

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

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**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:** KLI, Inc.  
**Facility Address:** 16174 Industrial Drive, Milford VA 22514  
**Facility EPA ID #:** VAD 052356623

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 #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 “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**”<sup>1</sup> 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?

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):**

**KEY CONTAMINANTS:**

A closed surface impoundment near the southern boundary of the site appears to be the primary source of contamination. Total chromium and hexavalent chromium are the primary constituents of concern at the facility. Several other inorganic constituents and organic compounds have been detected in the groundwater at the facility. Both total chromium and hexavalent chromium have been detected above Maximum Contaminant Level (MCL) values during several sampling events. Only monitoring well MW-7S directly downgradient from the closed RCRA surface impoundment has displayed chromium exceedances above MCL values. The other inorganic and organic constituents have been detected, but not above their specific MCLs. Hexavalent chromium has also been detected above the Alternate Concentration Limit (ACL) determined by the Commonwealth of Virginia. Sampling for both total and dissolved metals have shown comparable concentrations suggesting that the metals are in solution.

**REFERENCES:**

KLI Annual Reports 1999, 2000, 2001, 2002

KLI Quarterly Report First Quarter 2003

KLI Final Post-closure Permit, Sept. 1997

**Footnotes:**

<sup>1</sup> “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”<sup>2</sup> as defined by the monitoring locations designated at the time of this determination)?

   Y 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”<sup>2</sup>).

   If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the “existing area of groundwater contamination”<sup>2</sup>) – 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):**

**RATIONALE:**

The only surficial well to display the MCL exceedances for chromium is MW-7S, which is directly downgradient from the closed RCRA surface impoundment. In addition, concentrations for total chromium in MW-7S have been below the MCL for the last 4 quarters (2003 second quarter, 2003 first quarter, 2002 fourth quarter, and 2002 third quarter).

MW-7S has also displayed MCL exceedances for hexavalent chromium. Both the third quarter and second quarter 2002 concentrations have exceeded both the MCL and ACL values. Hexavalent chromium has been below both the MCL and ACL for the past three quarters (2003 second quarter, 2003 first quarter, and 2002 fourth quarter).

The migration potential of contaminants in this area is extremely low because of the flat hydraulic gradient over the site. The average horizontal flow velocity has been estimated to be between 49 to 63 feet per year.

The plume has not spread vertically because of a thick, lower permeability silt layer underlying the uppermost aquifer, which is a permeable sand and gravel layer or surface fill material. The deep monitoring well, MW-7I, which is screened in the silt layer has shown no organic contamination and very low concentrations of a few inorganics, and has never shown an exceedence of the MCLs.

Additional sampling of the surface water in the marshy area across the Route 773 to the south will be conducted in FY2004 to add additional supporting evidence of the stability of the plume.

**Footnotes:**

<sup>2</sup> “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?

**Rationale and Reference(s):**

- Y   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.

Groundwater discharges to the surface to the south of the property in a marshy wetland. The wetland is part of an unnamed tributary that discharges to the Mattaponi River. Additional sampling of the surface water in the marshy area across the Route 773 to the south will be conducted in FY2004 to verify the stability of the plume. The only well that currently exceeds MCLS (MW-7S) is upgradient of the unnamed tributary so to be conservative it is assumed that the groundwater from this well discharges into the tributary.

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5. Is the **discharge** of “contaminated” groundwater into surface water likely to be “**insignificant**” (i.e., the maximum concentration<sup>3</sup> 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)?

**Rationale and Reference(s):**

  Y   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<sup>3</sup> 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<sup>3</sup> 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<sup>3</sup> 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 – skip to #8 and enter “IN” status code.

**Rationale and Reference(s):**

Concentrations have continually fluctuated over the past five years of sampling , but concentrations for total chromium have been below the MCL for the last 4 quarters (2003 second quarter, 2003 first quarter, 2002 fourth quarter, and 2002 third quarter). Assuming a dilution factor of ten (10) of the contaminated groundwater once it discharges to surface water, the total chromium concentrations would be less than current MCL. In addition, if the same dilution factor is used, the hexavalent chromium concentrations would be less than the current ACL.

Footnotes:

<sup>3</sup> 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 implemented<sup>4</sup>)?

Not applicable

\_\_\_\_\_ 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 ecosystems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR
- (2) providing or referencing an interim-assessment<sup>5</sup>, 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 into surface water is potentially significant) continue after documenting: 1) the maximum known or reasonably suspected concentration<sup>3</sup> 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<sup>3</sup> 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 – skip to #8 and enter “IN” status code.

**Rationale and Reference(s):**

Footnotes:

<sup>4</sup> 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.

<sup>5</sup> 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?”

   **Y** 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. 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 monitoring at the facility is required under a Post-closure Permit Additional sampling of the surface water in the marshy area across the Route 773 to the south will be conducted in FY2004 to add additional supporting evidence of the stability of the plume.

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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).

  Y   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 KLI, Inc facility, EPA ID # VAD052356623, located at 16174 Industrial Drive, Milford, VA 22513. 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 | (Original Signed)                      | Date  | 9/25/03 |
|              | _____                                  | _____ |         |
|              | (Print) Richard C. Doucette            |       |         |
|              | (Title) Environmental Engineer Senior  |       |         |
| Supervisor   | (Original Signed)                      | Date  | 9/25/03 |
|              | _____                                  | _____ |         |
|              | (Print) Howard R. Freeland             |       |         |
|              | (Title) Environmental Engineer Manager |       |         |
|              | (EPA Region or State) III/VA           |       |         |

**Locations where References may be found:**

Department of Environmental Quality  
Division of Hazardous Waste Permitting, Groundwater  
629 East Main Street  
Richmond, VA 23219

**Contact telephone and e-mail numbers:**

|           |                                   |
|-----------|-----------------------------------|
| (Name)    | <u>Richard C. Doucette</u>        |
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