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:	Mead Storage Depot
Facility Address:	Chillicothe, OH
Facility EPA ID #:	OHD 043 730 209

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?

   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 AMigration 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).

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):

The Mead Storage Depot is located in Londonberry, Ohio twelve miles southeast of the Mead Paper Plant in Chillicothe, OH. Figure 1 in *The First Quarter 2008 Progress Report for Interim Measures, dated May 15, 2008* shows the withdrawl wells (RW-1 and RW-2) in the center of the figure, the 28 groundwater monitoring wells to the south /southeast, the new 700 series wells are in the lower left corner of the figure near Schooley Road.

*The *First Quarter 2008 Progress Report for Interim Measures, dated May 15, 2008*, indicates VOC groundwater sample results, summarized in Table 7, as exceeding U.S. EPA Safe Dinking Water Act Maximum Contaminant Levels (MCLs).

Specifically the results from groundwater samples taken in February 2008 indicate Trichloroethylene (TCE) is above the MCL of 5 parts per billion (ppb) in well D401-70 (5.7 ppb)-*downgradient of RW well* and well D601-26 (15 ppb)-*near Marsh*. Also, vinyl chloride exceeds the MCL of 2 ppb in well D500-11 (53 ppb)-*near RW*, well D504-39 (5.8 ppb)-*downgradient of RW well*, well D600-25 (5 ppb)-*near Marsh*, well D600-30 (14 ppb)-*near Marsh*, and well D601-39 (2.1 ppb)-*near Marsh.*

[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).

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)?

__X__ 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):

*The First Quarter 2008 Progress Report for Interim Measures, dated May 15, 2008, Figure 2 –Total VOC Iso-concentration Map, along with the results in Table 7, show a plume that is defined by clean wells (well nests D700-30/D700-49 and D701-29/D701-39) are on the south side of Schooley Road at the downgradient boundary and found on the lower left corner of Figure 2.

As the pump and treat (P&T) system continues to operate the plume is expected to continue to stabilize or reduce in volume in the area under the influence of the pump well (RW-1or backup RW-2). The influent concentrations for all contaminants has been steadily dropping since the P& T started in the 1994, specifically TCE has dropped from 47 ppb in 12/94 to 2.0ppb in 3/08. The PTA-INF Concentration plot in the *The First Quarter 2008 Progress Report for Interim Measures, dated May 15, 2008* demonstrates this data trend.

There also is a portion of the plume which is not in the direct influence of the P&T system and it lies to the south/southwest of the pump well and is monitored in part by the D600,D601,D700 and D701 wells. The well nests D700-30/D700-49 and D701-29/D701-39 are on the south side of Schooley Road and were sampled in the last quarter of 2007 and the first quarter of 2008 these VOC results show Non Detect (ND) indicating the area where the plume would travel downgradient is not impacted. These wells will continue to be monitored quarterly and provide a downgradient sampling point for the portion of the plume that is beyond the control of the P&T system. The VOC analysis from these wells will track the TCE contamination and it's degradation products to check for migration.

[2] existing area of contaminated groundwater is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of contamination that can and will be sampled/tested in the future to physically verify that all contaminated groundwater remains within this area, and that the further migration of contaminated groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

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

X 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):

Surface water is sampled at the unnamed tributary to Walnut Creek where the creek passes under Schooley Road. The results from that surface water sample is of (0.8 ppb) for cis-1,2DCE, for the February 2008 sampling in the *The First Quarter 2008 Progress Report for Interim Measures, dated May 15, 2008*. Surface water sampling point S3 (a seep) is also sampled in the Marsh Area which is downgradient of the plume and shows vinyl chloride at 4.2 ppb[2].

[2] *The Report of Findings Addendum to the Task 2 Plume Delineation for the RCRA Interim Measures at MW Custom Papers, LLC Storage Depot, Lancaster Road, Londenberrry, Ohio, March 12, 2003*

5. Is the **discharge** of contaminated groundwater into surface water likely to be **insignificant** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater level, and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

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X If yes - skip to #7 (and enter YE status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater level, the value of the appropriate level(s), and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

___ If no - (the discharge of contaminated groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater level, the value of the appropriate level(s), and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater levels, the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

___ If unknown - enter IN status code in #8.

Rationale and Reference(s):

Impacts to surface water from groundwater discharge:

Surface water sample results from the unnamed tributary to Walnut Creek and a seep sample are in *The Report of Findings Addendum to the Task 2 Plume Delineation for the RCRA Interim Measures at MW Custom Papers, LLC Storage Depot, Lancaster Road, Londenberrry, Ohio, March 12, 2003* are shown in Table 4 of the Report and summarized below. The surface water sample locations are shown in Figure 1 and labeled S1, S2, S3, and S4. **S3 is a seep sample in the marsh**; S1, S2 and S4 are surface water samples from the unnamed tributary to Walnut Creek.

Surface water sampled at the unnamed tributary to Walnut Creek where the creek passes under Schooley Road has reduced in concentration from to 0.8 ppb for cis-1,2DCE, for the February 2008 sampling to from 1.3 ppb for cis-1,2DCE sample from the same location in November of 1999.

Surface Water Contaminant	Maximum Concentration(ppb)	Maximum Contaminant Level (ppb)
TCE	1.1 @ S2	5
Cis, 1,2- Dichloroethylene	50 @ S3	70
Trans, 1,2- Dichlorethylene	11 @ S3	100
Vinyl Chloride	4.2 @ S3	2

[3] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

The surface water samples from the unnamed tributary to Walnut Creek are below current MCLs, although the seep sample exceeds the MCL for vinyl chloride by 2 ppb the surface water samples downgradient of the seep are below MCLs. These results indicate it is anticipated that the impacts to receiving surface water, are acceptable.

Sediment/Soil Impacts from groundwater discharge to surface water:

The sediment/soil samples below were collected at three locations (S-3-A, S-3-B, S-3-C) within a 15 foot radius of the S3 seep sample location in the organic "muck" or sediment/soil of the marsh area in the vicinity of groundwater discharging to surface water. These results are from Table 5 in the *Report of Findings Addendum to the Task 2 Plume Delineation for the RCRA Interim Measures at MW Custom Papers, LLC Storage Depot, Lancaster Road, Londenberrry, Ohio, March 12, 2003*

Sediment/surface soil Contaminant	Maximum Concentration(µg/kg)	U.S. EPA Region 5's Ecological Screening Levels for Sediment (µg/kg)
TCE	<30	112
Cis, 1,2- Dichloroethylene	363	620[1,2]
Trans, 1,2- Dichlorethylene	100	654
Vinyl Chloride	<50	202

1. Indiana Department of Environmental Management
2. USEPA. *Great Lakes Initiative Clearing House*. Accessed 12/18/07 http://cfpub.epa.gov/gliclear/criteria_query.cfm

These results indicate the sediments sampled are below ecological screening levels and that the impacts to receiving sediments and ecosystems are acceptable.

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 implemented[4])?

___ 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 AIN@ 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.

7. Will groundwater **monitoring** / measurement data (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?

X 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.

___ If no - enter NO status code in #8.

___ If unknown - enter IN status code in #8.

Rationale and Reference(s):

Sampling of the 28 groundwater wells, which are within and define the edge of the plume, and the surface water sample at the unnamed tributary to Walnut Creek at Schooley Road will continue on a quarterly basis per the AOC. An assessment of the ecological risk in the marsh area will be negotiated with the facility.

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).

X 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 Mead Storage Depot facility, EPA ID # OHD 043-730-209, located Chillicothe, OH . 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

___ IN - More information is needed to make a determination.

Completed by	(signature)		Date
	(print)	Christopher J. Black	
	(title)	Environmental Scientist	

Supervisor	(signature)		Date
	(print)	George Hamper	
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