STATEMENT OF BASIS

for
Proposed Remedy for Soil and Groundwater Contamination at
Northern Indiana Public Service Company, NIPSCO
Bailly Generating Station
Areas ‘A’ and ‘B’

Chesterton, Indiana

EPA ID No. IND 000 718 114

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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July 2011

Northern Indiana Public Service Company (NIPSCO)
Bailly Generating Station
246 Bailly Station Road
Chesterton, Indiana
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INTRODUCTION

This *Statement of Basis* (SB) for the Northern Indiana Public Service Company (NIPSCO) Bailly Generating Station (the Facility), located in Chesterton, Indiana presents the proposed remedy to address the operational portions of the Facility, referred to as "Areas A and B". This SB does not apply to the other portion of the Facility, known as "Area C", or to off-site areas currently under investigation. In 2009, US Environmental Protection Agency (EPA) divided the Facility into three sub-sections (Areas A, B, and C) for the purpose of streamlining the corrective action process (Figure 1). Areas A and B are defined as those portions of the Facility which are involved in the current, on-going operations of the Facility. Area C is defined as that portion of the Facility that contains historic coal combustion by-product landfills and the off-site Indiana Dunes National Lakeshore (IDNL) area. The proposed remedy for Area C and any additional off-site areas identified will be presented in a separate SB in the future. EPA will select a final remedy only after the public comment period has ended and the information submitted during this time has been reviewed and considered. At this time, EPA is only taking comments on Areas A and B, as described in this document. EPA is issuing this SB as part of its public participation responsibilities under the Resource Conservation and Recovery Act (RCRA).

This document summarizes information that can be found in greater detail in the *Corrective Measures Proposal* (CMP) and other documents contained in the administrative record for this Facility (Attachment 1: Index to the Administrative Record). EPA encourages the public to review these documents in order to gain a more comprehensive understanding of the Facility and activities that have been conducted there under the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §6901 et seq. The administrative record can be found at the local repository located within the

Portage Public Library and at EPA's Chicago office[1], as well as on-line at http://www.epa.gov/reg5rcra/wptdiv/sites/nipsco/index.html.

EPA may modify the proposed remedy or select another remedy based on new information or public comments. Therefore, the public is encouraged to review and comment on all corrective measure alternatives. The public can be involved in the remedy selection process by reviewing the documents contained in the administrative record and by attending the public meeting.

PROPOSED REMEDIES

EPA is proposing the following remedies to address contaminated soil and groundwater at several Solid Waste Management Units (SWMUs) and other Areas of Concern (AOCs) at the NIPSCO Facility (Figure 2). The following table is a summary of remedies proposed by EPA. In the following sections of this document more detailed explanation of each remedy is provided.

Contaminated Media		**Proposed Remedy**
Area A*	Soil	1. Excavation and off-site disposal 2. Institutional controls to limit future land use and potential exposure risk
	Groundwater	1. Monitoring to confirm soil remedy success 2. Institutional controls to limit potential future use and risk
Area B**	Soil	Institutional controls to limit future land use and potential exposure risk
	Groundwater	Institutional controls to limit potential future use and risk
Site Wide	All	Financial assurance to ensure remedies can be implemented and maintained

*Area A = SWMUs 10, 16, 18, 20, 21 and AOCs 1, 4, 5
**Area B = SWMUs 4 & 5

FACILITY BACKGROUND

The NIPSCO Facility is located in Northwestern Indiana, in the town of Chesterton. It provides electricity to customers throughout Northern Indiana. The entire site occupies approximately 330 acres in an industrial area along the shoreline of Lake Michigan. It is bordered on the north by Lake Michigan, on the north and east by a portion of the Indiana Dunes National Lakeshore (IDNL), on the west and south by the ArcelorMittal Steel Burns Harbor Plant, and partially on the south by U.S. Route 12 and freight and commuter rail lines.

1 Portage Public Library, 2665 Irving St., Portage, IN 46368, (219) 763-1508; EPA Region 5, 7th Floor Record Center, 77 W. Jackson Blvd., Chicago, IL 60604, (312) 886-4253.

The site consists of two coal fired electricity-generating units and their supporting buildings. In 1959, construction began on what would become known as Unit 7, a 194 Megawatt (MW) capacity high-pressure boiler and steam turbine. Unit 7 was completed and became operational in 1962. In 1966, a major plant modification and expansion project was undertaken to allow the construction of a second coal-fired generating unit. Referred to as Unit 8, this 422 MW capacity high-pressure boiler and steam turbine became operational in 1968.

The Facility currently consists of about 300,000 square feet of buildings, offices, and production areas. The Facility employs 180 people, and operates 24 hours a day, producing and supplying electricity to the northern one-third of Indiana. The western portion of the Facility, termed "Area A", contains rail lines, the coal feedstock pile, the coal feedstock pile run-off infiltration basin, debris storage areas, fly ash staging areas, and the majority of the Site's other SWMUs and AOCs. Area B is composed of the Settling Ponds and the Industrial Wastewater Treatment Plant, while Area C consists of the eastern landfill areas and the INDL Study Area (which is still under investigation). The Facility generates electricity for distribution to industrial, commercial, and residential customers using two coal-fired, high-pressure steam boilers, Boiler Units No. 7 and 8 (SWMU 27), each connected to a steam turbine generator. A third generator (Unit No. 10), which burns natural gas, is available during peak electrical demand.

Site Specific Characteristics and Physical Setting

Hydrogeological Setting

The Facility is located within the Calumet Lacustrine Plain, an area characterized by three post-glacial dune-beach complexes, and bordered on the north by Lake Michigan and on the south by the Valparaiso Morainal Area. The dune-beach complexes parallel the Facility and the current lakeshore boundary. Local geomorphology from the lakeshore to the south consists of the Holocene and Tolleston dune-beach complex, the western portion of the Great Marsh (an interdunal lowland), and the Calumet and Glenwood dune-beach complex. The Facility is situated within the Holocene and Tolleston dune-beach complex; however, the landscape has been modified to support Facility activities and consists primarily of fill materials. The land surface elevation ranges from approximately 578 feet above mean sea level (amsl) along the shore of Lake Michigan to approximately 620 ft amsl within the Facility, including Areas A and B (Figure 3).

The surficial aquifer under the Facility consists of glacially derived sediments associated directly or indirectly with the advance and retreat of the Lake Michigan ice lobe during the Wisconsinan glaciation. In the vicinity of Areas A and B, the surficial aquifer consists primarily of unconfined lacustrine sands and ranges in thickness from 20 to 40 ft. In unpaved areas, precipitation directly recharges the shallow unconfined aquifer via infiltration through permeable unsaturated zone soils. Groundwater flow in this aquifer is primarily horizontal and northward toward Lake Michigan.

Ecological Setting

Regionally, the Facility resides within an industrial corridor of Northwest Indiana. The site shares a border with a portion of the Indiana Dunes National Lakeshore. The IDNL is east and north of Areas A and B and currently still under EPA study as part of Area C (Figure 1). IDNL is a globally rare dune and swale ecosystem, meaning the land consists of a series of roughly parallel, sandy ridges and low, wet swales formed from irregular cycles of high and low water levels[2]. As a whole, the IDNL is composed of over 15,000 acres of dunes, oak savannas, swamps, bogs, marshes, prairies, rivers, and forests. Its landscape represents at least four major successive stages of historic Lake Michigan shorelines, making it one of the most extensive geologic records of one of the world's largest, fresh water bodies. Biological diversity within the IDNL is amongst the highest per unit area of all the national parks, with over 1,100 flowering plant species and more than 350 species of birds[3].

IDNL's unique ecosystem and proximity to the site warrants more extensive study to ensure that it is appropriately protected. EPA continues to evaluate IDNL and the nearby NIPSCO landfills while moving ahead with the remedy selection for the other areas of the Facility, Areas A and B. Areas A and B contain a limited amount of ecological habitat due to the industrialized nature of these portions of the Facility. Attachment 3 documents the absence of ecological habitat in Area B based upon the nature of the area being highly disturbed and of low ecological quality. The northern-most portion of Area A includes the Lake Michigan beach area, which was evaluated and the findings are presented later in this document within the "Investigations" and "Facility Risks" sections.

Although the total area of ecological habitat for these areas is small, of particular importance is the evaluation of potential risk to the piping plover, a federally endangered shore bird. Endangered species are animals and plants that are in danger of becoming extinct. By the time the piping plover was listed under the Endangered Species Act in 1985, the Great Lakes population numbered only 17 breeding pairs, and the breeding areas had been reduced from sites in eight states to only northern Michigan[4]. That is why it is so important that part of the Lake Michigan shoreline is designated "critical habitat". Critical habitat is afforded the same protections as the endangered species for which the habitat is listed. The designation can assist in land management decisions as well as alert the public and other regulatory authorities of the need for special consideration. Therefore, even though the plover is not known to visit this particular stretch of shoreline, it is recognized that the habitat is ideal for the plover and consequently a key in its recovery. The proximity of the critical habitat to the Facility was the basis for the evaluation of the plover as a receptor in the ecological risk assessment (see Attachment 2 for more information on IDNL and the piping plover).

Interim Measures

Some remediation work has been performed at the facility in the past. NIPSCO began conducting its investigation of soil and groundwater contamination shortly after signing

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2 The Nature Conservancy, www.nature.org

3 The National Park Service, www.nps.gov

4 US Fish & Wildlife Service, www.fws.gov

an Administrative Order on Consent with EPA in 2005. When NIPSCO discovered unacceptable levels of contamination, they proposed and implemented remedies to address the problem. EPA had not selected the final remedy at the time they were discovered; these actions were done as "Interim Measures."

Eight units investigated during the RCRA Facility Investigation (RFI) in Area A were determined to have releases. Seven of these units include areas where interim measures were conducted: SWMU 10, SWMU 20, SWMU 21, AOC 1, AOC 4, AOC 5 and SWMU 16; these were remediated during implementation of the RFI (Attachment 4: Interim Measures Figures). Excavated soil from these units was sent to the Forest Lawn Landfill in Three Oaks, Michigan. All excavations were backfilled with clean fill obtained from Duneland Sand Company in Valparaiso, Indiana. The details of that work are below:

SWMU 10

Soil excavation was performed at SWMU 10 (Coal Handling Maintenance Building, see Attachment 4, Figure 1) after the previous above ground storage tank (AST) and associated piping were removed. Soil excavation started on April 12, 2006 and was completed on April 13, 2006. Excavation continued until all visually stained soil was removed, soil headspace measurements were at or below background readings of 0 – 1 ppm, and post confirmation soil sampling demonstrated removal of contaminated soil was complete. Six soil samples were collected to document post-excavation soil conditions. Based on these findings, three additional soil samples were collected. To achieve vertical delineation two deeper samples (8 to 10 and 13 to 15 ft bgs) were also collected. No compounds were detected above screening criteria and the sampling delineated the horizontal and vertical extent of detections.

To ensure any impact to the groundwater was appropriately characterized, two temporary "hydropunch" groundwater samples were collected at the water table, at approximately 32-34 ft bgs on June 7, 2006 for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and metals analysis. Analytical results show there are no concentrations above the Indiana Department of Environmental Management Risk Integrated System of Closure (IDEM RISC) Default Industrial Groundwater Closure Levels for these groundwater samples. Based on these results and the results of the human health risk assessment, discussed above, the interim measure remediation has been completed for SWMU 10. After remediation efforts were completed, a new AST with automated overflow protection and secondary containment was installed at the site of the former structure. No additional work is required for SWMU 10.

SWMU 20

Soil excavation at SWMU 20 (Former Waste Oil Underground Storage Tank) started on April 4, 2006 and was completed on April 5, 2006 (see Attachment 4, Figure 2). The tank began operation in 1962 and was removed in 1988; however, the surrounding soil was not removed at that time. The excavation extended from the northern edge of the foundation of Unit #7 approximately 15 ft northward, and extended east-west approximately 50 ft. The excavation continued until all visually stained soil was removed, and soil headspace measurements were at or below background levels, which was achieved at a depth of 3 ft bgs. Five post excavation soil samples were collected and validated analytical results indicate no constituents were detected above the IDEM RISC industrial soil closure levels at SWMU 20. Based on these results, the interim measure remediation was completed and no additional work is required at SWMU 20.

SWMU 21

Soil excavation was performed at SWMU 21 (Unit No. 10 UST) on April 4, 2006 (see Attachment 5, Figure 3). Soil excavation efforts continued until all visually stained soil was removed, and soil headspace measurements were at or below background. The final excavation was approximately 40 ft wide in the east-west direction, and extended approximately 30 ft north of the Unit No. 10 foundation, to a depth of approximately 1.5 ft bgs. Soil immediately around the overflow pipe was excavated to a depth of approximately 3 ft. A layer of unstained soil was present between the top of the UST and the stained soil that was removed beginning at the ground surface. Therefore, it was concluded that the UST at SWMU 21 did not need to be removed because the source of oil-stained soil was the overflow pipe above the ground surface, not loss of product from the tank itself. Five post-excavation soil samples were collected and validated analytical results indicated no constituents were detected above the IDEM RISC industrial soil closure levels at SWMU 21. Based on these results, the interim measure remediation was completed. After remediation efforts were completed, new automated overflow protection was installed in the Unit No. 10 UST. No additional work is required for SWMU 21.

AOC 1

Soil excavation was performed at AOC 1 (Empty Drum Storage) on April 10 and 11, 2006 (see Attachment 4, Figure 4). The excavation extent was based on the location of the drum storage rack and previous sampling conducted at the AOC. The excavation continued until all visually stained soil was removed, and soil headspace measurements were at or below background. The final excavation footprint was approximately 30’x50’ and the depth was approximately 5 ft bgs. Five post-excavation soil samples were collected and validated analytical results indicate no constituents were detected above the IDEM RISC industrial soil closure levels. Based on these results, the interim measure remediation was completed. After remediation efforts were completed, a new enclosed containment structure with secondary containment was constructed at the site of the former unit. No additional work is required for AOC 1.

AOCs 4 & 5

Soil excavations were performed at AOC 4 and AOC 5 from June 21, 2006 to June 28, 2006, until all visually stained soil was removed, and soil headspace measurements were at or below background (see Attachment 4, Figure 5). VOC contaminated soil was removed from an approximate 60’x60’ and 40’x60’ footprint. The average excavation depth was one to two feet below ground surface. Five post excavation soil samples were collected at AOC 4 and AOC 5. Validated analytical results indicate no constituents were detected above the IDEM RISC industrial soil closure levels at AOC 4 and AOC 5. Based on these results, the interim measures remediation was completed. The east (AOC 4) and west (AOC 5) Induced Draft (ID) fan bearings and associated piping were replaced by NIPSCO. No additional work is required for AOCs 4 & 5.

SWMU 16
NIPSCO performed soil excavation at the former chemical cleaning fractionation tank (SWMU 16) located on the west side of the Unit No. 7 building (see Attachment 4, Figure 6). Five post-excavation soil samples were collected at SWMU 16. Validated analytical results indicate arsenic, benzo(a)pyrene toxic equivalent (BaP-TE), benzo(a)anthracene, benzo(a)pyrene, and benzo(b)flouranthene were detected above the IDEM RISC industrial soil closure levels in SWMU 16 soil that remained after the excavation was complete. Due to the inaccessibility of SWMU 16 to the public, as well as the determination that the future use for this area is industrial only, the human health risk assessment demonstrated that the presence of these compounds in SWMU 16 soil does not pose an unacceptable risk to human health. Based on this analysis and resulting conclusion, the interim measure remediation has been completed and no additional work is required for SWMU 16.

In addition to the past remediation activities in Area A, five units were investigated during the RFI in Area B and were determined to require no further action. These units included the Bottom Ash Pond (SWMU 2), the Bottom Ash Waste Pile (SWMU 3), the Settling Ponds (SWMU 4) and the Secondary Settling Pond #2 (SWMU 5). Historic releases to groundwater from the surface impoundments were terminated when the central settling ponds were dredged, reinstalled and lined in 1980. Current plumes of boron and selenium in groundwater were identified, delineated to screening level criteria and shown to be dissipating or stable, confirming the absence of a current source within Area B. The Human Health Risk Assessment for Area B, discussed above, concluded there are no unacceptable risks to human receptors in Area B. Remedial actions already performed are further discussed below.

Although not an action taken as a part of the RCRA Corrective Action, releases from the facility's unlined surface impoundments were addressed in the past. In July 1976, the National Park Service (NPS) notified NIPSCO that it estimated 1 million gallons of water per day were infiltrating from NIPSCO's unlined surface impoundments into the Indiana Dunes. In February 1978, NIPSCO agreed to permanently terminate the seepage. As part of this agreement, the company applied to the Indiana Stream Pollution Control Board for an amendment to its National Pollutant Discharge Elimination System (NPDES) permit that would authorize NIPSCO to discharge water from its ponds into Lake Michigan, currently known as Outfall 001 and regulated by IDEM. NIPSCO also reconfigured and sealed the ponds with a foot of natural clay liner, a membrane liner, and sand and buffer materials, completing construction in 1980 (Attachment 5: Historic Site Photos). Although the pond sources appear to be controlled, their legacy includes elevated groundwater metals plumes and soils with lowered pH within the IDNL.

The remaining Area A unit, SWMU 18 (also referred to as the Horseshoe Area) was identified as the source of dissolved metals plumes in groundwater that extend from SWMU 18 northward toward Lake Michigan. This area has been used to temporarily store coal combustion byproduct, or fly ash, generated intermittently when boilers or ductwork is cleaned since approximately 1986. The result of staging the material on bare ground was infiltration of contaminants through the soil and into the underlying groundwater. The plume has been delineated and is not discharging to Lake Michigan, as demonstrated by the data presented in the following section. Identification of SWMU 18 as the source was based upon waste stream knowledge, historic residuals management practices in the operating area of the site, groundwater flow direction, and the geometry of the plume as evidenced by monitoring well data. Based upon the size and scope of remediation needed at SWMU 18, it was not addressed as an interim measure. The proposed remedy for this SWMU is presented in more detail later in this document.

<u>Investigations</u>
Investigation activities conducted within Areas A and B included sampling of groundwater, soil, surface water, and sediment. The sample results presented here describe the current conditions, not the conditions that existed prior to the implementation of Interim Measures.

Groundwater, Surface Water, Soil and Sediment
Screening criteria are used to delineate the nature and extent of contamination on site compared to conservative values considered safe. Groundwater and surface water screening criteria, based upon the facility's conceptual site model and proximity to Lake Michigan, were derived from the Great Lakes Basin Methodologies (Indiana Department of Environmental Management, IDEM, 2002), also known as the Great Lakes Initiative (GLI) values. Some constituents did not have applicable GLI screening criteria and were therefore compared to other values, such as background values, National Recommended Surface Water Quality Criteria, Indiana Department of Environmental Management (IDEM) Risk Integrated System of Closure (RISC) values and EPA Regional Screening Levels for tap water (RSLs). Shallow groundwater was also compared to plant toxicity screening values, again, based upon the site-specific conceptual site model and the presence of shallow groundwater. Soil and sediment constituents were compared to IDEM RISC Industrial Soil Closure Levels or EPA Industrial Soil Regional Screening Levels. They were also compared to ecological values such as EPA Ecological Soil Screening Levels and EPA Region 5 Ecological Screening Levels.

The primary constituents of concern (COCs) found to be associated with the site are metals. Volatile and semi-volatile organic compounds (VOCs and SVOCs) were not consistently detected in the groundwater at the site. All thirteen groundwater-monitoring wells were sampled for these constituents before determining that further investigation was not warranted for these specific constituents. Based upon those findings, the groundwater has not been impacted by VOCs or SVOCs. Due to the presence of certain VOCs or SVOCs in the on-site Facility soils; however, these constituents were carried through the risk assessment process in both the human health and ecological risk assessments. That information will be covered in the risk portion of this document.

A variety of potential receptors were evaluated in the human health risk assessment including current and future Facility workers, trespassers and construction workers. Eleven ecological receptors, including four mammals, five birds (including the endangered piping plover), soil invertebrates, and terrestrial plants were evaluated in the ecological risk assessment. More information regarding those risk assessments can be found later in this document.

The potential risks from the Facility to the piping plover were evaluated through groundwater samples on the Lake Michigan shoreline. The plover is a shore bird that feeds and nests along the beach, its greatest potential risk from the Facility conditions would be the presence of contaminated groundwater, discharging to the Lake or accessible to the bird through feeding on the shoreline, above screening levels calculated specifically for the plover. The groundwater samples for the plover evaluation were collected within 100 feet of the shoreline in the surf zone where shorebirds would be expected to feed (Figure 4). EPA determined the sample locations. Although samples were collected at multiple depth intervals, the shallow groundwater samples were used for the purpose of evaluating the plover because deeper groundwater would not be accessible to the bird. A subset of data for the plover evaluation is presented below. In general, groundwater concentrations did not exceed the plover screening criteria; however, the plover was further evaluated within the ecological risk assessment, discussed below.

Piping Plover
Lake Michigan Beach Groundwater (100' Surf Zone)
Highest Concentration found in Five Samples

Constituent	Screening Criterion (ppm*)	Background GW Concentration** (ppm)	Highest Sample Concentration (0-2') (ppm)
aluminum	0.0269	0.14	0.01
arsenic	0.0006072	0.0032	0.00097
barium	0.0103	0.019	0.02
boron	0.2544	0.12	**0.27**
cadmium	0.00001001	0.001	0.0004
chromium	0.0004325	0.001	0.00078
copper	0.009	0.00228	0.0015
lead	0.0025	0.0017	0.0004
magnesium	1.963	22	12
manganese	0.0008149	1	0.0018
mercury	2.349E-09	0.000115	**0.00023**
molybdenum	0.008833	0.01	0.0041
selenium	0.00002163	0.001	0.00056
silver	0.0032	0.001	0.0004

*ppm = parts per million is a measurement equivalent to 1 milligram of the constituent per liter of water (mg/l) or 1 milligram per kilogram soil (mg/kg)

**Background groundwater concentrations are sampled from outside of the influence of the site in order to compare the Facility 's impacts to any naturally or regionally occurring concentrations of constituents.

It is important to compare the concentrations in the groundwater to the appropriate surface water quality standards because groundwater at the site discharges to Lake Michigan. Groundwater was screened against IDEM GLI criteria to ensure the site was not adversely impacting other receptors, particularly those specific to the Great Lakes. A summary of the Lake Michigan beach groundwater sampling from two locations is below. Although only two sample locations are presented below, there were a total of ten sampling locations within this area of the lakeshore (Figure 4). Some locations consisted of multiple groundwater depth sampling intervals; a total of 21 individual samples were collected at the beach immediately north of the Facility. The robust nature of the sampling design ensured adequate delineation of groundwater quality both horizontally and vertically. Sample depth intervals ranged from 0-2 feet deep to 17-19 feet deep, where groundwater aquifers were encountered. This sample design allowed multiple exposure pathways and potential receptors to be evaluated from this single sampling event. Of the 21 individual samples, one location had boron, magnesium and selenium concentrations above background and screening values, and another location had boron only at concentrations above background and the screening value. Those samples are presented in the tables below (see Administrative Record for other samples).

An effort was taken to mitigate the effects of the Lake water on the groundwater aquifer, to ensure EPA was evaluating groundwater results before mixing in the groundwater-surface water interface. Through the development of a piper diagram, a graphical representation of the chemistry of a water sample, it was determined that although the aquifer is heavily influenced by lake water deeper samples were representative of groundwater outside of the zone where groundwater mixes with surface water.

Lake Michigan: Groundwater Delineation at the Shore (500' inland)
Sample Location LMB-GW06

Constituent	Background* Concentration (ppm)	GLI** Criteria (ppm)	Sample Concentration (5.7'-7.7') (ppm)	GLI** Criteria (ppm)	Sample Concentration (15.5'-17.5') (ppm)
aluminum	0.14	0.2	0.016	0.2	0.1
arsenic	0.0032	0.15	0.00044	0.15	0.0089
barium	0.019	0.91	0.019	7.24	0.054
boron	0.12	1.6	0.035	1.6	**1.8**
cadmium	0.001	0.0039	0.0004	0.018	0.002
chromium	0.001	0.13	0.00049	0.64	0.0006
copper	0.0023	0.016	0.001	0.085	0.0024
lead	0.0017	0.011	0.0004	0.075	0.002
magnesium	22	82	12	82	**110**
manganese	1	0.97	0.02	5.37	2.4
mercury	0.000115	0.00077	0.00023	0.00077	0.00023
molybdenum	0.01	0.8	0.0048	0.8	0.003
selenium	0.001	0.0046	0.00036	0.0046	**0.0059**
silver	0.001	0.1	0.0004	0.1	0.002

*Background concentrations were calculated in accordance with "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Final Guidance" (USEPA 1989) and the "Addendum to Interim Final Guidance" (USEPA, 1992). **GLI criteria for certain constituents are hardness dependent and calculated in accordance with IDEM GLI methodologies using the following equation: GLI = exp{A*[In(hardness)]+B}/1000ug/mg
Concentrations in bold exceed the GLI criteria and the background concentrations.

Sample Location LMB-GW08: (East of GW06)

Constituent	Background Concentration (ppm)	GLI Criteria (ppm)	Sample Concentration (5.7'-7.7') (ppm)	GLI Criteria (ppm)	Sample Concentration (16'-18') (ppm)
aluminum	0.14	0.2	0.0075	0.2	0.1
arsenic	0.0032	0.15	0.00055	0.15	0.015
barium	0.019	1.21	0.029	4.68	0.036
boron	0.12	1.6	0.09	1.6	**2.2**
cadmium	0.001	0.0048	0.0004	0.013	0.002
chromium	0.001	0.16	0.00034	0.46	0.002
copper	0.0023	0.02	0.0011	0.06	0.0019
lead	0.0017	0.014	0.0004	0.051	0.002
magnesium	22	82	17	82	74
manganese	1	1.22	0.027	3.75	1.3
mercury	0.000115	0.00077	0.00023	0.00077	0.00023
molybdenum	0.01	0.8	0.0023	0.8	0.003
selenium	0.001	0.0046	0.0015	0.0046	0.0045
silver	0.001	0.1	0.0004	0.1	0.002

Soil

As indicated above, the Facility investigation also included several rounds of soil samples within Areas A & B (Figure 5). Soil samples were collected between 2005-2009 with a subset of the analytical data presented below. The following table presents sampling data that exceeded the screening criteria, IDEM RISC industrial values or EPA Regional Screening Levels for industrial land use in the absence of IDEM values. Within Area A, 15 total SWMUs or AOCs were sampled, and 7 had constituents in exceedence of the screening criteria. Within Area B, 4 SWMUs or AOCs were sampled and one had a single constituent in exceedence of the screening criteria. All exceedences were carried through to the risk assessment process, described in more detail below. The table presenting the soil samples contains only the highest concentrations of all constituents found above screening values within Areas A and B.

Areas A & B: Soil Samples Exceeding Screening Criteria

Area and Location of Samples[1]	Constituent	Screening Criterion[2,3]	Maximum Concentration Detected[2]	Depth[4]
Area A: SWMU 10	Benzo(A)Anthracene	15 ppm	60 ppm	4.5-5.5'
Area A: SWMU 10	Benzo(A)Pyrene	1.5 ppm	49 ppm	4.5-5.5'
Area A: SWMU 10	Benzo(B)Fluoranthene	15 ppm	70 ppm	4.5-5.5'
Area A: SWMU 10	Dibenzo(A,H)Anthracene	1.5 ppm	13 ppm	4.5-5.5'
Area A: SWMU 10	Indeno(1,2,3-CD)Pyrene	15 ppm	33 ppm	4.5-5.5'
Area A: SWMU 16/18	Arsenic	20 ppm	126J[5]/79 ppm	0-0.5'

[1]Solid Waste Management Unit (SWMU) or Area of Concern (AOC)
[2]Concentrations in parts per million (ppm); one ppm is equivalent to 1 milligram per kilogram soil (mg/kg)
[3]Indiana Department of Environmental Management (IDEM) RISC Industrial soil criteria (http://www.in.gov/idem/files/risctech_appendix1_2006.pdf)
[4]The depth refers to feet below ground surface
[5] "J" refers to this value as being an estimated value, meaning something interfered with the reliability of the data within the laboratory; however, for screening purposes that data can still be used to guide an investigation. The samples nearby this specific sample had much lower arsenic values, 1.4-26 ppm, likely more representative of concentrations at that SWMU. The next highest value from SWMU 18 is also reported.

SUMMARY OF FACILITY RISKS

The purpose of the risk assessments is to evaluate the potential adverse affects site-related constituents may be having, or may have in the future, on receptors. Human health risk assessments were conducted for both Areas A and B. An ecological risk assessment was conducted for Area A; but not for Area B. It was determined early in the site evaluation process that no viable ecological habitat exists within Area B, therefore, an ecological risk assessment was not preformed for Area B. Presented below is a summary of the data evaluated as part of the risk assessments. The tables present the various receptors that were evaluated as part of the risk assessment process after constituents of potential concern were identified in various media. Additional information on each risk assessment is provided below.

Area A: Ecological Risk

Exposure Area / Habitat	**Receptor (1)**	**Total Hazard Quotients (2)**										
		ALUMINUM	**ARSENIC**	**BARIUM**	**BORON**	**CADMIUM**	**CHROMIUM**	**COPPER**	**LEAD**	**MANGANESE**	**MOLYBDENUM**	**SELENIUM**
Northwest Area Woodland Swale	Shrew	2E-03			8E-02	6E-01		1E-03	2E-01	1E-01		
	Vole	2E-03			4E-01	2E-01		1E-03	1E-02	4E-01		
	Fox	3E-05			3E-04	8E-04		6E-06	2E-04	2E-04		
	Mink	3E-04			3E-04	3E-02		8E-05	1E-02	4E-03		
	Woodcock	2E-04			1E-02	1E-01		2E-04	3E-01	1E-02		
	C. Goose	5E-07			7E-05	1E-05		5E-07	9E-06	1E-05		
	Robin	1E-03			1E+00	4E-01		1E-03	9E-01	2E-01		
	Hawk	8E-07			3E-05	9E-04		7E-07	2E-03	1E-04		
	Plants-Soil				1E+00	2E-02			3E-01	2E+00		
	Plants-GW				7E-01					1E-01	3E-02	5E-03
	Soil Inv.				6E-01	4E-03			2E-02	1E+00		
SWMU26 Upland Slope Successional Meadow	Shrew				1E-01	6E-01	3E-01		2E-01	2E-01		
	Vole				4E-01	2E-01	4E-02		8E-03	5E-01		
	Fox				2E-03	5E-03	2E-03		1E-03	1E-03		
	Mink				2E-03	2E-01	7E-02		4E-02	3E-02		
	Woodcock				7E-02	5E-01	5E-01		8E-01	7E-02		
	C. Goose				5E-04	7E-05	3E-05		3E-05	9E-05		
	Robin				1E+00	5E-01	4E-01		6E-01	3E-01		
	Hawk				2E-04	5E-03	5E-03		8E-03	1E-03		
	Plants-Soil				1E+00	2E-02	1E+00		2E-01	**3E+00**		
	Plants-GW	2E-01	4E-02		**2E+00**	3E-03	2E-02	5E-02		2E-01	5E-02	2E-02
	Soil Inv.				7E-01	5E-03	5E-01		1E-02	1E+00		
West Area Upland Successional Meadow	Shrew			7E-02	1E-01					7E-02	4E-01	7E-01
	Vole			6E-02	2E-01					4E-02	7E-02	2E-01
	Fox			2E-04	8E-04					3E-04	5E-04	4E-03
	Mink			8E-03	5E-03					1E-02	9E-03	1E-01
	Woodcock			3E-01	2E-01					4E-02	1E-01	4E-01

	C. Goose			6E-05	1E-04					6E-06	5E-06	4E-05
	Robin			6E-01	8E-01					6E-02	1E-01	5E-01
	Hawk			3E-03	4E-04					4E-04	1E-04	4E-03
	Plants-Soil			3E-01	**7E+00**					**2E+00**		**3E+00**
	Soil Inv.			1E+00	**3E+00**					1E+00	2E-02	3E-01
Lake Michigan Beach and Outfall OO1												
LMB-GW01 & Outfall	Piping Plover	2E+00	2E+0	9E+00	9E-01		2E+01	2E+01	9E-01	4E-01	3E-01	2E+01
LMB-GW03 & Outfall		2E+00	2E+0	9E+00	6E-01		2E+01	2E+01	9E-01	4E-01	4E-01	2E+01
LMB-GW05 & Outfall		2E+00	2E+0	9E+00	9E-01		2E+01	2E+01	9E-01	4E-01	3E-01	2E+01
LMB-GW07 & Outfall		2E+00	2E+0	9E+00	**2E+00**		2E+01	3E+01	9E-01	8E-01	7E-01	4E+01
LMB-GW09 & Outfall		2E+00	3E+0	8E+00	7E-01		1E+01	3E+01	9E-01	4E-01	4E-01	2E+01

Notes:

(1) Terrestrial plants were evaluated for potential exposure to soil and groundwater. Receptors defined as "Plants-GW" and 'Plants-Soil" represent these pathways.

(2) Total hazard quotients represent the sum of all applicable hazard quotients for each receptor (For example, the total HQ for the shrew is equal to the sum of HQs calculated from soil, surface water, plants, and invertebrate).

HQ>1.0 There is potential for harmful effects due to the contaminant in question that should be further evaluated through a risk management approach.

HQ=1 Contaminant *alone* is not likely to cause ecological risk

HQ<1.0 Harmful effects are NOT likely

Bold indicates the HQ exceeded both the target HQ of 1 as well as the respective reference area HQ. See the discussion below for further explanation. Blank cells indicate constituent was not a COPEC in the given exposure area

Areas A and B: Human Health Risk

Potential Carcinogenic Risks

Receptor	Exposure Area	COPC	Medium	Maximum Concentration (mg/kg or mg/L)	Exposure Point Concentration (mg/kg or mg/L) (1)	Total Excess Lifetime Cancer Risk
Current Facility Worker	NW Drainageway	BAP-TE	Surface Soil	3.4	3.4	$3x10^{-7}$
	NW Area	Arsenic	Surface Soil	126	29.4	$9x10^{-6}$
Current Trespasser	NW Drainageway	BAP-TE	Surface Soil	3.4	3.4	$1x10^{-7}$
	NW Area	Arsenic	Surface Soil	126	29.4	$2x10^{-7}$
Future Facility Worker	NW Drainageway	BAP-TE	Surface Soil	3.4	3.4	$3x10^{-6}$
	NW Area	Arsenic	Surface Soil	126	29.4	$9x10^{-6}$
Future Construction Worker	NW Drainageway	BAP-TE	Subsurface Soil	3.4	3.4	$2x10^{-7}$
	NW Area	Arsenic	Groundwater	0.018	0.018	$1x10^{-7}$
		BAP-TE	Subsurface Soil	78.6	5.2	$3x10^{-7}$
		Total				$4x10^{-7}$
	SWMU 26	Arsenic	Groundwater	0.018	0.018	$1x10^{-7}$
	Future Area B	Arsenic	Subsurface Soil	30	30	$6x10^{-7}$

Notes:

(1) Exposure Point Concentrations (EPCs) are the lower of the maximum detected concentrations and the 95% upper confidence limit (UCL) on the mean concentration. The 95% UCL, as a means to guide a risk based decision, is more conservative than the arithmetic average of the data. This is because it represents a concentration at which 95% of the time the actual concentration is below. Using the 95% UCL provides a wide margin of safety that takes into consideration the many variables and unknowns associated with environmental sampling and analysis.

Bold indicates the total excess lifetime cancer risk exceeded the target risk of $10x10^{-5}$.

Blank cell indicate constituent was not a COPEC in the given exposure area

COPC – Constituent of potential concern

Mg/kg – milligrams per kilogram

Mg/L – milligrams per liter

Potential Non-Carcinogenic Hazards

Receptor	Exposure Area	COPC	Medium	Maximum Concentration (mg/kg or mg/L)	Exposure Point Concentration (mg/kg or mg/L) (1)	Total Hazard Index
Current Facility Worker	NW Drainage- way	Manganese	Surface Water	2.5	2.5	2x10^{-4}
		Benzo(a)pyrene	Surface Soil	2.1	2.1	5x10^{-6}
		Total				2x10^{-4}
	NW Area	Arsenic	Surface Soil	126	29.4	5x10^{-2}
		Total				5x10^{-2}
	SWMUs 4 & 5	Manganese	Surface Water	0.95	0.95	6x10^{-5}
Current Trespasser	NW Drainage- way	Manganese	Surface Water	2.5	2.5	5x10^{-4}
		Benzo(a)pyrene	Surface Soil	2.1	2.1	7x10^{-6}
		Total				5x10^{-4}
	NW Area	Arsenic	Surface Soil	126	29.4	5x10^{-3}
	SWMUs 4 & 5	Manganese	Surface Water	0.95	0.95	2x10^{-4}
Future Facility Worker	NW Drainage- way	Benzo(a)pyrene	Surface Soil	2.1	2.1	6x10^{-5}
	NW Area	Arsenic	Surface Soil	126	29.4	5x10^{-2}
Future Construction Worker	NW Drainage- way	Benzo(a)pyrene	Subsurface Soil	2.1	2.1	6x10^{-5}
	NW Area	Arsenic	Groundwater	0.018	0.018	2x10^{-2}
		Benzo(a)pyrene	Subsurface Soil	49	3.3	1x10^{-4}
		Manganese	Groundwater	2.4	2.4	1x10^{-2}
		Total				3x10^{-2}
	SWMU 26	Arsenic	Groundwater	0.018	0.018	2x10^{-2}
	Future Area B	Arsenic	Subsurface Soil	30	30	9x10^{-2}

Notes:

(1) Exposure Point Concentrations (EPCs) are the lower of the maximum detected concentrations and the 95% upper confidence limit (UCL) on the mean concentration. The 95% UCL, as a means to guide a risk based decision, is more conservative than the arithmetic average of the data. This is because it represents a concentration at which 95% of the time the actual concentration is below. Using the 95% UCL provides a wide margin of safety that takes into consideration the many variables and unknowns associated with environmental sampling and analysis.

Bold indicates the total hazard quotient (HQ) exceeded the target HQ of of 1.
Blank cell indicate constituent was not a COPEC in the given exposure area
COPC – Constituent of potential concern
Mg/kg – milligrams per kilogram
Mg/L – milligrams per liter

Area A Ecological Risk Assessment

An ecological risk assessment is the process through which scientists evaluate the likelihood that adverse ecological effects might occur, or are occurring, due to exposure to one or more stressors, such as chemical contamination. Within Area A, four exposure areas were identified as potential ecological habitat: the northwest swale, SWMU 26, the west area, and the Lake Michigan beach. Within these areas, eleven potential receptors and respective food-chains were evaluated, including: mammals, birds, invertebrates and plants. More specifically:

- Mammals:
  - Invertivores: shrew
  - Herbivores: meadow vole
  - Omnivores: fox
  - Carnivores: mink

- Birds:
    - Inland invertivores: woodcock
    - Shoreline invertivores: piping plover
    - Herbivores: Canada goose
    - Omnivores: robin
    - Carnivores: hawk
- Soil Invertebrates
- Plants

Assessment endpoints and risk questions were developed for each receptor in each potential habitat to help guide and focus the risk assessment. The endpoints were based on protecting the reproductive success and population sustainability of the selected non-Federally protected receptors for each habitat and were based on protecting *individual* members of the Federally protected species, the piping plover. Due to the sensitive nature of threatened or endangered species, risks are evaluated on an individual organism level. This provides an extra layer of conservatism, beyond protection of an overall population, by ensuring potential risks from the Facility won't adversely affect a single protected organism.

Risk questions developed from the assessment endpoints described above included:

- Does exposure to site-related contamination result in unacceptable adverse effects to the reproductive success and population sustainability of ecological receptors?
- Does exposure to site-related contamination result in unacceptable adverse effects to the survival, growth and reproduction of individual piping plovers?

The outcome of all measurement endpoint evaluations is a hazard quotient (HQ), which is the ratio of an estimated exposure dose to an established reference value. Basically, it provides a quantitative reference point for the potential risks associated with constituents of concern, hazardous chemicals and metals, for the purpose of making risk management decisions. An HQ greater than 1 means there is potential for harmful effects due to the chemical in question that should be further evaluated through a risk management approach. An HQ equal to 1 means the chemical alone is not likely to cause ecological risk. An HQ less than 1 means harmful effects are not likely. The result of the risk characterization for each habitat is as follows.

The northwest swale was evaluated as potential habitat for wildlife, invertebrates and plants. Hazard quotients (HQs) did not exceed 1 for both site media and reference areas for any receptors. Therefore, this habitat does not pose an unacceptable potential risk to the evaluated receptors.

SWMU 26 was evaluated as potential habitat for wildlife, invertebrates and plants. Hazard quotients did not exceed 1 for any wildlife or invertebrates, demonstrating that this habitat does not pose an unacceptable potential risk to those receptors. The HQs for plants relating to boron and manganese exposure (2 and 3, respectively) exceed the threshold criteria of 1. When the HQ is greater than 1, potential risk should be further evaluated. Additional information was weighed during the risk management decision process for this SWMU and Area A as a whole as a result of the HQ exceeding 1. This area is within an active electricity-generating portion of the Facility, where ecological restoration would not be prudent. Neither the primary function nor use of this area is ecological habitat. Furthermore, the risk evaluation utilized "no-effects" reference points for the risk assessment due to the lack of "low-effects" reference points. This means the contaminated soil was compared to conservative "no observed effect" levels rather than more representative "low observed effect" levels. Consequently, the level of true site risk to plants at this SWMU was conservatively *overestimated*. This process, although producing extra conservative results, is fundamental in the risk management decision-making process that takes place in the proposed remedy evaluation and selection. EPA proposes the source control measures detailed below at SWMU 18 will serve to further reduce potential risk at SWMU 26; however, the current ecological risk associated with this SWMU is acceptable.

The west area was evaluated as potential habitat for wildlife, invertebrates and plants. Hazard quotients did not exceed 1 for wildlife; therefore, this area does not pose an unacceptable risk to those receptors. The HQs for plants exposure to boron, manganese and selenium exceed 1 (7, 2, 3 respectively). The HQ for invertebrates exposed to boron exceeds 1 (HQ=3). This risk evaluation helped guide the risk management decisions associated with the proposed remedy to address Area A as a whole. This area is also within an active portion of the site, where electricity is generated, making ecological restoration unrealistic. Further, the conservatism associated with an evaluation based upon "no-effect" levels provides adequate confidence that this area's potential risk to plants and invertebrates is extremely low. EPA's risk management decision for Area A, eliminating the source of groundwater contamination at SWMU 18 and employing appropriate institutional controls, may serve to further reduce the already acceptable risk in this nearby area.

The Lake Michigan beach area was evaluated as potential habitat for the endangered piping plover. All HQs for exposure to contamination in groundwater, surface water and sediment were below 1 or equivalent to reference area HQs, except for boron at location LMB-GW07. The total hazard quotient for exposure to boron at LMB-GW07 was 2, and about 75% of this estimated risk is from the groundwater exposure pathway, and 25% is from the surface water exposure pathway. The total HQ of 2 is essentially equivalent to the background groundwater HQ of 0.7. Based on this analysis, the beach habitat does not pose an unacceptable potential risk to the piping plover from site related constituents. Again, to further reduce the already acceptable risk, EPA's risk management decision for Area A is to eliminate the source of groundwater contamination from SWMU 18.

Areas A & B Human Health Risk Assessments

A human health risk assessment is the process by which scientists evaluate the potential for adverse risks to people in contact with certain medium at a site. Risk assessments characterize potential risks that may be present currently or could exist in the future from site related contamination. Risk assessments performed for both Facility Areas A and B evaluated potential risks to the following human health receptor scenarios: current and future Facility workers, current and future trespassers, and future construction workers.

The first step in the risk assessment process is to determine the potential constituents of concern, or contaminants, to which potential human exposures may occur. Four constituents of concern were identified within Area A: arsenic, benzo(a)pyrene, benzo(a)pyrene toxic equivalents and manganese. Two constituents of concern were identified within Area B: arsenic and manganese. Affected media evaluated in both areas included surface soil, subsurface soil, surface water, sediment and groundwater. Exposure areas are then identified where potential risks could exist. Those areas within Area A include: the northwest drainage way, SWMU 26, Outfall 001, the northwest area and the west area. Within Area B they include: SWMUs 2 and 3, SWMUs 4 and 5, and the future use of the entire Area B.

The final risk characterization step of the risk assessment process combines toxicity information from the constituents of concern with receptor-specific parameters to provide a quantitative estimate of potential human health risks associated with each combination of constituent, medium, exposure area and receptor. The EPA has determined that the acceptable cancer risk range is between $1x10^{-4} – 1x10^{-6}$. In other words, the acceptable range for the chance of developing an additional incident of cancer from the contamination alone is 1-in-10,000 to 1-in-1 million. EPA prefers to select remedies that are at the more protective risk range. The non-carcinogenic risk is characterized by the hazard quotient (HQ), a ratio of an exposure level by a contaminant (e.g., maximum concentration) to a screening value selected for the risk assessment for that substance. The HQ is a means to express the relative safety of contaminants that are noncancerous but could cause other health or environmental problems. For contaminants that are cancerous, risks are estimated by the Excess Lifetime Cancer Risk, which is a function of the exposure and the toxicity of the contaminant. If the exposure level is higher than the toxicity value, then there is the potential for risk to the receptor and a risk management decision must be made.

In both Areas A and B, the estimated potential carcinogenic risks associated with potential exposures to all media and exposure areas were calculated to be less than the target risk of $1x10^{-5}$ and all non-carcinogenic hazard indices were less than the target hazard index of 1. Based on these findings, EPA has determined there are no unacceptable risks to human receptors in either Areas A or B.

SCOPE OF CORRECTIVE ACTION

As a result of historic waste management activities, EPA identified the NIPSCO Facility as being subject to certain provisions of RCRA, in particular RCRA Corrective Action. In April 2005, pursuant to Section 3008(h) of RCRA, 42 U.S.C. § 6928(h), EPA and NIPSCO entered into an Administrative Order on Consent (Order) requiring that various Corrective Action activities be undertaken and completed consistent with guidance and according to performance schedules.

A RCRA Facility Investigation (RFI) was conducted for Facility Areas A and B, and is currently on-going for Area C and portions of the adjacent IDNL property as required by the Order. Initially, RFI activities and reports (including site maps) referred to four distinct areas of the Facility and the adjacent IDNL property. To streamline implementation of the Corrective Action process, these five subdivisions were subsequently categorized into three primary areas – Area A, Area B and Area C (Figure 1). This document addresses Area A, upon which are located the primary operations of the Facility, and Area B in which the NPDES-permitted settling ponds are located. Although RFI activities are ongoing in Area C, investigation work and findings within Areas A and B are sufficiently complete to allow implementation of the next phase of the Corrective Action process; proposing, selecting and implementing final remedies which will be presented in more detail later in this document. Upon completion of the RFI activities in Area C, proposed remedies will be presented in a separate Statement of Basis at a later date.

SUMMARY OF ALTERNATIVES

Area A

This section provides descriptions of various remedial options that are potentially appropriate to address the migration of metals from SWMU 18 to the underlying groundwater, the remaining source of contamination within Area A. These remedial options have been chosen based on consideration of site-specific circumstances, and include only appropriate, implementable approaches consistent with expected future land use.

For the other parts of Area A, discussed in the Interim Measures section, excavation was chosen as the presumptive, interim remedy during various phases of the investigation. Excavation was the obvious choice due to its: (1) ease of implementation, (2) flexibility to allow additional removal based on visual assessment and field screening, (3) effectiveness in the short- and long-term by eliminating sources, which was easily verified through post-excavation sampling and analysis, (4) cost-effectiveness, (5) permanence and (6) acceptance as a proven technology. EPA is proposing that the interim measures conducted at the SWMUs and AOCs detailed above have adequately cleaned up the contamination to the standards appropriate for industrial land use. EPA's proposed remedy for SWMU 10, SWMU 20, SWMU 21, Area of Concern (AOC) 1, AOC 4, AOC 5 and SWMU 16 is that NIPSCO must maintain institutional controls to make sure that these areas cannot be converted to residential land use in the future, unless additional cleanup is conducted.

Area B

Area B also had work conducted previously to eliminate contaminant sources from the surface impoundments. Although that work, detailed in the previous section, was not part of the current corrective action program, EPA is proposing those remedial actions have cleaned up those surface impoundments adequately, and that NIPSCO must file appropriate institutional controls to prevent unacceptable exposures.

Areas A & B

All interim and proposed final remedies will also include the appropriate institutional controls to ensure future land use remains industrial and potential exposure does not pose an unacceptable risk to any receptors. The following remedial options have been considered for all SWMUs and AOCs, with the exception of the previously lined surface impoundments:

No Further Action

This alternative assumes the degree of impacts from SWMU 18 are well understood and are generally minor; that natural processes such as sorption, dispersion and dilution are sufficient to address potential risks to Area A and Lake Michigan habitats; and, therefore, no additional monitoring or remedial efforts are necessary. No further action is the baseline case against which all other corrective measures are compared, as a point of reference.

Soil Capping

This alternative involves construction of a cap that would minimize the infiltration of water through SWMU 18 soils and thereby minimize the further migration of metals from soils to the underlying groundwater. Capping is assumed to include removal of all above ground coal combustion byproduct material present, installation of a 40-mil geomembrane liner over approximately one acre within the SWMU 18 berm, and placement of 6 inches of topsoil over the liner along with seeding, mulching, and installation of a perimeter drainage swale. Under this alternative, an appropriate institutional control would be recorded to limit land use to industrial purposes and would include specific operation and maintenance provisions to maintain the integrity of the cap and prevent worker exposure.

Soil Excavation and Off-Site Disposal

Excavation and off-site disposal of soils would serve to remove source material in SWMU 18 and thereby minimize the migration of metals from soils to the underlying groundwater. This alternative includes removal of coal combustion byproduct present at SWMU 18, excavation of impacted soils to target leachate goals[5] developed in the Corrective Measures Proposal for Areas A and B, and transportation to an off-site permitted landfill. The media cleanup standards will be site-specific target leachate goals for the purpose of aquifer restoration and protection. Approximately 780 cubic yards of soil will be removed, but may be increased based upon confirmation sampling. The excavation would be backfilled with a minimum of 6 inches of topsoil or other material capable of supporting vegetation, then seeded and mulched. Post excavation

[5] Target leachate goals were developed consistent with EPA's Soil Screening Guidance.

groundwater monitoring will occur in order to measure the success of the remedy. Appropriate groundwater points of compliance will be established up gradient of the excavation area. These locations will be monitored for metals until groundwater concentrations meet the GLI or MCL criteria, with the final remedial goal being the more conservative of the two. Once the criteria are met, the wells will continue to be monitored for a period of at least two years to confirm compliance.

As stated above, the long-term goals for groundwater remediation will be to meet either the GLI or MCL criteria (the more conservative of the two). The Great Lakes Water Quality Initiative was established 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 plus all of the streams, rivers, lakes and other bodies of water that are within the drainage basin of the Lakes [60 Fed Reg 15367]. However, for certain site constituents, the MCLs are more conservative than the GLI criteria. The Indiana portions of Lake Michigan waters are designated Outstanding State Resource Waters within the Great Lakes Basin [327 IAC 2-1.5-19] and provide a source of drinking water. "EPA expects final remedies to return 'usable' groundwaters to their maximum beneficial use, wherever practicable, within a timeframe that is reasonable given the particular circumstances of the facility" (EPA ANPR 1996a; EPA Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action 2004). Therefore, for those constituents that have more conservative MCLs, the drinking water criteria will be applied as a final remedial goal at appropriate points of compliance for this area of the site. Final remedy goals for the remaining area of the site, Area C, may differ with site-specific conditions, discussed below.

EPA's proposed goals are appropriate and technically practicable within Area A of the facility based upon area-specific circumstances, such as: the aquifer's direct discharge to the lake, the maximum beneficial groundwater use for the aquifer at this location of the site, and the already moderate concentrations of constituents that will be further reduced with source control. Dividing the site into multiple areas acknowledges the area-specific exposure and risk profiles as well as the technical practicability of reaching specific final remedy goals. Appropriate final remedy goals will be selected for Area C in consultation with the National Park Service and will take area-specific circumstances into consideration, balancing exposure and risk against groundwater restoration.

EVALUATION OF THE PROPOSED REMEDY AND ALTERNATIVES

The interim measure remedies completed in Area A at the SWMUs listed below are also evaluated in Table 1 (attached) using the four performance standards and the seven balancing criteria presented below for SWMU 18. For these SWMUs and AOCs, based upon screening criteria it was clear that a 'No Further Action' remedy is not appropriate.

SWMU 10

Soil excavation and off-site disposal was implemented as an interim measure. An approximate area of 30'x30', as deep as 8' in some areas, was removed and backfilled with clean material. Capping was ruled out because of anticipated issues with grade changes and because ongoing cap maintenance and avoidance by traffic was not deemed viable for the production areas. Excavation was determined to be the best possible option at addressing the performance criteria (see Table 1).

SWMU 20

Soil excavation and off-site disposal was implemented as an interim measure. An approximate area of 50'x15' and 3' deep was removed and backfilled with clean material. Capping was ruled out because of anticipated issues with grade changes and because ongoing cap maintenance and avoidance by traffic was not deemed viable for the production areas. The relatively small excavation footprint also ruled out a cap. Excavation was determined to be the best possible option at addressing the performance criteria (see Table 1).

SWMU 21

Soil excavation and off-site disposal was implemented as an interim measure. An approximate area of 40'x30' and approximately 1.5' deep was removed and backfilled with clean material. Capping was ruled out because of anticipated issues with grade changes and because ongoing cap maintenance and avoidance by traffic was not deemed viable for the production areas. Excavation was determined to be the best possible option at addressing the performance criteria (see Table 1).

AOC 1

Soil excavation and off-site disposal was implemented as an interim measure. An approximate area of 30'x50' and depth of 5' was removed and backfilled with clean material. Capping was ruled out because of anticipated issues with grade changes and because ongoing cap maintenance and avoidance by traffic was not deemed viable for the production areas. Excavation was determined to be the best possible option at addressing the performance criteria (see Table 1).

AOCs 4 & 5

Soil excavation and off-site disposal was implemented as an interim measure. Approximate areas of 60'x60' and 40'x60' at 2' deep were removed and backfilled with clean material. Capping was ruled out because of anticipated issues with grade changes and because ongoing cap maintenance and avoidance by traffic was not deemed viable for the production areas. Excavation was determined to be the best possible option at addressing the performance criteria (see Table 1).

SWMU 16

Soil excavation and off-site disposal was implemented as an interim measure. An approximate area of 40'x30' at 1' deep was removed and backfilled with clean material. Capping was ruled out because of anticipated issues with grade changes and because ongoing cap maintenance and avoidance by traffic was not deemed viable for the production areas. Excavation was determined to be the best possible option at addressing the performance criteria (see Table 1).

Although these remedies were completed as interim measures, and likewise the lining of Area B settling ponds was performed in 1980 (well before EPA's corrective action investigation), they are nevertheless included in Table 1 as part of the evaluation of remedial technologies for Areas A and B. The following evaluation, therefore, focuses on the proposed remedy for SWMU 18.

No Further Action

With respect to the Protection of the Environment performance standard, it is possible that without any further remedial activities, natural processes will work to deplete existing sources of coal combustion byproduct within the SWMU 18. However, the processes that would act to reduce source area concentrations (e.g., infiltration and migration with groundwater) may not act to sufficiently and conservatively protect Lake Michigan.

Further, with respect to the Achieve Media Cleanup Objectives performance standard, the No Further Action scenario would not be capable of achieving the leachate and groundwater action levels developed to protect Lake Michigan. Based on the inability to achieve the first two performance standards, the No Further Action scenario does not pass the initial screening, and will not be further evaluated in this SB.

Soil Capping

With respect to the Protection of the Environment performance standard, soil capping could create a land surface that can support native vegetation as well as minimize infiltration through impacted soils and reduce impacts on underlying groundwater. These actions would reduce potential impacts to ecological receptors in the down gradient habitats. Thus, soil capping appears to be capable of achieving the Protection of the Environment performance standard.

With respect to the Achieve Media Cleanup Objectives performance standard, the soil capping scenario would likely be capable of preventing the infiltration of leachate and achieving the groundwater action levels developed to protect Lake Michigan.

The remedial time frame for this option includes the time required installing the cap and the time required for the concentrations of metals in groundwater to decline. The time frame to install the soil cap would be one year or less. The time frame for native vegetation to become established would be a function of natural environmental processes and may be a gradual process that takes several years. The time frame for groundwater concentrations at the compliance wells to decline below the groundwater action levels is a function of aquifer hydrologic properties and the fate and transport characteristics of the metals. Based on an estimated linear groundwater velocity of 0.6 to 1.3 foot per day, and a distance of 60 ft between SWMU 18 and the nearest compliance wells, the minimum amount of time required before the effect of capping might be observed would be 46 to 100 days (not taking into account the effects of dispersion or retardation). Despite some uncertainty in the remedial time frame, soil capping appears to be capable of achieving the Achieve Media Cleanup Objectives performance standard.

With respect to the Control the Sources of Releases performance standard, soil capping should control the migration of metals from SWMU 18 by cutting off infiltration. Soil capping therefore appears capable of achieving the Control the Sources of Releases performance standard. Soil capping would not require source removal therefore the requirement to Comply with Standards for Waste Management does not apply.

Based on the ability of soil capping to achieve the Protection of the Environment, Achieve Media Cleanup Objectives and Control the Sources of Releases performance standards, the soil capping scenario does pass the initial screening, and will be further evaluated in the detailed screening portion of this SB, below.

Excavation and Off-Site Disposal

With respect to the Protection of the Environment performance standard, excavation and off-site disposal followed by backfilling and seeding could create a land surface that can support native vegetation as well as reduce the impact of contaminated soil pore water and underlying groundwater. These actions would reduce potential impacts to ecological receptors in the down gradient habitats. Thus, excavation and off-Site disposal appears to be capable of achieving the Protection of the Environment performance standard.

With respect to the Achieve Media Cleanup Objectives performance standard, the excavation and off-site disposal scenario would likely be capable of preventing the infiltration of leachate and achieving the groundwater action levels developed to protect Lake Michigan.

The remedial time frame for this option includes the time required to remove all coal combustion byproduct and excavate impacted soil, as well as the time required for the concentrations of metals in groundwater to decline. The time frame to design and perform soil excavation would be one year or less. The time frame for native vegetation to become established would be a function of natural environmental processes and may be a gradual process that takes several years. The time frame for groundwater concentrations at the compliance wells to decline below the groundwater action levels is a function of aquifer hydrologic properties and the fate and transport characteristics of the metals. Based on rationale described above, the minimum amount of time required before the effect of excavation and off-site disposal could be observed would be 46 to 100 days. Despite some uncertainty in the remedial time frame, excavation and off-Site disposal appears to be capable of achieving the Achieve Media Cleanup Objectives performance standard.

With respect to the Control the Sources of Releases performance standard, excavation and off-Site disposal should control the migration of metals from SWMU 18 by reducing the impact of contaminated soil pore water and underlying groundwater. Excavation and off-Site disposal therefore appears capable of achieving the Control the Sources of Releases performance standard. Excavation and off-Site disposal is a proven technology and would readily achieve the performance standard Comply with Standards for Waste Management.

Based on the ability of excavation and off-site disposal to achieve the Protection of the Environment, Achieve Media Cleanup Objectives and Control the Sources of Releases performance standards, the excavation and off-site disposal scenario passes the initial screening, and will be further evaluated in the detailed screening portion of this SB, below.

The following sections weigh the technologies that are able to achieve the four threshold performance standards (soil capping and excavation with off-site disposal) using the seven balancing criteria. The balancing criteria are: Long Term Effectiveness; Toxicity, Mobility and Volume Reduction; Short-term Effectiveness; Implementability; Cost; Community Acceptance; and State Acceptance.

Long Term Effectiveness

This criterion evaluates long-term reliability and effectiveness, degree of certainty that the remedy will remain protective, and the magnitude of risks remaining from untreated waste or treatment residuals.

With respect to the soil cap scenario, the addition of a geomembrane liner would minimize the infiltration of soil moisture for the lifespan of the liner. The actual lifespan of a liner depends on numerous design and installation factors, but a typical design lifespan is 50 years. As long as the liner is effective, residual contamination under the liner would be physically and hydrologically isolated, and thus would present little risk to the down gradient habitats or Lake Michigan.

With respect to the excavation and off-site disposal scenario, because the excavation would be backfilled and seeded, the approach would be protective of nearby habitat. In addition, because this approach permanently removes source materials and immediately underlying soil that contains inorganic constituents greater than the site-specific, target leachate goal developed to protect Lake Michigan, the risks from residual contamination are low.

Over the long term, the excavation and off-site disposal scenario does appear to be more reliable compared to the soil cap scenario because it reduces or eliminates the source of impacted soil and does not rely on an engineered barrier with a finite lifespan.

Toxicity, Mobility and Volume Reduction

This criterion evaluates the ability of a remedy to reduce the toxicity, mobility and volume of waste with particular emphasis on the degree to which a treatment is irreversible.

With respect to the soil cap scenario, this approach minimizes the mobility of the metals in unsaturated zone soils under the cap, but does not reduce the volume of soil impacted by contamination. In addition, given the finite lifespan of the soil cap, this scenario may not provide an irreversible solution.

With respect to the excavation and off-site disposal scenario, the approach also reduces the mobility of the metals in the remaining unsaturated zone soils. However, unlike the capping scenario, excavation and off-site disposal directly reduces the volume of source material. Because source materials would be removed, excavation and off-site disposal, in combination with alternate fly ash management methods, may provide an irreversible solution.

Short-term Effectiveness

This criterion considers the short-term effectiveness and the short-term risks that the remedy poses, along with the amount of time for remedy design, construction and implementation.

With respect to the soil cap scenario, this solution could be designed and implemented in less than one year, and would effectively minimize migration of metals to groundwater. However, subsequent reductions in concentrations at the down gradient points of compliance could take months or years. Therefore this scenario is not necessarily effective in the short term.

With respect to the soil excavation and off-site disposal scenario, this solution could be designed and implemented in less than one year. This approach would also minimize migration of metals to groundwater, but reductions in concentrations at the down gradient points of compliance could take months or years. Therefore this scenario is also not necessarily effective in the short term for those particular points of compliance.

Implementability

This criterion evaluates remedies based on the degree of difficulty to implement, and includes consideration of technical and administrative feasibility as well as the availability of required services and materials.

For the soil cap scenario and the soil excavation scenario, the technical design challenges and the administrative aspects of hiring a subcontractor to implement the work are relatively straight-forward. Either of these solutions could potentially be designed and constructed in less than one year.

Cost

This criterion evaluates remedies based on capital (i.e., initial) and operations and maintenance (O&M) costs, and the net present value of the initial and O&M costs. For soil capping, materials costs were estimated assuming a 40-mil geomembrane liner. A drainage swale constructed around the cap would manage storm water than runs off the capped surface. For both the capping and excavation scenarios, SWMU 18 would be covered with a minimum 6 inches of topsoil or other suitable fill material and seeded. Mobilization, demobilization and erosion control measures were estimated assuming 20% of materials costs and engineering efforts were estimated to be 15% of materials costs.

O&M costs were extrapolated from actual recent sampling costs and were estimated for a 5-year period into the future using net present value analysis. The 5-year O&M timeframe was determined by assuming the source is either isolated (capping) or eliminated (excavation), the 46 to 100 day time-of-travel estimate from SWMU 18 to the three down gradient monitoring wells, and flushing with 18 to 40 pore volumes. Because this component of the cost estimate is the same for both remedies, it is not a differentiator in the cost comparison. As summarized in Table 1, for soil capping, the initial and O&M costs are estimated to be approximately $154,000, and for soil excavation and off-site disposal of the upper 6 inches of coal combustion byproduct and affected soil, the initial and O&M costs are estimated to be approximately $63,000. If an additional 6 inches of material required excavation, the initial and O&M costs would increase to approximately $107,000. Based on these analyses of the final two remedy options, excavation and off-site disposal is the most cost-effective.

Community Acceptance

Outside stakeholders, would most likely be interested in the expeditious implementation of a permanent solution at SWMU 18 that minimizes impacts to groundwater. Because the capping approach has a finite lifespan, the excavation approach may have slightly greater community acceptance. EPA looks forward to reviewing public comments received during the public participation period, discussed below, to better understand stakeholder opinion.

State Acceptance

The "Final Remedy Selection Criteria for Results-Based RCRA Corrective Action" (EPA, 2000) suggests remedies should also be evaluated based on the degree to which they are acceptable to the State of Indiana. The IDEM RISC policies for the evaluation and selection of remedial technologies for RCRA sites indicate remedial technologies must be capable of achieving a timely closure and must be cost-effective. In addition, proposed remedies must be made available for public comment and details of the public participation period are below. Since both remediation scenarios are capable of achieving timely closure and are relatively cost effective, and because this SB will be made available for public comment, both the soil capping and soil excavation scenarios have approximately the same potential to be acceptable to the State of Indiana. In addition, EPA believes performance monitoring based on MCLs and GLI criteria, derived from the Indiana Department of Environmental Management's *Criteria and Values for Selected Substances Calculated using the Great Lakes Basin Methodologies* (IDEM, 2002), should be acceptable to the State.

Summary of Evaluation of Remedial Technologies

Both the soil capping and soil excavation scenarios were determined to be able to achieve the performance standards, and thus were carried forward for additional evaluation. These two remedies were compared using the seven balancing criteria. As summarized above, the two remedial scenarios have approximately equal potential to be effective in the short-term, both are technically and administratively feasible, and both would likely achieve state acceptance. However, soil excavation and off-site disposal has a greater potential to be effective in the long-term, reduces the volume of impacted soil, would be less expensive and may be more acceptable to the community. Based on these considerations, EPA is proposing soil excavation and off-site disposal to control the leaching of metals from SWMU 18 soil to groundwater. Within 90days after EPA issues the Final Decision and Response to Comments, NIPSCO must submit a Corrective Measures Implementation work plan documenting the remedy to be performed and the operation and maintenance that will follow. The work plan must identify the appropriate screening criteria (the more conservative of either the GLI or MCL), compliance points and schedule.

<u>FINANCIAL ASSURANCE</u>

EPA is also selecting financial assurance as a component of the final remedy. NIPSCO must demonstrate that adequate funds will be available to complete the construction as well as the operation and maintenance of all selected remedies. NIPSCO must provide this financial assurance within 90 days after EPA issues the Final Decision and Response to Comments. Any of the following financial mechanisms may be used to make this demonstration: financial trust, surety bonds, letters of credit, insurance, or qualification as a self insurer by means of a financial test. After successfully completing the construction, NIPSCO may request that the amount of the financial assurance be reduced to the amount necessary to cover the remaining costs. NIPSCO may make similar requests from time to time as the operation and maintenance phase of the remedies proceeds.

<u>PUBIC PARTICIPATION</u>

EPA solicits input from the community on the cleanup methods proposed under each of the previous alternatives. EPA has set a public comment period from July 14–August 28, 2011, to encourage public participation in the selection process. Previous public participation opportunities regarding the site included an EPA fact sheet mailed to the community and local environmental groups in February 2010. EPA will host a public meeting at the Indiana Dunes National Lakeshore Visitor Center, 1215 N. State Road 49, Porter, Indiana for this Statement of Basis on July 28, 2011 from 6pm – 8pm. We encourage community members to attend the meeting and submit any comments regarding these proposed remedies in writing by August 28, 2011.

The administrative record is available at the following locations (please call for hours):

EPA, Region 5
7th Floor Record Center
77 W. Jackson Blvd.
Chicago, IL 60604
(312) 886-4253

Portage Public Library
2665 Irving Street
Portage, IN 46368
(219) 763-1508

Comments will be summarized and responses provided in the Response to Comments. The Response to Comments will be drafted at the conclusion of the public comment period and incorporated into the administrative record. To send written comments or obtain further information, contact:

Michelle Kaysen (LU-9J)
77 W. Jackson Blvd
Chicago, IL 60604
(312) 886-4253
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