

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)

Migration of Contaminated Groundwater

Facility Name: Northern Indiana Public Service Company – Bailly Generating Station (2015 Update)
Facility Address: 246 Bailly Station Road, Chesterton, IN 46304
Facility EPA ID #: IND 000 718 114

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., 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" 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.

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***An EPA Lifetime Health Advisory (LHA) level of 0.04 mg/L has been established for molybdenum (EPA 2006).

Footnotes:

i"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 MCLs or NSDWRs. MCLs can be found at: <http://www.epa.gov/safewater/contaminants/index.html>

USGS (1992) Shedlock et al. Hydrogeology and Hydrochemistry of Dunes and Wetlands Along the Southern Shore of Lake Michigan, Indiana. U.S. Geological Survey Open-File Report 92-139, 86pp.

Cohen, D.A., T.K. Greeman, and P.M. Buszka, 2002. Surface-water and ground-water hydrology and contaminant detections in ground water for a Natural Resource Damage Assessment of the Indiana Harbor Canal and nearshore Lake Michigan watersheds, Northwest Indiana. U.S. Geological Survey, Administrative Report, Indianapolis, Indiana.

EPA. Drinking Water Health Advisory for Boron, 2008. EPA 822-R-08-013
http://www.epa.gov/safewater/ccl/pdfs/reg_determinc2/healthadvisory_ccl2-reg2_boron.pdf

EPA. 2006 Edition of the Drinking Water Standards and Health Advisories. EPA 822-R-06-013

EPA. Health Effects Support Document for Manganese, 2003.
www.epa.gov/safewater/ccl/pdf/manganesec.pdf

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater" 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"?)

 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):

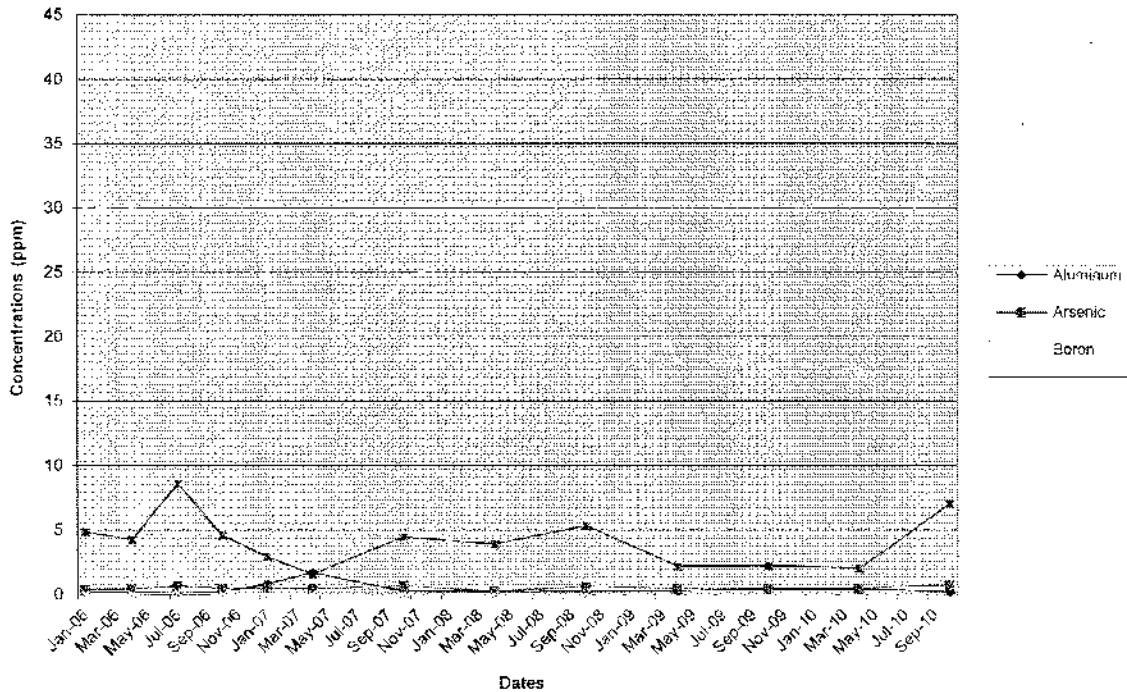
The migration of contaminated groundwater in the western plume, originating from the former on-site fly ash staging area, is stabilized. Delineation of this plume was completed in late 2009 on the Lake Michigan beach immediately north of the facility (see Figure of Sitewide Overview). The on-site monitoring wells MW-108, MW-109, and MW-110 have concentrations of metals in exceedence of screening values (see Cross Section for well locations relative to the lake). These wells are located on a bluff at the northern edge of the facility, approximately 30 feet above the beach. To determine whether constituents were entering the lake, five groundwater samples were collected from both the shallow and deep aquifers (at intervals of 5-7' and 15'-19' below ground surface, bgs) approximately 500 feet inland from the water, spanning the width of the facility. To ensure complete delineation, five groundwater samples were also taken from the shallow and deep aquifers (at intervals of 0-2', 8-10', and 15-18' bgs) at the shoreline, or 500' down gradient from the first row of samples. The shallow groundwater discharging into the lake meets conservative screening values developed for the protection of the piping plover, an endangered species. The shallow groundwater discharging to the lake also meets Great Lakes Initiative (GLI) screening criteria that are protective of the Great Lakes. At two sampling locations, 500' inland from the lake, there are GLI exceedences in the deeper groundwater (>15'bgs). However, those constituents (boron, magnesium, and selenium) are not detected at

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Monitoring Well 119: On-Site, SWMU 15

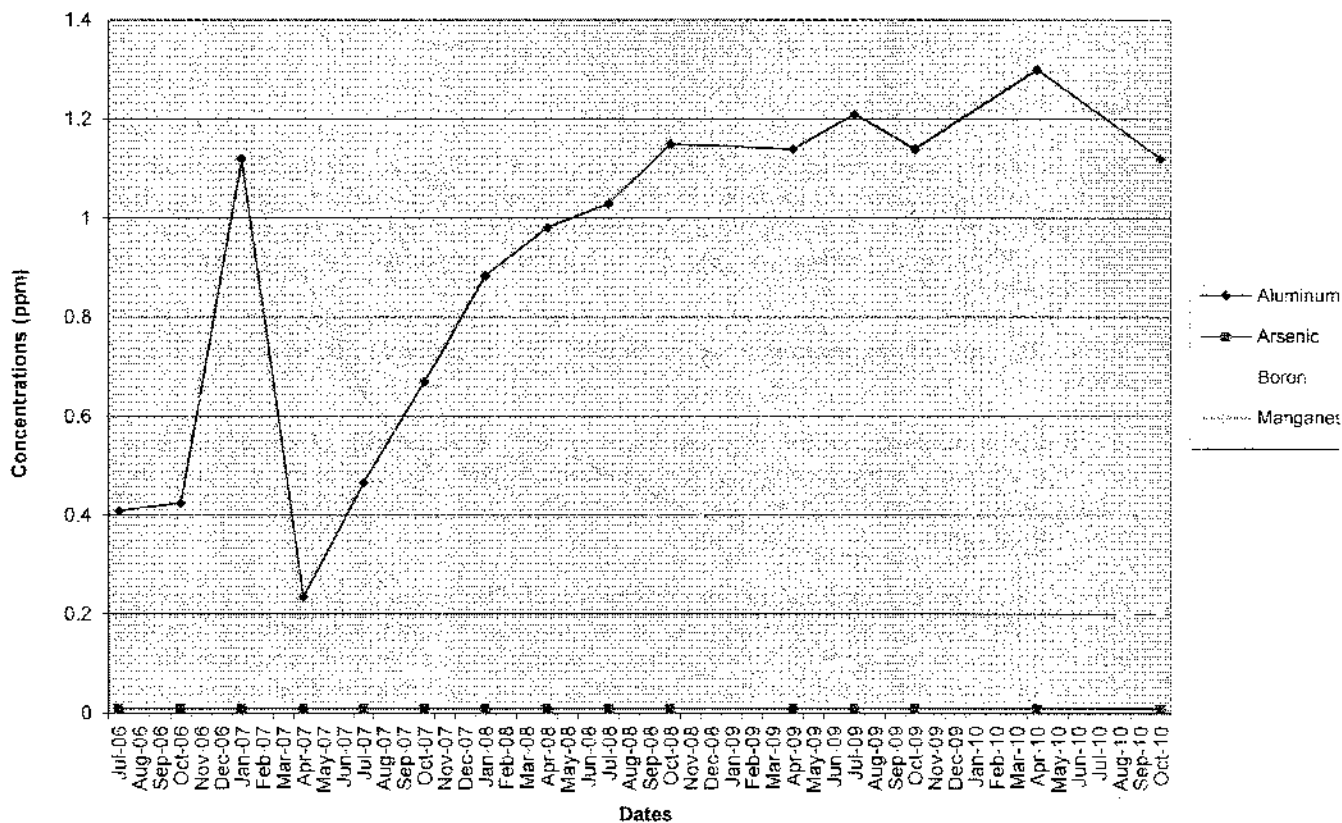
MW-119



Monitoring Well IDNL-GW13: Off-Site, Downgradient from MW-119

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MW-134



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?

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

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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):

As referenced in question two, Maximum Contaminant Levels (MCLs) were used as preliminary screening values. At one location in IDNL where groundwater discharges to surface water, IDNL-GW12, aluminum concentrations in the groundwater exceed 10x the NSDWR.

Constituent	Maximum (mg/L)	10 x MCL (mg/L)	10 x NSDWR (mg/L)	Location of Maximum	Waters Affected
Aluminum	2.86		2.0	IDNL-GW12	IDNL

However, as considered in the question above, other conditions that significantly increase the potential for unacceptable impacts to surface waters, sediments, or ecosystems do exist at this site. The MCLs for this portion of the site may not be an appropriate criteria to address ecosystems. Consequently, additional screening criteria specifically designed to address waters within the Great Lakes System were considered and are described below.

The Great Lakes Water Quality Initiative (GLI) was established in order to develop a consistent level of environmental protection for the Great Lakes ecosystem [60 Fed Reg 15366-15425]. Part of the intent behind the GLI program was to reduce disparities between water quality programs such that Great Lakes-specific criteria and methodologies to protect aquatic life, wildlife and human health were developed. The GLI methodologies were developed with the sensitivity of the Great Lakes resources in mind, including the lakes themselves, their connecting channels and "all of the streams, rivers, lakes and other bodies of water that are within the drainage basin of the Lakes" [60 Fed Reg 15367].

The Indiana portion of Lake Michigan waters and all waters incorporated in the Indiana Dunes National Lakeshore are designated Outstanding State Resource Waters within the Great Lakes Basin [327 IAC 2-1.5-19]. In determining the "significance" of contaminated groundwater to surface water, it is important to note that Indiana's water quality standards for all waters within the Great Lakes system states, "... all high quality waters designated under section 19(b) of this rule as an outstanding state resource water shall be maintained and protected in their present high quality without degradation" [327 IAC 2-1.5-4(c)]. Although 327 IAC 5-2-11.7 provides a framework in which to implement the referenced antidegradation standard and primarily focuses on point source discharge from a NPDES permit, it is reasonable to believe that the IDNL wetlands would be provided the type of protection described under the antidegradation standard. As a federal park with wetlands, which has been designated an Outstanding State Resource, IDNL's groundwater aquifer is classified as a Class I aquifer afforded the greatest level of protection from degradation.

How the Applicable Water Quality Standard was Selected

The contaminant discharge has been preferentially compared to the appropriate Great Lakes Initiative (GLI) screening criteria based on the following considerations:

- 1) The site is entirely within the Lake Michigan Basin and all groundwater within the watershed discharges to the Great Lakes
- 2) Lake Michigan and IDNL waters are listed as Outstanding State Resource Waters within a Class I groundwater aquifer
- 3) The IDNL is public land containing special aquatic sites, globally rare dune and swale ecosystem, and several rare plant and animal species
- 4) The Great Lakes Water Quality Initiative began with the purpose to establish a consistent and conservative level of environmental protection for the Great Lakes ecosystem

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 X (2015) 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, 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 "TN" status code.

Rationale and Reference:

The discharge of contaminated groundwater into surface water within the IDNL cannot be shown to be acceptable. Continued impacts to the surface water, sediment or ecosystems should not be allowed to continue until a final remedy decision. Groundwater constituents are found in IDNL surface waters above the GJI screening criteria at two locations, presented below.

Surface Water Exceedences of the GJI screening criteria in IDNL

Constituent	GJI criteria for the Surface Water (mg/L)	Conc. Max. (mg/L)	Location of Maximum Detection
Boron	1.6	4.97	IDNL-SW13; downgradient from SWMU 15
Manganese	0.676	4.24	IDNL-SW08; in Central Blag Slough

Stressed vegetation, manifesting as yellowing and burnt plant tips, has been observed by the National Park Service at the "southwestern terminus of the Cowles Bog Wetland complex, downgradient from SWMUs 14 and 15. There is a complicated hydrogeologic cycle between the groundwater, surface water and sediment pertaining to the bioavailability of certain metals dependent upon physical, chemical parameters in the environment. The most chronically exposed receptors are the plants within the park. Concentrations of site constituents have been found in plant tissue. The risk of these concentrations are being evaluated in the Baseline Ecological Risk Assessment currently under review. The table below presents the sediment concentrations within those areas for constituents that exceed the soil screening criteria (EPA Eco-SSLs).

Sediment Exceedences of the Eco-SSLs within Areas of IDNL where Groundwater Discharges to Surface Water

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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 facility, EPA ID # IND 000 718 114, located at 246 Bailly Station Road, Chesterton, IN 46304. 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) Michelle Kaysen Date 9/8/15
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