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 Tecumseh Products (Tecumseh Compressor) Company Site
Facility Address:	100 E. Patterson, Tecumseh, Michigan 49286
Facility EPA ID #:	MID 005 049 440

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 programs 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			Chlorinated VOCs, see Key References Below
Air (indoors)[2]	X			Chlorinated VOCs, see Key References Below
Surface Soil (e.g., <2 ft)	X			Chlorinated VOCs, see Key References Below
Surface Water			X	TCE and vinyl chloride exceed default GSI criteria adjacent to river
Sediment			X	Sediment has not been sampled near GSI discharges or sewer outfalls
Subsurf. Soil (e.g., >2 ft)	X			Chlorinated VOCs, see Key References Below
Air (outdoors)			X	Outdoor air has not been sampled, screening criteria exceeded for soil

_____ 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):

Groundwater is impacted by volatile organic compounds (VOCs) at levels above Maximum Contaminant Levels (MCLs), MDEQ's Residential Vapor Intrusion Shallow Groundwater Screening Levels (GWVI-sump-res), Residential Vapor Intrusion Groundwater Screening Levels (GWVI-res), Nonresidential Vapor Intrusion Shallow Groundwater Screening Levels GWVI-sump-nr, Nonresidential Vapor Intrusion Groundwater Screening Levels GWVI-nr, Surface Water Human Drinking Water Values (HDV), Default Groundwater Surface Water Interface screening criteria, and Residential and Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria (Part 201 Generic Cleanup Criteria and Screening Levels and/or May 2013 Guidance Document for the Vapor Intrusion Pathway). The extent of groundwater impacts exceeding each criteria is undefined, and trend tests for contaminants in groundwater at MW-21 and MW-23 indicate the plumes are expanding.

Soil is impacted by VOCs at levels exceeding Residential and Nonresidential Vapor Intrusion Screening Levels (SVI-res and SVI-nr), Residential and Nonresidential Soil Volatilization to Indoor Air Inhalation Criteria, Residential and Nonresidential Infinite Source Volatile Soil Inhalation Criteria (VSIC), Residential and Nonresidential Finite VSIC for 2 and 5 Meter Sources, Soil GSI Protection Criteria for HDV, Groundwater Surface Water Interface Protection Criteria, Residential and Nonresidential Drinking Water Protection Criteria (Part 201 Generic Cleanup Criteria and Screening Levels and/or May 2013 Guidance Document for the Vapor Intrusion Pathway). The extent of soil impacts exceeding each criteria is undefined, and likely extends off-site where impacted by the migration of contaminated groundwater.

The site is vacant, limiting the potential for on-site exposures, however, additional on-site controls are required to reduce potential exposures relative to future uses.

Soil gas is impacted by VOCs at levels exceeding the Residential and Nonresidential Vapor Intrusion Shallow Soil Gas (sub-slab) Screening Levels (SGVI-SS-res and SGVI-SS-nr), and the Residential and Nonresidential Vapor Intrusion Deep Soil Gas Screening Levels (SGVI-res and SGVI-nr). The extent of impacts is undefined. The site is currently vacant, minimizing on-site exposures, and an operative SVE system is reducing VOC levels in indoor air in a portion of the existing building. However, the evaluation of off-site exposures to soil gas emanating from contaminated soil and/or groundwater is incomplete.

Indoor Air is impacted by VOCs at levels exceeding the Residential and Nonresidential Vapor Intrusion Indoor Air Screening Levels (IAVI-res and IAVI-nr). Mitigation systems have been installed in some on-site and off-site areas where known exceedances have been documented, or pre-emptively without prior sampling. However, impacts remain undefined and the plumes are expanding, so the evaluation of off-site exposures to indoor air from contaminated soil gas, soil, and/or groundwater is incomplete.

Primary contaminants of concern include trichloroethylene (TCE), tetrachloroethene (PCE), vinyl chloride, 1,1,1-trichloroethane (1,1,1-TCA), and associated degradation products, among others.

Key References:

1) Current Conditions Report, dated September 21, 2009, and prepared by RMT.
2) Remedial Investigation and Groundwater Environmental Indicator Report, dated September 28, 2012, and prepared by TRC Environmental Corporation.
3) Supplement to the Current Human Exposure Environmental Indicator Report, dated September 30, 2013, and prepared by TRC Environmental Corporation.
4) Response to Tecumseh Products Company's September 30, 2013 Supplemental Submission to the Human Health Environmental Indicator Report, dated January 31, 2014, and prepared by US EPA.
5) Supplement to Remedial Investigation and Environmental Indicator Report (Migration of Contaminated Groundwater Under Control), dated July 31, 2015 and prepared by TRC Environmental Corporation.

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)

Contaminated Media	Residents	Workers	~~Day Care~~	Construction	Trespassers	Recreation	Food[3]
Groundwater	?	N (onsite*)		? (onsite/ offsite)	N (direct contact)	? (Offsite)	? (GSI)
Air (indoors)	?	? (Offsite)		--	?	--	N
Soil (surface, e.g., <2 ft)	N (direct contact)	N (onsite*)		? (onsite/ offsite)	N (direct contact)	N (direct contact)	N
Surface Water	N (direct contact)	N (onsite*)		--	N (direct contact)	? (Offsite)	? (GSI)
Sediment	N (direct contact)	N (onsite*)		--	N (direct contact)	N (direct contact)	N
Soil (subsurface e.g., >2 ft)	N (direct contact)	N (onsite*)		? (onsite/ offsite)	N (direct contact)	N (direct contact)	N
Air (outdoors)	?	N (onsite*)		? (onsite/ offsite)	?	N	N

* site is currently vacant
GSI = groundwater surface water interface evaluation not complete

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.

___

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

Rationale and Reference(s):

Subsurface soils and groundwater are contaminated by historical site activities. The site is currently vacant, eliminating current potential on-site exposures, but contamination extends off-site, undefined, at increasing levels, preventing an evaluation that off-site exposures are under control. A Groundwater Ordinance is being used to prevent the ingestion of contaminated groundwater within the area of known impact. Exposures via vapor intrusion have not been completely assessed.

It is currently unclear if the groundwater impacts will remain within the area defined by the groundwater ordinance.

The screening criteria for vapor intrusion for TCE in groundwater (MDEQ's $GW_{VI\text{-}sump\text{-}res}$ and $GW_{VI\text{-}res}$) have been exceeded north of the site where mitigation controls are not currently in-place. Limited indoor air sampling yielded one result just below the indoor air screening criteria (MDEQ's $IA_{VI\text{-}res}$).

Residences to the east were assessed early in the investigation when contaminant levels were lower; further consideration should be given to these areas.

The extent of contamination in soil exceeding the screening level for ambient air (VSIC) has not been delineated for purposes of demonstrating exposures are limited to on-site areas. Reporting in October 2015 is expected to produce maps outlining relevant exceedances.

Onsite and offsite construction workers have the potential to come in contact with, and be exposed via inhalation of, contaminated soil and groundwater.

Off-site workers have the potential to be exposed to exceedances of screening criteria for VOCs in indoor air via vapor intrusion.

Recreational and Food exposures are potential offsite, dependent upon further information collected during the ongoing GSI evaluation.

Current restrictive covenants restrict on-site land use to commercial/industrial purposes, but additional controls are needed to address handling of contaminated soil and other materials, on-site exposures via inhalation of VOCs in ambient air and indoor air in exiting/future buildings. Source reduction is needed to eliminate off-site exposures in the long term.

Key References:

1) Response to Tecumseh Products Company's September 30, 2013 Supplemental Submission to the Human Health Environmental Indicator Report, dated January 31, 2014, and prepared by US EPA.
2) Supplement to Remedial Investigation and Environmental Indicator Report (Migration of Contaminated Groundwater Under Control), dated July 31, 2015 and prepared by TRC Environmental Corporation.
3) Trend Analysis: Tecumseh Products, dated September 30, 2015 and prepared by USEPA FIELDS Group.

[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)?

_____ 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)

[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.

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" 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 IN - More information is needed to make a determination whether exposures are under control at the former Tecumseh Products Company facility, MID 005 049 440, located at 100 East Patterson, in Tecumseh Michigan.

Completed by: (signature) _____ Date 9/30/15

(print) Joseph C. Kelly, P.G.

(title) Physical Scientist

Supervisor: (signature) _____ Date 10.5.15

(print) Michael Beedle

(title) Section Chief

(EPA Region / State) LCD/RRB, CA1 Region 5

Locations where References may be found:

US EPA Region 5
77 W. Jackson Blvd.
Chicago, IL 60604
9th floor, cubicle 09048 hard drive

Contact telephone and e-mail numbers

(name) Joseph Kelly

(phone #) 312-252-2111

(e-mail) Kelly.Joseph@epa.gov

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.