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: WR Grace & Co. – Conn. Curtis Bay Works Facility
Facility Address: 5500 Chemical Road, Baltimore, Maryland 21226-1698
Facility EPA ID #: MDD001710227

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., report 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 "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 groundwater 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?

__√__ 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.

The W.R. Grace & Co. – Conn. (Grace) Davison Chemical Division Curtis Bay Works (Curtis Bay plant site) occupies approximately 110 acres located on the peninsula separating Curtis Bay and Curtis Creek, and on the adjacent land along the Curtis Bay shoreline. The site is located in southeastern Baltimore, Maryland and is a major inorganic chemical manufacturing center for silica-based adsorbents and related products, polyolefin catalysts used in plastics and packaging, and fluid cracking catalysts used in petroleum refining (GeoTrans, 2002a). The facility is bordered to the south by a rail line, the Lafarge Cement Company, and by the Baltimore City Quarantine Road Landfill; to the east by a US Gypsum Company facility; and to the north and west by Curtis Bay and Curtis Creek (Figure 1).

Operations at the facility date back more than 90 years. Prior to 1901, the area was used as farmland. Currently, the property is divided into two approximately equal, 55-acre sections: the Manufacturing Area, including 12 production facilities, warehousing facilities, maintenance shops, administrative buildings, and a technical research center; and the Non-Manufacturing Area, including the Water Reclamation Plant, Herring Pond, Spoils Ponds 1 & 2, the Radioactive Waste Disposal Area (RWDA), the capped landfill, and the filter cake disposal cell. The facility layout is shown on Figure 2.

It should be noted that the RWDA is a former Department of Energy (DOE) area and is being addressed separately from the rest of the facility by the US Army Corps of Engineers (USACE). Investigation and corrective action for this area are being conducted separately from the rest of the facility activities under a different regulatory program (Formerly Utilized Sites Remedial Action Program, FUSRAP). Accordingly, this EI Determination does not include the RWDA.

In June 2002, Grace and the EPA agreed to an Administrative Order on Consent ("Consent Order"), executed under Section 3013 of the Resource Conservation and

[1] "Contamination" and "contaminated" describe 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).

Recovery Act (RCRA). The Consent Order provides the regulatory framework for Corrective Action environmental investigations at the site. The initial objective of the Consent Order is the determination of the status of the site with regard to the Human Exposure and Migration of Contaminated Groundwater EIs. Prior to execution of the Consent Order, Grace implemented a preliminary groundwater investigation of the site to collect the data necessary to complete the EIs ("the 2001 Investigation"). This investigation (GeoTrans, 2002a) included the collection of groundwater samples from 18 monitoring wells and 27 Geoprobe locations, and the collection of 10 near-shore sediment pore water and surface water samples (Figure 3). Grace analyzed the groundwater samples from the Manufacturing Area for 108 constituents, including 12 metals, 33 volatile organic compounds (VOCs), and 63 semi-volatile organic compounds (SVOCs). Grace has limited all manufacturing operations throughout the life of the Curtis Bay facility to the Manufacturing Area. The use, transport, and storage of organic chemicals (used in relatively small quantities at the site) has, therefore, only occurred in the Manufacturing Area. Accordingly, Grace analyzed groundwater samples from the Non-Manufacturing Area for only the 12 constituent list metals.

Grace used the data from the 2001 Investigation to evaluate groundwater quality and potential surface water impacts resulting from the discharge of site groundwater. Grace also performed an evaluation of the potential impacts of site groundwater discharge to the shallow sediments in Curtis Bay and Curtis Creek (GeoTrans, 2002b). EPA reviewed these analyses and requested that Grace conduct a follow-up investigation to verify assumptions regarding the thickness of site-impacted groundwater, groundwater flow directions, and the geochemical conditions in near shore sediments. This investigation, known as the "Supplemental EI Investigation," was conducted in two phases. A detailed description of this investigation is available in the Quality Assurance Project Plan (QAPP) prepared by GeoTrans (2003a). The first field phase, completed in 2003, involved the collection of 12 surface water samples, 12 sediment cores, seven sediment gas samples, and 19 sediment pore water samples. The results of the first field phase are documented in a letter report prepared by GeoTrans (2003b). Grace completed the second field phase in July 2004. The work included the collection of 10 groundwater samples from three Geoprobe sampling points and 27 groundwater samples from site monitoring wells. The results of the second field phase are reported in two documents [GeoTrans (2004a and 2004b)]. Figure 3 shows the sampling locations for the Supplemental EI Investigation.

As specified in the QAPP, the list of groundwater Constituents of Interest (COIs) for this EI determination includes 170 chemicals [21 metals, 21 pesticides, 7 poly-chlorinated biphenyls (PCBs), 67 semi-volatile organic compounds (SVOCs), 52 volatile organic compounds (VOCs), low pH, and high pH]. Grace screened the site groundwater quality data against U.S. EPA (EPA) Maximum Contaminant Levels (MCLs) or EPA Region III Risk-Based Concentrations for COIs without a specified MCL. Grace conducted the screening using the results from the 2001 Investigation (Geoprobe and monitoring well data), the RWDA Investigation (EA Engineering, Science and Technology, Inc., 2001, all sampling points external to the RWDA), and the 2004 Supplemental EI Investigation (Geoprobe and monitoring well data). Grace groundwater permit wells GM-16, 17, and 18, even though they are located within the defined area of the RWDA, were also included in this analysis. These three data sets collectively provide complete coverage of the Curtis Bay facility and include a total of 69 groundwater monitoring locations. Figure 3 shows the combined set of sampling locations used for this screening. Table 1 summarizes this screen and includes the maximum measured concentration, associated sampling point and indicates whether the screening level was exceeded.

The screening identified 37 COIs that exceed a groundwater screening level at one or more sampling locations. The 37 COIs included 17 metals, six pesticides, seven SVOCS, four VOCs, one PCB, low pH, and high pH.

Exceedances were identified for the following parameters:

General	Metal	PCB	Pesticide	SVOC	VOC
Low pH	Zinc	Aroclor-1260	gamma-BHC (Lindane)	Nitrobenzene	Methylene Chloride
High pH	Vanadium		Dieldrin	Naphthalene	Chloroform
	Thallium		delta-BHC	Carbazole	Bromodichloromethane
	Selenium		beta-BHC	bis(2-Ethylhexyl)phthalate	Benzene
	Nickel		alpha-BHC	bis(2-Chloroethyl)ether	
	Molybdenum		Aldrin	2,4-Dinitrotoluene	
	Mercury			Dibenzofuran	
	Manganese				
	Lead				
	Iron				
	Copper				
	Cobalt				
	Chromium				
	Cadmium				
	Arsenic				
	Antimony				
	Aluminum				

Metals account for approximately half of the total groundwater exceedances. In general, metals occur at higher concentrations relative to screening levels and are more widespread than the other exceeding constituents. On average, metals exceed the screening level at 23 locations compared with 7 for all other constituents combined. For the non-metalic constituents, the most widespread COIs are low pH (51 locations), chloroform (24 locations), and naphthalene (10 locations).

The exceedances recorded for three of the COIs (two VOCs and one SVOC) may not be significant or are not likely related to actual groundwater conditions. Chloroform occurs in site groundwater at relatively low concentrations but is a common byproduct from the chlorination of public water supplies for disinfection purposes. The source of the chloroform detected in site groundwater, therefore, may be the public water supply used by the plant which may be leaking in the manufacturing area. Methylene chloride and bis(2-ethylhexyl)phthalate also occur at relatively low concentrations. Methylene chloride is a common laboratory contaminant; bis(2-ethylhexyl)phthalate is a common ingredient in plastics and could, therefore, be introduced from the various equipment used in sample collection and analysis. The relatively high occurrence rates for methylene chloride and bis(2-ethylhexyl)phthalate in field and equipment blanks (73 and 61 percent, respectively) suggest that the observed exceedances likely result from sample collection and analysis processes and are, therefore, unrelated to actual site conditions.

Metals concentrations were also detected in site groundwater during a 1988 Maryland Department of the Environment (MDE) Screening Site Inspection of the former Estech property (*A Site Inspection of Estech General Chemical Company, July 1989)*. The Estech property is currently within the WR Grace property boundaries. Cadmium and lead were identified as constituents that exceeded MCLs for drinking water standards in one sampling point. Pesticides were also reported at elevated concentrations in ground water. During the 1950s and 1960s, Estech General Chemical manufactured organic phosphates and chlorinated hydrocarbon pesticides.

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").

_____ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination") – 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):

A contour map (Figure 4) of shallow groundwater levels at the site indicates the presence of a local groundwater high in the Manufacturing Area. Water-table elevations higher than nine feet occur within a broad area generally coinciding with the axis of the peninsula separating Curtis Bay from Curtis Creek. Groundwater levels in the Non-Manufacturing Area are locally affected by site operations. The groundwater level map shows that in nearly all areas of the site, groundwater either discharges to Curtis Bay or to Curtis Creek. Although a small, landward portion of the site lies down gradient from the Manufacturing Area groundwater high, groundwater from this area is also anticipated to discharge to adjacent surface water because of the high groundwater levels documented at the adjacent Quarantine Road Landfill site. The groundwater elevation data, therefore, indicate that the groundwater plume is not expanding in volume, primarily due to the influence on local groundwater flow by Curtis Bay and Curtis Creek. These surface water bodies act as groundwater constituent migration boundaries. The surface water features prevent further spread of the elevated concentrations because groundwater discharge occurs.

Two weeks of groundwater elevation monitoring conducted in three site monitoring well clusters provides supporting evidence that site groundwater discharges to Curtis Bay and Curtis Creek (GeoTrans, 2004b). Groundwater levels were monitored

[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.

from June 26 through July 9, 2004 at the GM-27 cluster (P-3, 27I, 27D), the GM-26 cluster (P-2, GM-26D), and the GM-13 cluster (P-1, GM-13D). Figure 3 shows the location of each well cluster. In addition, surface water fluctuations were monitored at a tide gage installed near the Curtis Bay shore adjacent to Herring Pond.

The plots indicate that groundwater levels along the site shoreline are greater than the water levels in the Bay and the Creek. Further, a comparison of the water levels in the shallow and deep wells at each cluster shows that hydraulic head in the water table aquifer typically increases with depth near the site shoreline. The existence of groundwater levels that are greater than surface water levels and the upward directed hydraulic gradient near the shoreline indicates that shallow groundwater at the Curtis Bay site discharges to adjacent near-shore surface water.

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 “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):

See previous discussion in response to question #3.

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 their appropriate surface water “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 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 concentration of key contaminants discharged above their groundwater “level,” the value of the appropriate “level(s),” and if there is evidence that the concentrations area 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 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 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):

In order to demonstrate that the discharge of contaminated ground water into surface water is likely to be insignificant, Grace evaluated ground water data collected onsite, and surface water and pore water data collected from Curtis Bay and Curtis Creek. Initially, Grace estimated a potential dilution factor for ground water discharging to surface water. Next, Grace used that dilution factor to estimate surface water concentrations that would potentially result from contaminated site ground water discharging to surface water in Curtis Creek/Bay. Finally, Grace compared the estimated surface water concentrations to surface water screening criteria.

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

The screening criteria for each COI were selected as the lowest appropriate concentration from among the following criteria sources:

- Maryland and Federal Freshwater Chronic,
- Maryland and Federal Saltwater Chronic,
- Maryland Estuarine Chronic,
- Toxicological Benchmarks for Screening of Potential Contaminants of Concern for Effects on Aquatic Biota on Oak Ridge Reservation (Table 1, tier II secondary chronic values) (Suter and Tsao, 1998), and
- Maryland and Federal Human Health Criteria for Consumption of Organism Only.

Grace used a direct approach to estimate potential dilution of groundwater discharging to surface water based on the comparison of surface water to sediment pore water COI concentrations. The surface water concentrations were measured within one meter of the bottom of Curtis Bay and Curtis Creek. The pore water concentrations were measured just below the bottom at locations coinciding with the surface water samples.

As an initial step in this process, Grace screened the surface water concentration data against the screening criteria (Table 2). This analysis was conducted subsequent to the preparation and approval of the Supplemental EI Investigation QAPP. The surface water concentration data for 11 COIs were collected from two near shore sampling points, identified as T1C1 and T2C1 on Figure 3. T1C1 and T2C1 are located on Transects 1 and 2, respectively, which were sited to characterize sediment pore water in Curtis Bay and Curtis Creek down gradient from groundwater having the highest measured concentrations of site COIs. As noted in Table 2, one COI (barium) in the surface water samples at T1C1 and T2C1 exceeds surface water quality criteria. In addition, although not detected, arsenic is a potential exceedance because the method detection limit (2.4 ug/l) for this COI is greater than the screening criteria (0.14 ug/l).

Table 2 also shows the shallow sediment pore water concentration data for the 11 COIs with available data. A comparison of the pore water concentrations for arsenic at location T2C1 (Transect 2) and copper at T1C1 (Transect 1) to the adjacent surface water concentrations for these constituents, respectively, suggests that a minimum four-order of magnitude dilution of concentrations occurs between pore water and adjacent surface water.

If no other source of a COI in the surface water exists, the ratio of the surface water concentration to the pore water concentration is an estimate of the dilution factor. In addition, the smallest ratio among the various COIs at a site is the best estimate of the dilution factor. High ratios suggest that there either are other sources of the COI or that there is less attenuation than for COI with the smallest ratio. Because the pore water samples that are presented were collected at shallow depths, it is believed that dilution rather than attenuation is the primary cause for the reduction in concentration between the pore water and surface water.

Given the estimated 1.0 x 10^{-4} reduction from pore water to surface water at the site and the maximum observed barium concentration of 36.5 ug/L in pore water, the site contribution to the observed surface water barium concentration is likely negligible (0.00365 ug/L). Although arsenic may be present in surface water at concentrations greater than the screening level (0.14 ug/L), the COI was not detected (the detection limit was a relatively low level, 2.4 ug/L). The available site surface water concentration data, therefore, indicate that site groundwater discharge to Curtis Bay and Curtis Creek is not significant with regard to these 11 COIs.

Grace further evaluated the potential significance of the discharge of site groundwater to surface water by screening site groundwater concentration data against the conservatively selected surface water criteria noted above. Consistent with the procedure used to identify potential groundwater contamination, Grace conducted the screen using the Geoprobe sampling results from the 2001 Investigation, the RWDA Investigation data, and the 2004 Supplemental EI Investigation data. As previously noted, these data sets used in combination provide complete coverage of the Curtis Bay facility and include a total of 69 groundwater monitoring locations.

The surface water screen revealed that groundwater concentrations for 61 COIs exceed their respective surface water quality criteria. The 61 COIs include 21 metals, 18 pesticides, 16 SVOCs, four VOCs, one PCB, and total cyanide (Table 3). Application of the conservative dilution factor (1 x 10^{-4}) determined from the Transect 1 and 2 surface water/pore water concentration data discussed above enables the estimation of the diluted concentrations of the 47 exceeding COIs that have defined surface water quality criteria (Table 4). Based on this approach, only arsenic potentially exceeds the screening level after accounting for dilution. The estimated site contribution to surface water concentration levels for each of the other exceeding COIs is much less than the respective water quality criteria. The discharge of site groundwater to adjacent surface water with respect to these COIs is, therefore, insignificant with regard to impacting surface water quality.

The arsenic groundwater concentration that exceeds the surface water criteria after dilution was measured at MW-8D in 1999 for the RWDA investigation. The well yielded a concentration of 16,400 ug/L (dissolved). The corresponding estimated surface water concentration is 1.64 ug/L as compared to the surface water quality criteria of 0.14 ug/L (Federal Human Health Consumption of Organism Only criteria). MW-8D is located adjacent to the southern (up-gradient) boundary of the site (Figure 3). Re-sampling of the well in June 2004 resulted in dissolved and total arsenic concentrations of 8.8 and 24.8 ug/L, respectively. Sitewide for the three investigations considered in this EI determination, 141 groundwater samples have been collected and analyzed for arsenic. The 95 percent upper confidence interval on the mean arsenic concentration for these data is 371 ug/L. Given that the arsenic concentration at MW-8D was much lower for a subsequent sampling event, that the 16,400 ug/L value is not reproducible and an apparent anomaly with respect to typically observed concentrations, and that the elevated concentration was measured in an up-gradient well located at a significant distance from the shoreline, the Curtis Bay site impact to surface water quality with regard to arsenic is also considered insignificant.

The amount of discharging groundwater with elevated COI levels is likely decreasing with time. The COIs identified in site groundwater are, for the most part, unrelated to any of the site's current manufacturing processes. The Curtis Bay Works was previously the site of sulfuric acid manufacturing operations. The pyrite ore that served as the principal raw material for this process naturally contained trace amounts of the metals identified in the groundwater screen conducted for this EI. These operations over time may have resulted in a lowering of groundwater pH and an increase in trace metal concentrations. Grace discontinued sulfuric acid manufacturing operations several decades ago and any such effects on site groundwater are likely diminishing with time.

Pesticides were manufactured at the former Estech property, currently within the W.R. Grace property boundary. The site groundwater data show that pesticides occur only in isolated locations and at very low concentrations. In addition, the pesticide data show that concentrations are not increasing.

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 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):

Skip to Question #7 pursuant to the response to Question #5.

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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.

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?"

__√__ 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):

Routine, state permit-required groundwater monitoring for eight COIs (pH, Magnesium, Iron, Chromium VI, Chromium, Lead, Nickel, and Nitrate/Nitrite) is ongoing in the Non-Manufacturing Area. Additional groundwater assessment will be conducted during the RCRA Facility Investigation process, as needed. Furthermore, the physical characteristics of the site and the direction of groundwater flow mean that the area of contamination will remain within the existing area because groundwater cannot move beyond the migration barriers of the surface water bodies.

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, "Migration of Contaminated Groundwater" is "Under Control" at the WR Grace & Co. – Conn - Curtis Bay Works facility, EPA ID # MDD001710227, located at 5500 Chemical Road Baltimore, Maryland under current and reasonably expected conditions. 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/State 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) ______________________ (print) Stephanie Dehnhard (title) Remedial Project Manager	Date	7/12/05
Supervisor	(signature) ______________________ (print) Robert E. Greaves (title) Chief, RCRA General Operations Branch, EPA Region 3	Date	7/12/05

Locations where References may be found:

The following documents are on file with the USEPA Region III:

1. *Revised Final Remedial Investigation (RI) Report of the Radioactive Waste Disposal Area (RWDA) at the W.R. Grace Curtis Bay Facility, Baltimore, Maryland* (EA Engineering, Science, and Technology, Inc., 2001).

2. *Historical Data Review and Report of Groundwater Investigations to Support Environmental Indicator Determination* (GeoTrans, Inc., 2002a).

3. *Evaluation of Concentrations of Arsenic, Lead, and Cadmium in Sediments Offshore of the W.R. Grace & Co.-Conn. Davison Chemical Division Curtis Bay Works, Baltimore, Maryland* (GeoTrans, Inc., 2002b).

4. *Quality Assurance Project Plan for the RCRA Corrective Action Program at the W.R. Grace & Co.-Conn. Davison Chemical Division Curtis Bay Works, Supplemental Investigations to Address U.S. EPA Region III Comments Regarding the July 23, 2002 Environmental Indicator Assessment Report. (GeoTrans, May 2003)* (GeoTrans, Inc., 2003a)

5. *Results of Sediment Investigations at the W.R. Grace & Co. Curtis Bay Works, Baltimore, Maryland. December 3, 2003 Letter to Mr. David Williams (W.R. Grace & Co.-Conn.) from Mr. Mark Shupe (GeoTrans, Inc.) provided as an attachment to a December 3, 2003 letter from Mr. David Williams to Ms. Deborah Goldblum (U.S. EPA Region III)* (GeoTrans Inc., 2003b).

6. *Summary of Preliminary Results of Groundwater Investigation Tasks and Proposed Modifications to the Supplemental Investigation for Enviromental Indicator Determination at the W.R. Grace & Co.-Conn. Curtis Bay Works. April 9, 2004 letter from Mr. Mark Shupe (GeoTrans, Inc.) to Ms. Deborah Goldblum (U.S. EPA Region III)* (GeoTrans, Inc., 2004a).

7. *Summary of preliminary Results of Monitoring Well Installation and Groundwater Sampling Tasks, Supplemental Environmental Indicator Investigation at the W.R. Grace & Co.-Conn. Curtis Bay Works, Baltimore, Maryland. November 10, 2004 letter from Mr. Mark Shupe (GeoTrans, Inc.) to Ms. Stephanie Dehnard (U.S. EPA Region III)* (GeoTrans, Inc., 2004b).

8. *A Site Inspection of Estech General Chemical Company* (MDE, July 1989*)*

9. *Suter, G.W. II and Tsao, C.L., 1996. ES/ER/TM-96/R2 Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision. Available online at : www.esd.ornl.gov/programs/ecorisk/ecorisk.html. Prepared by Risk Assessment Program Health Sciences Research Division Oak Ridge, Tennessee 37831. Prepared for the U.S. Department of Energy Office of Environmental Management.*

10. *Site Survey of the Estech General Chemical Company, Baltimore, MD. Maryland Department of the Environment, August 2000.*

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