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:	Clean Harbors of Cleveland, Inc.
Facility Address:	2900 Rockefeller Ave., Cleveland, OH
Facility EPA ID #:	OHD 000 724 153

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

   ☐ 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?

☐ 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):

References: *September 1990 Order on Consent between the United States Environmental Protection Agency and Clean Harbors Environmental Services, Inc.*
Report of Subsurface Investigation Chromic Acid Spill Area, February 25, 1991
Report of Diked Area Subsurface Investigation and Work Plan for Soil Removal, July 22, 1991
Sampling and Analysis Results Former ChemClear Property, March 3, 2006

Background
Clean Harbors of Cleveland is a wastewater treatment facility located in Cleveland, OH. It encompasses a 5.5 acre area and is located in a heavily industrial area of Cleveland. A consent order was made between EPA and Clean Harbors on September 28, 1990. The consent order detailed what actions should be taken to mitigate risks to the environment made by Clean Harbors' predecessor, ChemClear.

In August of 1985, a cracked pipe fitting in a recessed portion of a receiving tank resulted in a chromic acid release to the environment. It was estimated that approximately 2,500-3,000 gallons of chromic acid was released. A recovery system was subsequently installed, which recovered approximately 500 gallons of the spilled chromic acid. The Order required ChemClear to perform a soil and groundwater investigation of the area for total chromium (Exhibit C of the 1990 Consent Order) in order to determine the nature and extent of contamination from the spill.

In addition to investigating the spill area, it was ordered by the U. S. EPA to empty and properly dispose of the contents of three aboveground storage tanks (tanks 1, 2, and 3). ChemClear verified that this had been done and proceeded to construct a concrete containment area around the tanks. After construction of the containment area was completed, EPA ordered that soil sampling be performed around this area for the hazardous constituents that were contained in the tanks. Those hazardous constituents were the following: maleic acid, vanadium, total cyanide, arsenic, barium, cadmium, chromium, lead, mercury, selenium, methanol, cadmium, hexavalent chromium, nickel, cyanide (complexed), cyanide salts, lead, maleic anhydride, 1,4-napthaquinone, toluene and phenol. A subsurface soil investigation was performed and a report was submitted to EPA in 1991. Also, after the tanks were decontaminated and reconstructed, some of the soil in the diked area was excavated and sent to an off-site disposal facility.

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[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).

Geology/Hydrogeology

The site is characterized by two level areas separated by a steep hill with a 3:1 slope to the west. This site is located approximately 800 feet east of the Cuyahoga River on the side of a hill which forms the embankment down to the flood plain of the river. The groundwater flow at the site is generally from east to west, towards the Cuyahoga River. The 1991 soil and groundwater investigation showed that he surface soils on site are characterized by up to three feet of olive brown silt fill material. The groundwater table is located within the lower fine sand layer. Water level measurements obtained in wells MW-5 -8 in the 1991 sampling indicate a low horizontal hydraulic gradient in the spill area of approximately 2% to the west. It was also observed that groundwater was encountered at depths of 12 to 22 feet below ground surface. The 2005 investigation confirmed the 1991 investigation observations.

Summary of Investigations

The results of the 1991 chromic acid spill investigation were detailed in the Report of Subsurface Investigation Chromic Acid Spill Area, February 25, 1991. For the purpose of this EI determination, the groundwater results were compared against Maximum Contaminant Levels (MCLs) and it was found that no results were above the MCL for total chromium. The results were further screened against Region 5 Ecological Screening Levels (ESLs) to determine if there would be any adverse impact from the contaminated groundwater to the Cuyahoga River that lies 800 feet west of the facility. It was found that the groundwater results were also below the ESLs.

In 2005, an additional investigation was performed at the site to determine whether contaminated groundwater was moving off site. Three monitoring wells were installed downgradient of the spill area as shown in the attached figure. The November 2005 analytical results were also below MCLs and ESLs for total chromium as shown below in Table 1. In addition to total chromium, groundwater was analyzed for chromium III and chromium VI; neither of which showed any detection in groundwater.

As mentioned above, in 1991, two separate investigations occurred: one in the chromic acid spill area and one around the diked area. The investigation around the diked area included several soil samples surrounding the above ground storage tanks 1, 2, and 3. The analysis included constituents that historically were contained in the tanks (see background for detailed contaminant list). The only contaminant that was found to be above its screening level (Soil Screening Levels-Migration to Groundwater) was arsenic at soil boring B-17. The arsenic concentration found at this sampling point was 240 mg/kg at a depth of 2-4 feet below ground surface. This appeared to be an anomaly since the other twelve sampling points had concentrations of arsenic in the range of 13-23 mg/kg with an average concentration at a depth of 2-4 feet of 21mg/kg. In order to verify that the 240 mg/kg result of arsenic was an anomaly, the November 2005 sampling event required that a soil sample be taken at the same location. The results confirmed that this was an anomalously high result as seen from Table 2. In addition, it was determined from these results that groundwater did not need to be analyzed for arsenic since the potential to migrate from the soil into the groundwater is minimal.

Table 1-Chromium Results in the Groundwater from the Chromic Acid Spill Area

Contaminant	Investigation Date	MCL (mg/L)	ESL (mg/L)	Sample Location/ID	Results (mg/L)
Total chromium	1991	0.1	0.042	MW-1	0.006
				MW-5	0.039
				MW-6	No Detect
				MW-7	No Detect
				MW-8	0.028
Total chromium	2005	0.1	0.042	CHES-1	0.0023
				CHES-2	0.0020
				CHES-3	0.0021

Table 2-Arsenic Results in Soil from the Diked Area

Contaminant	Investigation Date	Soil Screening Level for Migration to Groundwater (mg/kg)	Calculated Background (1991 Diked Area Investigation)	Sample Location/ID	Depth Interval (ft.)	Results (mg/kg)
Arsenic	1991	29	26.6	B-17	0-2	28
					2-4	240
					5-7	25
Arsenic	2005	29		B-17A	0-2	33.5
					2-4	13
					4-6	6.8

Attachment 1 – Map of Clean Harbors Facility with well and soil boring locations shown

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"[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):

[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?

☐ 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):

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)?

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

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

☐ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

[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])?

☐ 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):

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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):

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, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Clean Harbors of Cleveland facility, EPA ID # OHD 000 724 153 located at 2900 Rockefeller Ave. in Cleveland, OH. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

☐ NO - Unacceptable migration of contaminated groundwater is observed or expected.

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

Completed by	(signature)	Jill Groboski	Date 3/9/06 ~~3/15/06~~
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