

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: Lord Kinematics
Facility Address: 124 Grant Street, Cambridge Springs, Pennsylvania 16403
Facility EPA ID #: PAD 05 112 9757

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).

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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): Lord conducted a focused investigation in 1997 of five SWMUs and two Areas of Concern (AOCs) identified in a RCRA Facility Assessment/ Environmental Priorities Initiative (RFA/EPI) report for the Facility (U.S. EPA 1994). This investigation determined that soils at these SWMUs and AOCs are not contaminated above EPA Region 3’s Risk Based Concentrations (RBCs) for an industrial Facility. Therefore it is unlikely that groundwater has been impacted by releases from these SWMUs or AOCs (ARCADIS Geraghty & Miller, 1998).

During the 1997 investigation, concentrations of tetrachloroethene (PCE) and trichloroethene (TCE) were detected in groundwater beneath the northern portion of the facility (away from SWMUs and AOCs) above their respective Maximum Contaminant Levels (MCLs), while levels of vinyl chloride and cis-1,2-dichloroethene (DCE) were only measured at levels above MCLs at an intermittent seep along French Creek. The source of VOC contamination in the groundwater is unknown. The highest concentrations found at the Facility for each of these contaminants is listed below, along with its respective MCL.

	Max. Concentration detected (ug/l)	MCL (ug/l)
Tetrachloroethene (PCE)	45,000	5.0
Trichloroethene (TCE)	250	5.0
Vinyl chloride	53	2.0
1,2-Dichloroethene(total)(DCE)	271	70

This occurrence of volatile organic compounds (VOCs) was further evaluated through investigations in 1998 under the Pennsylvania Land Recycling and Environmental Remediation Standards Act (Act 2) (ARCADIS Geraghty & Miller, 1998). The 1997, 1998 and 1999 investigations determined that concentrations of PCE, TCE, and methylene chloride in groundwater is higher than their respective Safe Drinking Water Act, Maximum Contaminant Levels (MCLs). Based on the results of these investigations, Lord proposed quarterly groundwater monitoring at several monitoring wells for a period of one year, after which time, monitoring would be performed on a semi-annual basis at selected wells where VOC concentrations continued to be found at levels above appropriate risk based standards. Institutional controls and a notice of contamination were also proposed to restrict future groundwater use, and to notify the proper people of the extent of groundwater contamination at the Facility. PADEP approved this proposal in a letter to Lord dated February 23, 1999. The first year of groundwater monitoring under this plan was completed in 1999. Semi-annual groundwater monitoring for VOCs will continue in 2000 and 2001. (ARCADIS Geraghty & Miller 2000).

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References:

ARCADIS Geraghty & Miller 1998. "Site" Remedial Investigation/Risk Assessment Report, Lord Mechanical Products Division facility, Cambridge Springs, Pennsylvania. ARCADIS Geraghty & Milee, November 10, 1998.

ARCADIS Geraghty & Miller 2000. 1999 Summary Report, Lord Mechanical Products Division, Cambridge Springs, Pennsylvania. ARCADIS Geraghty & Miller, February 7, 2000.

U.S. EPA 1994. RCRA Facility Assessment/Environmental Priorities Report, Lord Kinematics facility. CDM Federal Programs Corporation. April, 1994.

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)?

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): As a result of the Act 2 Remedial Investigation, the core of the VOC plume was identified to be along the north side of the manufacturing building located in the approximate center of the Facility. A source area investigation used a direct-push sampling and on-site analysis program to screen multiple locations prior to installing a monitoring well network designed to effectively evaluate groundwater conditions. The monitoring well network consists of two deep wells and one shallow well straddling the water table within the core source area, a deep monitor well further downgradient in the approximate center of the plume, and deep monitor wells located to delineate the eastern and western edges of the plume. Depth to groundwater measurements within the surveyed monitor wells were used to determine the direction of groundwater flow beneath the Facility to be north-northeast towards French Creek (ARCADIS Geraghty & Miller 1998 and 2000). The groundwater monitoring data indicates that the migration of VOCs detected in groundwater at the facility is limited to a thin lense of groundwater (approximately 4 to 7 feet thick, present 8 to 10 feet below land surface).

The migration of the VOC plume has stabilized, as defined by the current monitoring well network and the presence of French Creek along the northern boundary of the Facility. Groundwater is migrating through an unconsolidated deposit of sand and gravel, which sits above a low permeability clay deposit located approximately 15 to 18.5 feet below land surface, and identified continuously below the Facility property. This clay deposit was determined to be up to 44 feet thick and overlying a layer of sandstone on top of siltstone [based on the advancement of a geotechnical boring along the northeastern edge of the Facility by a drilling contractor for the Pennsylvania Department of Transportation (PADOT) (ARCADIS Geraghty & Miller 2000)].

The eastern and western edges of the plume have been defined by monitor wells MW-5D and MW-1D respectively. During groundwater monitoring conducted in 1998 and 1999, TCE was the only VOC present in MW-5D above its MCL with a maximum concentration of 0.041 ug/l. During groundwater monitoring conducted from 1997 through 1999, PCE was the only VOC present in MW-1D above its MCL with a maximum concentration of 0.027 ug/l (ARCADIS Geraghty & Miller 1998 and 2000). These monitor wells are located approximately 375 feet apart. The width of the plume was further assessed by a line of groundwater samples collected along French Creek using direct-push drilling and sampling techniques in 1999. This focused 1999 investigation determined that the width of the plume is less than 300 feet wide beneath this area of the Facility (ARCADIS Geraghty & Miller 2000).

The discharge of groundwater to French Creek and the monitoring data along the eastern and western plume boundaries suggests that the migration of the VOC plume to other areas where exposure may occur has been stabilized.

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.

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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): Groundwater beneath the Facility discharges to French Creek along the northern border of the Lord property.

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5. Is the **discharge** of “contaminated” groundwater into surface water likely to be “**insignificant**” (i.e., the maximum concentration³ 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)?

_____ If yes - skip to #7 (and enter “YE” status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration³ 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.

X If no - (the discharge of “contaminated” groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration³ 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 concentrations³ 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): Groundwater monitoring of the VOC plume migrating towards French Creek indicates that the VOCs PCE, TCE, DCE, 1,1,1-trichloroethane (TCA) and vinyl chloride are present in groundwater that is discharging to surface water as a diffuse plume or intermittent groundwater seeps. The range of concentrations in mg/l of each constituent in groundwater monitoring wells and seeps is summarized below, along with their respective MCLs:

<u>Constituent</u>	<u>MW Concentration Ranges at the Fence</u>	<u>Seep Concentration Ranges</u>	<u>MCLs</u>
PCE	1-8000 ppb	0.5-13,000 ppb	5 ppb
TCE	1-41 ppb	<1-60 ppb	5 ppb
DCE(total)	0.6-2.1 ppb	3.2-271 ppb	70 ppb
TCA	0.06-5.9 ppb	0.1-4.6 ppb	200 ppb
Vinyl Chloride	0.1-1 ppb	0.03-53 ppb	2.0 ppb

Therefore, the discharge of VOCs from groundwater to surface water is insignificant for TCA, while it may be considered significant when compared to RCRA’s use of MCL’s for comparison of PCE (greater than 100 times its MCL—which equates to an approximate mass loading of PCE to the creek at 143.33 kg/year), TCE (slightly greater than 10 times its MCL), vinyl chloride (greater than 10 times its MCL), and DCE (greater than 3 times its MCL).

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An evaluation of this discharge was completed per the Act 2 Technical Guidance Manual and discussion with PADEP. Data from a 1999 direct push investigation focusing on further delineating the plume in proximity to the creek embankment was used along with monitor well and seep data to determine the average VOC concentrations entering the creek across the 300 foot wide by 6 foot thick plume. These average VOC concentrations are as follows:

<u>Constituent</u>	<u>Calculated Average Concentration Entering the Creek</u>
PCE	3380 ppb
TCE	20 ppb
cis-1,2 DCE	2 ppb
TCA	1 ppb
Vinyl Chloride	4 ppb

This analysis determined that the mass loading from the plume when mixed with the volume of water in French Creek (based on U.S.G.S. Harmonic Mean Flow, per Act 2 Technical Guidance Manual) does not exceed the Pennsylvania Title 25 Chapter 16 Water Quality Criteria for Toxic Substances.

The calculated in stream concentrations based on the mass loading were also compared to U.S. EPA Region III Biological Technical Assistance group (BTAG) values and secondary Chronic values for Fauna (Suter & Tsao, 1996). None of the in stream values were above these screening criteria concentrations.

In addition, it should be noted that this is a conservative evaluation of the VOC discharge to the creek because it assumes no VOC losses due to volatilization. This assumption is likely overly conservative based on the volatile nature of the constituents like PCE, TCE, DCE, TCA and vinyl chloride.

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

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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)?

X 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): The discharge of VOCs to French Creek has been determined to be currently acceptable based on a site-specific qualitative ecological assessment and a fate and transport analysis which evaluated the mixing of groundwater in surface water per the procedures provided in Act 2 technical guidance. The ecological assessment determined that no threatened or endangered species were identified within the vicinity of the Facility or in adjacent areas of French Creek during a survey conducted in conjunction with the PADOT Grant Street Bridge project, a qualitative site reconnaissance survey, and a review of the Pennsylvania Natural Diversity Inventory. A review of available screening benchmarks for assessing potential ecological risks to fish and invertebrates due to the VOCs in the aquatic system concluded that the discharge of VOCs in groundwater to surface water at this Facility is not anticipated to pose a risk to the environment. (ARCADIS Geraghty & Miller 2000).

The fate and transport analysis used an average concentration for VOCs across the 300 foot wide plume entering French Creek (based on data from a direct push investigation, monitor well data at the fence and at the seeps). This analysis determined that if all of the VOCs remained in the surface water (i.e., conservative evaluation assuming no volatilization) the in-stream concentration of VOCs would still be below the Pennsylvania Title 25 Chapter 16 Water Quality Criteria for Toxic Substances for human health criteria for all site related VOCs identified during 1997 through 1999. Additionally, the calculated in stream concentrations based on the mass loading were compared to U.S. EPA Region III BTAG values and secondary Chronic values for Fauna (Suter & Tsao, 1996). None of the in stream values were above the screening criteria concentrations.

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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 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): Site monitoring under the Act 2 Program will continue through 2001 on a semi-annual basis at selected wells and seeps where VOC concentrations continue to be found at levels above appropriate risk based standards.

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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 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 **Lord Kinematics** facility, EPA ID # **PAD 05 112 9757**, located at **124 Grant Street, Cambridge Springs, Pennsylvania 16403**. 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 (signature) _____ Date: 09-28-00
 Hilary Livingston
 Remedial Project Manager

Supervisor (signature) _____ Date: 09-28-00
 Paul Gotthold
 PA Operations Branch Chief
 EPA, Region 3

Locations where References may be found:

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