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:	C&D Technologies Inc,
Facility Address:	200 West Main St, Attica, IN 47918
Facility EPA ID #:	IND 000 810 754

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

The C&D Attica facility is located at 200 W. Main Street in Attica, Indiana along the eastern bank of the Wabash river. The land use surrounding the facility is industrial, commercial and residential with the Attica Wellhead Protection Area located southwest of the facility along the Wabash River. The facility is bounded on the southeast by Third Street: to the southeast by Main Street; the Wabash River to the northwest: and is located in a mixed area of industrial, commercial, and residential use. Historic operations prior to 1955 include the following commercial activities at the site: lumber yard, grain elevators, canning company, timber company, cabinet craft corporation, restaurant, a gasoline filling station and a drive up disposal area for the city of Attica (depicted as "Area 8" in Figure 1).

The C&D facility manufactures lead acid batteries for commercial, industrial and military applications. The local geology consists of glacially derived unconsolidated sediments (alluvium) underlain by and in contact with steep bedrock valley walls that run approximately parallel to the Wabash River. The unconsolidated sediments consist of approximately 140 feet of sand and gravel, The underlying and adjacent bedrock consists of shale and sandstone with limestone that dips to the southwest (USGS, 1994). At the east of the facility lies the contact between the unconsolidated sediments and sandstone, shale, and siltstone bedrock units.

Water is produced from the sand and gravel of Pleistocene age that is overlain by till (USGS, 1994). The depth to groundwater at the site (as measured in three events in 2008*)* typically ranges from 15 to 20 feet below ground surface (bgs) in wells nearest the riverbank, and 20 to 30 feet bgs in wells away from the river. Groundwater flow in the alluvial aquifer is typically to the northwest toward the Wabash River. However, interaction between the alluvial aquifer and the Wabash River can impact the groundwater flow direction near the river, causing groundwater to flow sub parallel to the river in a westerly direction.

Groundwater flow direction in the aquifer and the location of all the monitoring wells is shown in Figure 1.

The City of Attica municipal well field is located approximately 300-400 feet to the southwest of the C&D site. The wells are completed in the alluvial sand and gravel deposits along the east bank of the Wabash River at a depth of approximately 110 to 120 feet bgs.

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 **Acontaminated@**[1] above appropriately protective Alevels@ (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 Alevels,@ and referencing supporting documentation.

___ If no - skip to #8 and enter AYE@ status code, after citing appropriate Alevels,@ and referencing supporting documentation to demonstrate that groundwater is not Acontaminated.@

___ If unknown - skip to #8 and enter AIN@ status code.

Rationale and Reference(s):

[1] AContamination@ and Acontaminated@ 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 Alevels@ (appropriate for the protection of the groundwater resource and its beneficial uses).

Groundwater sample data were compared to the maximum contaminant level (MCL) values where established. Where MCL values are not available the Indiana Department of Environmental Management (IDEM) Residential Default Closure Levels (RDCLs) are used. A similar approach was taken for evaluation of aquatic biota in surface water. Screening values were preferentially obtained from the Indiana chronic SWQS, and secondarily from chronic National Ambient Water Quality Criteria. If unavailable from either source, aquatic biota screening criteria were obtained from USEPA Region 5 Ecological Screening Levels.

Table 1: Contaminant levels in groundwater

Contaminant	Maximum Concentration (µg/L)	Location	Screening Level (µg/ L)
TCE	20	MW-2	5 (MCL)
BEHP	1.3	MW-4	0.3 (Ecological screening level)
Lead	22.2	MW-4S	15 (MCL)
Barium	225	MW- 4S	220 (IDEM surface water screening criteria)
Arsenic	7.6	MW- 4S	0.175 (IDEM surface water screening criteria)

Key contaminants identified in groundwater at the site are trichloroethylene (TCE), bis (2 – ethylhexyl) phthalate (BEHP), lead (Pb), Barium (Ba) and arsenic (As). The appropriate screening values, the monitoring well where the contaminants were found and the maximum concentrations are shown in Table 1.

TCE has been detected in deeper monitoring wells MW-1 and MW-2 in the two most recent sampling events (December 2007-January 2008 and June 2008) at maximum concentrations of 7.3 and 20µg/L respectively. The MCL for TCE is 5.0µg/L. BEHP was detected in several June 2008 groundwater samples at the 0.98 to 1.3µg/L range, as compared to the RDCL of 6µg/L. BEHP is listed in the National Functional Guidelines as a common lab and field contaminant and all detected values are below the quantitation limit of 2µg/L. BEHP is considered in the evaluation of groundwater discharge to surface water, due to the EPA Region 5 ecological screening level of 0.3µg/L for surface water.

Lead was detected in MW-4S at a concentration of 22.2 µg/ L which exceeds the MCL and surface water screening criteria, 15µg/L and 6.7µg/L, respectively. Barium was detected in the same sample at the concentration of 225µg /l which exceeds the surface water screening value of 220µg/L. Arsenic was detected in all groundwater samples however none exceeded the MCL value of 10µg/L. However, Arsenic is considered in the evaluation of groundwater discharge to surface water, due to the exceedance of IDEM surface water screening criteria of 0.175 µg/ L.

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within Aexisting area of contaminated groundwater@[2] as defined by the monitoring locations designated at the time of this determination)?

[2] Aexisting 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 Acontamination@ that can and will be sampled/tested in the future to physically verify that all Acontaminated@ groundwater remains within this area, and that the further migration of Acontaminated@ 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.

__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 Aexisting area of groundwater contamination@[2]).

____ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the Aexisting area of groundwater contamination@[2]) - skip to #8 and enter ANO@ status code, after providing an explanation.

If unknown - skip to #8 and enter AIN@ status code.

Rationale and Reference(s):

Detections of contaminants in groundwater wells at the C&D Technologies site have been isolated but consistent. The only wells where TCE has been detected above MCLs are MW-l, and -2. These values are likely unrelated to the C&D facility given the Corrective Action characterization of an up gradient source and will not be considered further. Furthermore, the concentrations detected in both 2006, 2007 and 2008 are consistent, and are consistently found at depth, do not exceed MCL higher up in the aquifer, and are stable.

While Ba, As, BEHP and Pb were detected in all groundwater monitoring wells, there were no exceedences of the MCL/RDCL screening values. However, the concentration of these contaminants exceed the surface water screening values at MW-4 and MW-4S.

The limited groundwater sampling available from two rounds indicate a stable barium concentration in MW4S, however those values fluctuated around the screening value of 220 µg/L. BEHP exceedance was observed in the latest sampling round. Arsenic level in MW-4S dropped from 7.6 µg/L to 4.2 µg/L from 12/07 to 6/08. Lead shows a 7 fold increase from 12/07 to 6/08 values of 3.2µg/l to 22.2µg/l, respectively. MW-4S is located within the footprint of a closed landfill; therefore a source for lead may be present. Soil boring CB-52 closest to MW-4S yielded Pb and AS values of 103 mg/kg and 5.2 mg/kg at 4-5' below ground surface respectively

4. Does Acontaminated@ groundwater **discharge** into **surface water** bodies?

X If yes - continue after identifying potentially affected surface water bodies.

___ If no - skip to #7 (and enter a AYE@ status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater Acontamination@ does not enter surface water bodies.

___ If unknown - skip to #8 and enter AIN@ status code.

Rationale and Reference(s):

Groundwater from the C & D facility discharges to the Wabash River. See Figure 1. Also note that the Attica well field is situated about 300-400 feet to the southwest of the C&D site, within the Wabash River alluvium.

5. Is the **discharge** of Acontaminated@ groundwater into surface water likely to be **Ainsignificant@** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater Alevel,@ 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)?

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___ If yes - skip to #7 (and enter AYE@ 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 Alevel,@ the value of the appropriate Alevel(s),@ and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

X If no - (the discharge of Acontaminated@ 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 Alevel,@ the value of the appropriate Alevel(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 Alevels,@ 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 AIN@ status code in #8.

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

Rationale and Reference(s):

The maximum concentrations of BEHP, lead, and barium were compared to ten times their respective human and aquatic screening values, as appropriate. The comparison indicates the groundwater concentrations are less than ten times the "appropriate groundwater level"; therefore the discharge is deemed insignificant.

To confirm that contaminated groundwater from the site is not impairing the quality of the Wabash River adjacent to the facility, surface water samples and sediment samples were analyzed for the contaminants found in groundwater. The detected constituents in both these media were compared against human health (MCL and IDEM RISC criteria) and aquatic criteria (IDEM SWQS for surface water and Region 5 Ecological Screening Levels for sediment). BEHP, lead, and barium in surface water and sediment did not exceed any of the above mentioned criteria.

Arsenic did exceed ten times its screening value and is addressed below.

6. Can the **discharge** of Acontaminated@ groundwater into surface water be shown to be A**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])?

X If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site=s surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment,[5] appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment Alevels,@ 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 Acontaminated@ groundwater can not be shown to be A**currently acceptable**@) - skip to #8 and enter ANO@ 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 AIN@ status code.

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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.

Rationale and Reference(s):

Arsenic in surface water exceeded 10 times the IDEM surface water quality standard of 0.175µg/L The on-site groundwater values ranged from 0.64 to 7.6µg/L (June 2008 sampling) exceeding the ten times rule. Therefore, the average concentration of arsenic in groundwater was estimated from the groundwater/surfacewater interface monitoring wells located along the Wabash River. The average arsenic concentration is 2.55µg/L over the two recent sampling events. The average arsenic concentration in the background well (MW-3S) from the two recent sampling events is 2.7µg/L. The background concentration of arsenic in the Wabash River, 2.6µg/L (CDSW BKG-01) is in line with arsenic concentrations found in groundwater on-site and in the up gradient location, MW-3S. Based on these values, arsenic contamination in groundwater is not site related; therefore the discharge to groundwater is deemed "acceptable".

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 Aexisting 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 Aexisting area of groundwater contamination.@

___ If no - enter ANO@ status code in #8.

___ If unknown - enter AIN@ status code in #8.

Rationale and Reference(s):
Additional groundwater monitoring will continue in accordance with the ongoing RCRA Corrective Action Program including the RCRA Facility Investigation (RFI), Corrective Measures Study (CMS), RCRA Closure and Post-closure (if necessary).

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 C&D Technologies, Inc facility, EPA ID # IND 000 810 754 , located 200, West Main Street, Attica, IN. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

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

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

Completed by	(signature)		Date
	(print)	Bhooma Sundar	
	(title)	Project Manager	

Supervisor	(signature)		Date
	(print)	George Hamper	
	(title)	Chief, Corrective Action Section 2	
	(EPA Region or State)	5	

Locations where References may be found:

Contact telephone and e-mail numbers

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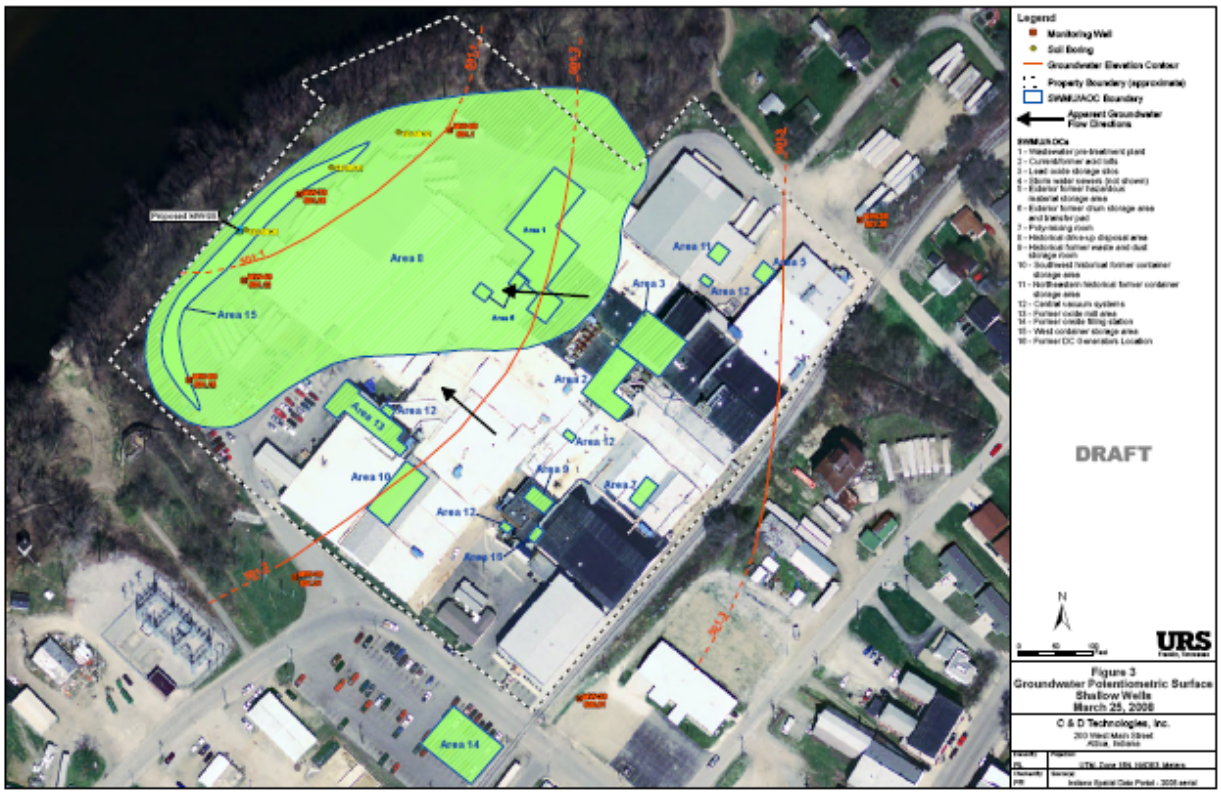

Figure 1 showing the location of monitoring wells and groundwater flow direction.