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:	**Koppers Industries, Inc., Roanoke Valley Plant**
Facility Address:	**Salem, Virginia**
Facility EPA ID #:	**EPA ID No. VAD003125770**

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 "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).

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 facility is involved in the production of creosote-treated wood products for the pressure-treatment of railroad cross ties, switch ties, bridge timbers, and crossing panels. Today, the only wood preservative used at the facility is a mixture of creosote and coal tar, but xylene was used, before 1986, to dry untreated wood. The key contaminants at the facility are polycyclic aromatic hydrocarbons (PAHs; MCL = 0.0002 ug/L), and the following volatile organics--specifically, the BETX group: benzene (EPA Maximum Contaminant Level for drinking water (MCL) = 5 ug/L); ethylbenzene (MCL = 700 ug/L); toluene (MCL = 1000 ug/L); and xylene (10,000 ug/L). Source: Koppers, Inc., Roanoke Valley Plant, RCRA Facility Investigation Report, September 22, 2003.

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).

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):

Groundwater exceeds BETX MCLs in roughly the eastern third of the facility. The highest BETX concentrations occur in the deepest aquifer zone (zone C—70 to 110 ft in depth) and in the middle aquifer zone (zone B—25 to 70 ft in depth). Key wells where aqueous BETX contaminants have been identified are: M-12B, M-16B, M-3C, M-6C, and M-11C). In addition, groundwater in some of the wells contains liquid product in "dense nonaqueous phase liquid" (DNAPL) form.

The highest contaminant concentrations in any of the aquifer zones were from zone C, with benzene concentrations at 380 ug/L and ethylbenzene concentrations at 3200 ug/L in groundwater at well M-6C. In comparison, the benzene concentration in zone B (well M-12B) was 82 ug/L and the ethylbenzene level was 680 ug/L.

In aquifer zone A (5 to 25 ft in depth), contamination is more limited in extent than in the other two zones. Also, the highest BETX concentrations in zone A are less than the highest concentrations in zones C or B. The benzene concentration from groundwater at well M-6A was below 25 ug/L and the ethylbenzene concentration was 550 ug/L.

Koppers Industries has stepped out from the general area of the plumes(s) in all three aquifer zones (A, B, and C), by drilling and monitoring additional wells. These wells are designed to detect the vertical and lateral extent of the groundwater contamination. Included in these additional wells are: M-13, M-27, M-29, M-38, and M-39. The analyses of groundwater collected from these wells indicates that the migration of contaminated groundwater has stabilized during the period of observation and is expected to remain within the existing area of contamination.

Sources: Koppers, Inc., Roanoke Valley Plant, RCRA Facility Investigation Report, September 22, 2003; Koppers Industries, Inc., 2002 RCRA Annual Groundwater Monitoring Report, February 28, 2003.

Footnotes:

[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?

Rationale and Reference(s):

____ If yes – continue after identifying potentially affected surface water bodies

__**X**__ 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.

The nearest surface water body is the Roanoke River, which meanders from west to east around the facility. Groundwater flow directions determined from water levels in monitoring wells from across the entire Post-closure Care and RCRA Facility Investigation networks and, more specifically, analyses of groundwater from monitoring well clusters surrounding the existing contaminant plume(s), show that contaminated groundwater from the facility does not discharge into the Roanoke River.

Sources: Koppers, Inc., Roanoke Valley Plant, RCRA Facility Investigation Report, September 22, 2003; Koppers Industries, Inc., 2002 RCRA Annual Groundwater Monitoring Report, February 28, 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)?

Rationale and Reference(s):

NA 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 – skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Footnotes:

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

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])?

NA 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[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 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 – skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Footnotes:

[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. 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):

The Post-Closure Care Permit for Koppers Industries and ongoing RCRA Facility Investigation work require continued groundwater monitoring at the site.

Sources: Koppers, Inc., Roanoke Valley Plant, RCRA Facility Investigation Report, September 22, 2003; Koppers Industries, Inc., 2002 RCRA Annual Groundwater Monitoring Report, February 28, 2003.

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 **Koppers Industries, Inc.** facility, EPA ID # **VAD003125770**, located at **Salem, Virginia**. 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	9/29/03
	(Print) Allen R. Brockman		
	(Title) Environmental Specialist II		
Supervisor	(Original Signed)	Date	9/29/03
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