kg) occurs from the ground surface to groundwater so that the routine worker cancer risk estimate can be used as a surrogate to show that trespasser and landscaper exposures are insignificant. Refinements to the vapor emission calculation to account for 8 ft of shallow soil with no significant TCE concentrations result in a cumulative cancer risk estimate of 9×10^{-5} for routine workers. Therefore, risk estimates for trespasser and landscaper exposure to soil would be much lower and clearly not significant.

The potential significance of routine worker inhalation exposures to constituents in groundwater that migrate into outdoors is also evaluated as a highly conservative surrogate for trespassers and landscapers who are expected to have exposures that are at least an order of magnitude lower. Risk estimates for on-site exposures are conservatively evaluated using standard default exposure factors for routine workers and the highest groundwater concentrations in units P1 or S1 at each on-site area. These upper-bound estimates are within USEPA's cancer risk limit of 10^{-4} and HI limit of 1 for all areas identified as having groundwater contamination. Therefore, risk estimates from potential volatilization to outdoor air are not significant.

On-site Maintenance Workers

The upper-bound estimates of cumulative cancer and noncancer risks for maintenance worker exposure are based on the maximum detected surface and subsurface soil or P1 groundwater concentrations and the exposure factors for evaluation of maintenance workers. These upper-bound estimates for maintenance worker contact with soil and P1 groundwater are within USEPA's cancer risk limit of 10^{-4} and HI limit of 1, for all AOIs identified as having soil or groundwater contamination. Therefore, risk estimates for maintenance workers are not significant.

Off-site Residents

Constituents in groundwater could migrate into off-site buildings. The potential significance of these inhalation exposures is evaluated based on residential exposures, which is also protective of commercial/industrial exposures and application of the Johnson and Ettinger model (1991) using the highest groundwater concentrations in S1 for each off-site area. Soil gas data were also collected off-site, adjacent to potentially affected residential buildings, and was used to verify the findings from comparison of the groundwater data to vapor intrusion criteria. The risk estimates for these assumed indoor air exposures are within USEPA's cancer risk limit of 10^{-5} and HI limit of 1, for all areas identified as having groundwater contamination. Similarly, the risk estimates for the assumed indoor air exposures from the soil gas data are within USEPA's cancer risk limit. Therefore, risk estimates from potential groundwater volatilization to indoor air are not significant.

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 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 *Former GM Delco Plant 5* facility, EPA ID # *IND 000 806 844*, located at *1723 North Washington Street, Kokomo, Indiana* 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 _____
(print) _____
(title) _____

Supervisor (signature) _____ Date _____
(print) _____
(title) _____
(EPA Region or State) _____

Locations where References may be found:

U.S. EPA Region 5 - Records Room
77 West Jackson Boulevard
Chicago, IL 60604

All materials referenced in this document can be found in the following reports:

- *Description of Current Conditions Report (ARCADIS 2005a)*
- *RFI Work Plan (ARCADIS 2005b)*
- *RFI Data Report and Phase II Work Plan (ARCADIS 2006a)*
- *RFI Data Report (ARCADIS 2006b)*
- *RFI Phase III Work Plan (ARCADIS 2006c, 2007a)*
- *RFI Data Report (ARCADIS 2007b)*
- *RFI Work Plan Addendum – Soil Gas Pilot Test (ARCADIS 2007c)*
- *Draft: RFI Phase IV Soil Investigation Data Report (ARCADIS 2007d)*
- *RFI Soil Gas Data Report (ARCADIS 2007e)*
- *RCRA Environmental Indicators (EI) CA725 Report (ENVIRON 2007)*

Contact telephone and e-mail numbers

(name) _____
(phone #) _____
(e-mail) _____

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.