

US EPA ARCHIVE DOCUMENT

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: EM Science
Facility Address: 2909 Highland Ave. Cincinnati, Ohio 45212
Facility EPA ID #: OHD 086438538

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?

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).

**Current Human Exposures Under Control
Environmental Indicator (EI) RCRIS code (CA725)**

2. Are groundwater, soil, surface water, sediments, or air media known or reasonably suspected to be "contaminated" 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)?

	<u>Yes</u>	<u>No</u>	<u>?</u>	<u>Rationale / Key Contaminants</u>
Groundwater	<u>X</u>	<u> </u>	<u> </u>	<u>GW above OEPA Residential Single Chemical Cleanup #s for : VOCs: PCE, TCE, 1,2 DCA, 1,2 DCE, carbon tetrachloride, chloroform, 1,4 dioxane (R9 PRGs x 10), vinyl chloride, benzene; acetone, toluene, others ;SVOCs: naphthalene; Metals: As, Pb</u>
Air (indoors) ²	<u> </u>	<u>X</u>	<u> </u>	<u> </u>
Surface Soil (e.g., <2 ft)	<u>X</u>	<u> </u>	<u> </u>	<u>SS concs. above OEPA RCNs for: VOCs and Metals: As</u>
Surface Water	<u> </u>	<u>X</u>	<u> </u>	<u>GW Seep562/Outfall; GW SeepC/ 84inch storm sewer</u>
Sediment	<u> </u>	<u>X</u>	<u> </u>	<u> </u>
Subsurf. Soil (e.g., >2 ft)	<u>X</u>	<u> </u>	<u> </u>	<u>SbSS concs. above (R9 PRGs x 10 for: 1, 4 dioxane); above OEPA RCNs for VOCs and Metals: As, Hg</u>
Air (outdoors)	<u> </u>	<u>X</u>	<u> </u>	<u> </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):

<u>Media</u>	<u>Contaminant</u>	<u>Ohio EPA GCNs^a</u>	<u>R9 PRGS x 10^b Max conc^c.</u>	<u>Location^e</u>
GW	PCE	5.0 ug/l	3500 ug/l	MW 35
GW	TCE	5.0 ug/l	19,000 ug/l	MW 27
GW	1,2 DCE	40.0 ug/l	15,000ug/l	MW9
GW	1,2 DCA	2.0 ug/l	40,000 ug/l	MW503 ^g
GW	1,1,2,2 PCA	7.0 ug/l	1,300 ug/l	MW35
GW	Chloroform	3.0 ug/l	44,000 ug/l	MW5
GW	Methylene Chloride	5.0 ug/l	67, 000 ug/l	MW5
GW	Carbon Tetrachloride	2.0 ug/l	22, 000 ug/l	MW 35

<u>Media</u>	<u>Contaminant</u>	<u>Ohio EPA GCNs^a</u>	<u>R9 PRGs x 10^b</u>	<u>Max Conc.^c</u>	<u>Location^c</u>
GW	Vinyl Chloride	0.2 ug/l		4,300 ug/l	MW 9
GW	Benzene	5.0 ug/l		12,000 ug/l	MW9
GW	Toluene	546 ug/l		55,000 ug/l	MW9
GW	Acetone	405 ug/l		19,000 ug/l	MW9
GW	1,4 Dioxane	-----	61.0 ug/l	75,000J ug/l	MW4
GW	Naphthalene	5.0 ug/l		87 J ug/l	MW 9

<u>Media</u>	<u>Contaminant</u>	<u>Ohio EPA GCNs^a</u>	<u>R9 PRGs x 10^b</u>	<u>Max conc.^c</u>	<u>Location^c</u>
GW	Arsenic	0.4 ug/l		71 ug/l	MW14
GW	Lead	5.0 ug/l		520 ug/l	MW18

<u>Media</u>	<u>Contaminant</u>	<u>Ohio EPA GCNs^a</u>	<u>R9 PRGs x 10^b</u>	<u>Max. Conc^c</u>	<u>Location^c</u>
Sur. Soil	PCE	45.5 mg/kg		1,900 mg/kg	VZ329 ^d
Sur. Soil	TCE	22.6 mg/kg		140 mg/kg	VZ329
Sur. Soil	1, 2 DCA	3.39 mg/kg		19 mg/kg	VZ331
Sur. Soil	Chloroform	2.41 mg/kg		180 mg/kg	VZ329
Sur. Soil	Ethylbenzene	225 mg/kg		350 mg/kg	VZ329
Sur. Soil	Xylenes	316 mg/kg		1,800 mg/kg	VZ329
Sur. Soil	Benzo(a)pyrene	.465 mg/kg		1,800 ug/kg	VZ407
Sur. Soil	Arsenic	3.73 mg/kg		16.2 mg/kg	VZ329
SubS Soil	TCE	22.6 mg/kg		160 mg/kg	VE 518 ^e
SubS Soil	1, 2 DCA	3.39 mg/kg		59 mg/kg	VE 518 ^e
SubS Soil	1,1,2,2 PCA	3.60		6900 ug/kg	VZ321
SubS Soil	Chloroform	2.41 mg/kg		160 mg/kg	VE 518 ^e
SubS Soil	Methylene Chloride	85 mg/kg		92 mg/kg	VE 314/VZ323
SubS. Soil	1,4 Dioxane		2, 200 ug/kg	9,100 ug/kg	VE509 ^e
SubS-Soil	Benzo(a)pyrene	.465 mg/kg		13,000 ug/kg	VZ408
SubS Soil	Arsenic	3.73 mg/kg		150 mg/kg	VZ412
SubS Soil	Mercury	0.284 mg/kg		6.1J mg/kg	VZ403

^a"Closure Plan Review Guidance for RCRA Facilities, March 1999". Appendix D, Table 1, Residential Generic Cleanup Numbers (GCNs) For Ohio Hazardous Waste Closures. Ohio Environmental Protection Agency.

^b"Region 9 PRGs Table 2000 Update". United States Environmental Protection Agency.

^c"Remedial Investigation Report For the EM Science Site, Cincinnati, Ohio, October 25, 1996". The Payne Firm.

^dVadose zone soil boring by hollow-stem auger.

^eVertical extent boring by hollow-stem auger, off-site.

^f"Technical Memorandum No. 11 Hot Spot Delineation and Removal Interim Action Report, September 29, 1997. The Payne Firm.

^gOff-site monitoring well.

^mPreliminary Assessment/Visual Site Inspection, EM Science Cincinnati, Ohio, Final Report, December 3, 1990, USEPA/PRC Environmental Management, Inc.

^lOhio EPA site inspection on March 13, 2002.

^lOhio EPA regulatory history.

- 12/24/92 Administrative Order on Consent to complete RI/FS at EM Science
- 11/19/93 submittal of "Work Plan for Remedial Investigation/Feasibility Study, EM Science site, Cincinnati, Ohio"
- 1/21/00 submittal of Draft FS Report
- Section XIV of F & Os, Ohio EPA decides to complete EM Science Draft FS Report
- 11/01-present, Ohio EPA preparing "Streamlined Feasibility Study for the EM Science Site, Cincinnati, Ohio"

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.

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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

Potential Human Receptors (Under Current Conditions)

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

The baseline risk assessment conducted for the facility indicated that the exposure point concentration for dermal exposure of on-property workers to soil/fill from VOCs (primarily PCE) exceeded an HI of 1 and total cancer risk of $1.0 \times E-05^a$ in the Middle West Ravine (VZ329).^c

^a"Closure Plan Review Guidance for RCRA Facilities, March 1999". Ohio Environmental Protection Agency.

^b"Remedial Investigation Report For the EM Science Site, Cincinnati, Ohio, October 25, 1996". The Payne Firm.

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

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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 baseline risk assessment for the facility indicated that the exposure point concentration for dermal exposure of on-property workers to soil/fill from VOCs (primarily PCE) exceeded an HI of 1 and total cancer risk of $1.0 \times E-05^a$ in the Middle West Ravine (VZ329), however, current on-property workers (i.e. outdoor workers) would have limited exposure to this unpaved area due to its location and their work activities (e.g. fork lift drivers).^c

^a"Closure Plan Review Guidance for RCRA Facilities, March 1999." Ohio Environmental Protection Agency.

^c"Remedial Investigation Report For the EM Science Site, Cincinnati, Ohio, October 25, 1996". The Payne Firm.

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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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):

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 EM Science facility, EPA ID #OHD086438538, located at Cincinnati, Ohio 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: Tim Staiger, ES 3

Date: 4/19/02

Tim Staiger

Reviewed by: Tim Staiger, ES 3

Date: 4/19/02

Tim Staiger

Supervisor: Harold O'Connell

Date: 4/20/02

Harold O'Connell

Locations where References may be found:

Ohio EPA, Southwest District Office

401 East Fifth Street

Dayton, Ohio 45402

(Phone) (937) 285-6357

Contact telephone and e-mail numbers

Tim Staiger, Ohio EPA

tim.staiger@epa.state.oh.us

Harold O'Connell, Ohio EPA

harold.oconnell@epa.state.oh.us

Joe Smindak, Ohio EPA/DERR Site Coordinator for the RI/FS @ EM Science

joe.smindak@epa.state.oh.us

Phone Number: (937)285-6357

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.

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)

Migration of Contaminated Groundwater Under Control

Facility Name: EM Science
Facility Address: 2909 Highland Avenue, Cincinnati, Ohio
Facility EPA ID #: OHD086438538

1. Has all available relevant/significant information on known and reasonably suspected releases to the groundwater media, 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?

If yes - check here and continue with #2 below.

If no - re-evaluate existing data, or

if data are not available, skip to #8 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 "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "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 "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

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).

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

2. Is groundwater known or reasonably suspected to be "contaminated"¹ above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

 X If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

 If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

 If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s): Groundwater is contaminated underlying EM Science from chemical releases from various locations on-site (e.g. West Ravine).

<u>Media</u>	<u>Contaminant</u>	<u>Ohio EPA GCNs^a</u>	<u>R9 PRGS x 10^b</u>	<u>Max conc^c</u>	<u>Location^c</u>
GW	PCE	5.0 ug/l		3500 ug/l	MW 35
GW	TCE	5.0 ug/l		19,000 ug/l	MW 27
GW	1,2 DCE	40.0 ug/l		15,000ug/l	MW9
GW	1,1,2,2 PCA	7.0 ug/l		1,300 ug/l	MW35
GW	Chloroform	3.0 ug/l		44,000 ug/l	MW5
GW	Methylene Chloride	5.0 ug/l		67, 000 ug/l	MW5
GW	Carbon Tetrachloride	2.0 ug/l		22, 000 ug/l	MW 35
GW	Vinyl Chloride	0.2 ug/l		4,300 ug/l	MW 9
GW	Benzene	5.0 ug/l		12,000 ug/l	MW9
GW	Toluene	546 ug/l		55,000 ug/l	MW9
GW	Acetone	405 ug/l		19, 000 ug/l	MW9
GW	1,4 Dioxane	-----	61.0 ug/l	75,000J ug/l	MW4
GW	Naphthalene	5.0 ug/l		87 J ug/l	MW 9
GW	Arsenic	0.4 ug/l		71 ug/l	MW14
GW	Lead	5.0 ug/l		520 ug/l	MW18

References:

^a"Closure Plan Review Guidance for RCRA Facilities, March 1999". Appendix D, Table 1, Residential Generic Cleanup Numbers (GCNs) For Ohio Hazardous Waste Closures. Ohio Environmental Protection Agency.

^b"Region 9 PRGs Table 2000 Update". United States Environmental Protection Agency.

^c"Remedial Investigation Report For the EM Science Site, Cincinnati, Ohio, October 25, 1996". The Payne Firm.

^dTechnical Memorandum No. 11 Hot Spot Delineation and Removal Interim Action Report, September 29, 1997. The Payne Firm.

^ePreliminary Assessment/Visual Site Inspection, EM Science Cincinnati, Ohio, Final Report, December 3, 1990, USEPA/PRC Environmental Management, Inc.

^fOhio EPA site inspection at EM Science on March 13, 2002.

^gOhio EPA regulatory history:

- 12/24/92 Administrative Order on Consent to complete RI/FS at EM Science
- 11/19/93 submittal of "Work Plan for Remedial Investigation/Feasibility Study, EM Science site, Cincinnati, Ohio"
- 1/21/00 submittal of Draft FS Report
- Section XIV of F & Os, Ohio EPA decides to complete EM Science Draft FS Report
- 11/01-Present, Ohio EPA preparing "Streamlined Feasibility Study for the EM Science Site, Cincinnati, Ohio"

^hOhio EPA, Southwest District Office, Division of Emergency & Remedial Response, files

ⁱOhio EPA communication with Dan Weed, The Payne Firm, on 3/13/02.

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 appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

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3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"² as defined by the monitoring locations designated at the time of this determination)?

If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"²).

If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"²) - skip to #8 and enter "NO" status code, after providing an explanation.

If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s): Current Interim Actions in place at EM Science to mitigate off-site migration of contaminated groundwater:

1. West Ravine-Surface Water Sump (Seep-562-outfall) at the mouth of the West Ravine-collects surface water and seepage from West Ravine fill, treated at facility pH neutralization system (pre-treatment unit) and discharged to POTW-Metropolitan Sewer District of Greater Cincinnati. Sump designed to handle a flow equivalent of 10 year, 24hr. storm event.^c Monthly status report provided to Ohio EPA/SWDO.^h
2. West Ravine- Storm Water Mangement-Storm water bypass above the West Ravine fill.
3. East Ravine-French Drain for collection of contaminated groundwater from upper hydrogeologic units (MW14, P1, MW16)-collected groundwater flows to facility pH neutralization system, and discharged to POTW-MSD of Greater Cincinnati.^c According to the monthly status report No.111 for March 2002, groundwater flow maps of the Upper Sand Unit and Lower Sand Unit indicate that in March 2002 the French Drain was effective.^h
4. East Ravine- Gradient Control System-Well (P6A) for contaminated groundwater from lower sand unit-intermittent operation based on analytical results.^c Monthly status report provided to Ohio EPA/SWDO.^h

However, the above interim actions do not completely contain the off-site migration of contaminated groundwater as evidenced by the exceedence of regulatory standards for downgradient, off-site monitoring wells MW 503, MW504, MW 505A, 505B and MW 507 near the southern boundary of the property. Also, there are exceedences of regulatory standards at the eastern boundary of the property at MW 23.^c See Table below.

General Comment: Human exposure to contaminated groundwater is unlikely under current conditions on site. The facility obtains water from the Cincinnati Water Works system for potable and industrial uses.ⁱ The surrounding area also is connected to this water system. The City of Cincinnati requires residents to use the municipal water supply and has a restriction on the installation of wells for potable water use.^c

Southern Boundary-Off-site Monitoring Wells

<u>Media</u>	<u>Contaminant</u>	<u>Ohio EPA GCNs^a</u>	<u>R9 PRGs x 10^b</u>	<u>Max Conc.^c</u>	<u>Location^c</u>
GW	1,2 DCA	2.0 ug/l		40,000 ug/l	MW503
GW	Chloroform	3.0 ug/l		23,000 ug/l	MW 503
GW	Methylene Chloride	5.0 ug/l		72,000 ug/l	MW 503
GW	Arsenic	0.4 ug/l		0.019 mg/l	MW 503
GW	Chloroform	3.0 ug/l		10 ug/l	MW 504
GW	Chromium	0.100 mg/l		0.490 mg/l	MW 504
GW	1,2 DCE	40.0 ug/l		460 ug/l	MW 505A
GW	1,2 DCA	2.0 ug/l		280 ug/l	MW 505A
GW	Chloroform	3.0 ug/l		32 ug/l	MW 505A
GW	Vinyl Chloride	0.2 ug/l		110 ug/l	MW 505A
GW	1, 4 Dioxane		61 ug/l	12,000 ug/l	MW 505A
GW	1, 4 Dioxane		61 ug/l	5,200 ug/l	MW505B
GW	1, 4 Dioxane		61 ug/l	120 ug/l	MW507
GW	Arsenic	0.4 ug/l		0.016 mg/l	MW507

Eastern Boundary (On-Site) Monitoring Wells:

<u>Media</u>	<u>Contaminant</u>	<u>Ohio EPA GCNs^a</u>	<u>R9 PRGS x 10^b</u>	<u>Max conc.^c</u>	<u>Location^c</u>
GW	1,1 DCA	560 ug/l		660 ug/l	MW 23
GW	1,2 DCA	2.0 ug/l		3,200ug/l	MW 23
GW	1.2 DCE	40.0 ug/l		1,100ug/l	MW 23
GW	Benzene	5.0 ug/l		250 ug/l	MW 23
GW	Chloroform	3.0 ug/l		150 ug/l	MW 23
GW	TCE	5.0 ug/l		630 ug/l	MW 23

References:

^a"Closure Plan Review Guidance for RCRA Facilities, March 1999". Appendix D, Table 1, Residential Generic Cleanup Numbers (GCNs) For Ohio Hazardous Waste Closures. Ohio Environmental Protection Agency.

^b"Region 9 PRGs Table 2000 Update". United States Environmental Protection Agency.

^c"Remedial Investigation Report For the EM Science Site, Cincinnati, Ohio, October 25, 1996". The Payne Firm.

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4. Does "contaminated" groundwater discharge into surface water bodies?

If yes - continue after identifying potentially affected surface water bodies.

If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Seep C enters the 84-inch storm sewer in the bottom of the East Ravine. Groundwater seepage at Seep C discharges at a minimal flow rate. Elevated VOC concentrations were present in Seep C^c, however, they did not exceed Ohio EPA WQSS^d. Storm water in the 84-inch storm sewer flows to Duck Creek, a small tributary of the Little Miami River that is located about 600 feet southeast of the property.^e Channel modification of Duck Creek has occurred in the vicinity of EM Science.^g The habitat of Duck Creek in that area has been altered (flow/habitat) so there would be minimal impact to the aquatic ecosystem. Ohio EPA has assessed 3.9 miles of Duck Creek and determined an aquatic life use designation of Limited Resource Water with essentially no restorability.^h

Also, EM Science has a stormwater management program in place. Sump-562 at the mouth of the West Ravine collects surface water and groundwater that is pumped to the pH/Neutralization building, treated and discharged to the City of Cincinnati's Metropolitan Sewer District.^e EM Science's consultant, The Payne Firm, Inc. submits to Ohio EPA a Monthly Status Report on data collected for interim actions that includes precipitation for the month and the detection of any sump overflows that occur. According to the Monthly Status Report No. 111 for March 2002 there were no detected sump overflows during the month of March 2002.^h

^c "Remedial Investigation Report For the EM Science Site, Cincinnati, Ohio, October 25, 1996". The Payne Firm.

^d Ohio EPA/SWDO/DERR, "Streamlined Feasibility Study for the EM Science Site, Cincinnati, Ohio" November, 2001.

^h Ohio EPA/SWDO/DERR, files

^j "State of Ohio Water Quality Standards" Ohio EPA, Division of Surface Water, OAC Chapter 3745-1-07.

^k Ohio CWA Section 303(d) List for FFY 1999-2000-April 1, 1998-Table 4.

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6. Can the discharge of "contaminated" groundwater into surface water be shown to be "currently acceptable" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented⁴)?

_____ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment,⁵ appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

_____ If no - (the discharge of "contaminated" groundwater can not be shown to be "currently acceptable") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

_____ If unknown - skip to 8 and enter "IN" status code.

Rationale and

Reference(s): _____

⁴ Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

⁵ The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

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7. Will groundwater **monitoring** / measurement (and surface water / sediment / ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

_____ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

 X If no - enter "NO" status code in #8.

_____ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):
Refer to item #3.

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8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the _____ facility, EPA ID # _____, located at _____. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

NO - Unacceptable migration of contaminated groundwater is observed or expected.

IN - More information is needed to make a determination.

Completed by Tim Staiger Date 4/19/02
Tim Staiger
Environmental Specialist 3

Supervisor Harold O'Connell Date 4/19/02
Harold O'Connell
Supervisor
Ohio EPA/Southwest District Office

Locations where References may be found:

Ohio EPA, Southwest District Office
401 East Fifth Street
Dayton, Ohio 45402
(Phone) (937) 285-6357

Contact telephone and e-mail numbers

Tim Staiger, Ohio EPA tim.staiger@epa.state.oh.us
Harold O'Connell, Ohio EPA harold.oconnell@epa.state.oh.us
Joe Smindak, Ohio EPA/DERR Site Coordinator for the RI/FS @ EM Science joe.smindak@epa.state.oh.us
Phone Number: (937)285-6357