Town of Pines Superfund Site

Town of Pines, Porter County, Indiana

Record of Decision

United States Environmental Protection Agency

Region 5

September 2016

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LIST OF ACRONYMS

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
COPEC	Chemicals of Potential Ecological Concern
EPA	U.S. Environmental Protection Agency
ESV	Ecological Screening Value
FS	Feasibility Study
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
IDEM	Indiana Department of Environmental Management
IDNL	Indiana Dunes National Lakeshore
MCL	Maximum Contaminant Level
MEP	Maximum Extent Practicable
MSW	Municipal Solid Waste
MW	Monitoring Well
MWSE	Municipal Water Service Extension
N/A	Not Applicable
NCP	National Contingency Plan
NIPSCO	Northern Indiana Public Service Company
NPS	National Parks Service
O&M	Operation and Maintenance
OU	Operable Unit
P.I.N.E.S.	People in Need of Environmental Safety
PRP	Potentially Responsible Party
RACER	Remedial Action Cost Engineering and Requirements
RAL	Removal Action Level
RAO	Remedial Action Objective
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RML	Removal Management Level
ROD	Record of Decision
RSL	Regional Screening Level
SARA	Superfund Amendments and Reauthorization Act
SERA	Screening Ecological Risk Assessment
TMV	Toxicity, Mobility, Volume
UTL	Upper Threshold Limit

PART 1: THE DECLARATION

1.0 Site Name and Location

The Town of Pines Superfund Site ("Pines Site" or "Site"), National Superfund Database identification number INN000508071, is located in Town of Pines, Porter County, Indiana. The Site has not been proposed for, or listed, on the National Priorities List, as EPA has chosen to use the "Superfund alternative approach," which relies on EPA's enforcement authorities to investigate and implement response actions through settlement agreements with responsible parties. The Site has not been divided into operable units.

2.0 Statement of Basis and Purpose

This Record of Decision (ROD) presents the remedial action (the "Selected Remedy") selected by the U.S. Environmental Protection Agency (EPA) for the Site. EPA selected the Remedy in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, by the Superfund Amendments and Reauthorization Act of 1986, and, to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record File for this Site.

The State of Indiana concurs with the Selected Remedy. A letter of concurrence from the State of Indiana can be found in Appendix 1.

3.0 Assessment of Site

The response actions selected in the ROD are necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances, pollutants, or contaminants from the Site.

4.0 Description of Selected Remedy

This remedial action involves phytoremediation[1] to treat contaminated groundwater; excavation of contaminated soils and replacement with clean, matching fill, as well as continuation of ongoing soil testing as requested by property owners; long-term groundwater monitoring; and environmental covenants to ensure protectiveness of the implemented remedy. The contamination addressed by this remedial action derives from coal ash generated by the combustion of coal at a nearby power generating station that was later disposed of at a landfill (Yard 520) or deposited at various locations within the Town of Pines and/or within the Area of Investigation, as described below, and groundwater contaminated by such coal ash. The Site includes the area of contaminated groundwater, various properties within the Town of Pines and/or the Area of Investigation with contaminated soil, and the landfill (Yard 520).

The following are the major components of the soil remedy selected in this ROD (Alternative 3):

[1] Phytoremediation is the use of plants to remove contaminants.

- **Investigation of soil** on additional properties in the vicinity of the Site will be conducted as needed to identify soil contamination above cleanup levels caused by the use of coal ash as landscaping fill.

- **Excavation and off-site disposal** of contaminated soil will be conducted where coal ash-derived contamination is above EPA's selected clean-up levels (see Table 1).

- **Restoration** of excavated properties will be completed using clean backfill.

- **Institutional Controls** to prevent exposure to soil contamination left at depth.

The following are the major components of the groundwater remedy selected in this ROD (Alternative 4):

- **Phytoremediation** will be used to remove Site-related contaminants from groundwater. The specific plants to be used will be determined after additional evaluation, though poplar trees are one example of a plant type that may be used. Plants used for phytoremediation of groundwater intercept groundwater flow and remove contaminants via fixation, transpiration, and other processes. Regardless of the plant species used, regular maintenance will be required, which could involve routine harvesting and disposal of biomass (such as leaves) to control the potential reintroduction of retained contaminants. The phytoremediation will occur in an area to the east of the northernmost cell of Yard 520.

- **Long-term groundwater monitoring** will be conducted to measure and demonstrate the effectiveness of the groundwater remedy. EPA expects that additional monitoring wells will need to be added to the existing network to adequately monitor Site-wide groundwater conditions.

- **Land use controls** will be implemented to legally restrict the installation of new drinking water wells in the areas where coal ash-derived contamination is present.

5.0 Statutory Determinations

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to this action, and is cost-effective. The remedial action utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. The selected remedial action for groundwater satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. However, the selected remedial action for soil does not satisfy the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, because the contaminants are elemental metals and removal from the properties is the only technically viable option. The coal ash-contaminated fill areas presenting a significant risk are the source materials that constitute a principal threat at the Site.

Because the remedy will result in hazardous substances, pollutants, or contaminants remaining on-Site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the remedial action and every five years subsequent to ensure that the selected remedy continues to be protective of human health and the environment.

6.0 Data Certification Checklist

The following information is included in the Decision Summary (Part 2) of this ROD, while additional information can be found in the administrative record file for this Site:

- Contaminants of concern (COCs), EPA's selected cleanup levels, and the basis for these levels (Table 1 and Section 14.A.1.)
- Baseline risk represented by the COCs (Section 14.A.)
- How source materials constituting principal threats will be addressed (Sections 18 and 19.B.)
- Current and reasonably anticipated future land use assumptions, and current and potential future uses of groundwater used in the Baseline Human Health Risk Assessment and this ROD (Sections 13.A. and 13.B.)
- Potential land and groundwater use that will be available at the Site as a result of the selected actions (Section 13.B.)
- Estimated capital, operation and maintenance (O&M), total present worth costs, and the number of years over which the remedy cost estimates are projected (Section 16.A)
- Key factor(s) that led to selecting the remedy (Section 2.10)

7.0 Authorizing Signature

EPA is the lead agency for developing and preparing this ROD. The State of Indiana has submitted a letter of concurrence for the implementation of the selected remedy.

for Douglas Ballotti, Acting Director
Superfund Division

9/30/2016
Date

PART 2: THE DECISION SUMMARY

8.0 Site Name, Location, and Brief Description

The Town of Pines Superfund Site (Site or Pines Site), National Superfund Database identification number INN000508071, is located in Town of Pines, Porter County, Indiana. The Site has also been referred to by several different names. The initial federal legal agreement for a removal action at the Site (AOC I described in Section 9.B.) listed the subject of the action as "Town of Pines, Indiana." The next federal legal agreement (AOC II described in Section 9.B.), which included a requirement to conduct the remedial investigation and feasibility study (RI/FS), simply refers to the Site as "Pines Site." Various documents generated by the responsible parties that conducted the investigation refer to the "Pines Area of Investigation." Finally, the recently issued AOC (the "Removal AOC" described in Section 9.B.) refers to the Site as "Town of Pines Groundwater Plume Site."

The Site includes a landfill containing primarily coal ash (Yard 520), various properties within the Town of Pines, Porter County, Indiana, and/or within the Area of Investigation, described below, where coal ash was deposited, often as fill, and areas of groundwater contaminated by such coal ash. The Town of Pines is a predominantly residential area of several hundred homes and surrounding areas. It is located in a dune and wetland area immediately west of Michigan City, Indiana and approximately 4,500 feet (ft) south of the southern shore of Lake Michigan. The "Area of Investigation" was established for the Site in initial RI/FS documents, as illustrated in Figure 1 and Figure 2 below. There is significant, although not complete, overlap between the boundaries of the Town of Pines and the Area of Investigation. The Indiana Dunes National Lakeshore (IDNL), managed by the National Park Service (NPS), is located between Lake Michigan and the Town of Pines. A small portion of the IDNL is included within the Area of Investigation.

The EPA is the lead agency for this Site, and IDEM is the support agency. The RI/FS was conducted at the Site in accordance with a legal agreement (AOC II) between EPA and four potentially responsible parties (the PRPs): Northern Indiana Public Service Company (NIPSCO); Brown, Inc.; Ddalt Corp.; and Bulk Transport Corp. EPA expects to negotiate with the PRPs for an agreement to implement this remedial action and would consider pursuing an enforcement action, if necessary.

9.0 Site History and Enforcement Activities

A. Site History

Between 2000 and 2003, IDEM and EPA responded to homeowners' complaints of bad taste in the water from their private wells by conducting sampling in a portion of the Town of Pines. Some of these samples contained boron and molybdenum at concentrations above EPA's Removal Action Levels (RALs). These elevated concentrations in groundwater were later found

to be derived from the coal ash disposed of in Yard 520 and used as fill material throughout surrounding areas[2].

Yard 520 was owned by Ddalt, Corp. and operated by Brown, Inc. Materials accepted by Brown for disposal at Yard 520 were primarily[3] coal ash materials generated from the combustion of coal at NIPSCO's Michigan City Generating Station. In addition, at least one other company, Bulk Transport Corp., was involved in the transport of the coal ash to Yard 520.

Yard 520 consists of two separate areas:

- The South area (a "Type III" landfill) which was constructed with a liner, spans approximately 10.5 acres, contains roughly 300,000 cubic yards of waste material and stopped receiving waste materials in the early 2000s.
- The North area (a "Type II" landfill) which was not constructed with a liner, spans approximately 27 acres, contains approximately 750,000 cubic yards of waste material, and stopped receiving waste materials in the mid-1980s.

For the purposes of this ROD, all further references to Yard 520 refer specifically to the North area as it is the source of the groundwater contamination associated with the landfill. A 2 ½ foot thick compacted clay cap was installed on most of the North area in the mid-1990s, and in 2005 and 2006, the cap was extended to cover all wastes.

Yard 520 is currently being managed under IDEM's post-closure requirements for landfills. This includes monitoring and maintaining the compacted clay cap and conducting semi-annual groundwater and surface water monitoring. As part of the post-closure process, IDEM approved an October 2013 report evaluating the landfill cap. This report determined that the compacted clay cap was adequately restricting infiltration of precipitation into the landfill.

B. Enforcement Activities

2003 AOC I to Address Drinking Water

On January 24, 2003, in response to the boron and molybdenum concentrations above the EPA RALs found in drinking water wells in the early 2000's, EPA and the PRPs as Respondents entered into an Administrative Order on Consent (referred to as "AOC I") that required the Respondents to extend municipal water service from Michigan City to a portion of the residences in the Town of Pines. Under an April 5, 2004 amendment to AOC I, the Respondents agreed to extend municipal water service to a larger area serviced by private wells and to provide bottled water service to all residences within the designated investigation area that did not receive municipal water service.

During the municipal water service extension (MWSE), it was confirmed that coal ash materials were used extensively throughout the Town of Pines. Road beds and some road surfaces were

[2] Most of the coal ash present at the Site as fill material was placed or otherwise disposed of in the 1970's.
[3] Less than 5 percent of the materials disposed of in this landfill consisted of construction and demolition waste and wastes generated from the steel making process.

found to contain coal ash, and coal ash was found to have been used extensively as fill material, including landscaping fill.

2004 AOC II to Conduct RI/FS

In April 2004, EPA and the PRPs as Respondents entered into an Administrative Order on Consent (AOC II) to conduct the RI/FS at the Site under the Superfund alternative approach[4]. The objectives of the RI, as described in the Statement of Work attached to AOC II, included, in part, determining the nature and extent of the contamination and determining whether additional cleanup measures were needed to protect the public and the environment from coal ash-related exposures. An RI report was issued on March 5, 2010, and a human health and an ecological risk assessment were issued in July 2012.

2016 Removal AOC to Address Coal Ash Fill

Sampling conducted later in the Remedial Investigation identified that fly ash (a type of coal ash) was used as landscaping fill in and around the Town of Pines, and some fill areas have concentrations of constituents that present an unacceptable exposure risk to human health. Some concentrations are above Removal Management Levels. As a result, an Action Memorandum was issued in October 2015 requiring a time critical removal action be conducted. In March 2016, NIPSCO and EPA signed an Administrative Settlement Agreement and Order on Consent (referred to as the "removal AOC") for NIPSCO to conduct this time-critical removal work. Under the removal AOC, NIPSCO has agreed to identify areas within the Town of Pines and/or within the Area of Investigation where areas with coal ash present unacceptable exposure risks, remove the contaminated soil, dispose of it properly off-site, and restore the property using clean fill materials. This ROD requires that this removal work be incorporated into the Site cleanup plan.

10.0 Community Participation

The RI and FS Reports and Proposed Plan for the Site were made available to the public on May 16, 2016. They can be found with other pertinent documents in the Administrative Record file which can be accessed on EPA's website for the Site (https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0508071), the Region 5 Superfund Records Center at 77 W. Jackson Boulevard in Chicago, Illinois, and the Michigan City Public Library located at 100 E. 4th Street in Michigan City, Indiana. The notice of the availability of these documents was published in The Michigan City News-Dispatch on May 11, 2016. A public comment period was held from May 16, 2016 to July 15, 2016, after an extension to the requisite 30 day comment period was requested. A public meeting was held on June 8, 2016 to present the Proposed Plan to the community. A transcript from this meeting has been added to the Administrative Record file. At this meeting, representatives from EPA and IDEM answered

[4] The Superfund alternative approach uses the same investigation and cleanup process and standards that are used for sites listed on the National Priorities List (the list of sites commonly known as "Superfund sites"). The Superfund alternative approach is used because it can potentially save the time and resources associated with listing a site on the NPL. As long as a PRP enters into a Superfund alternative approach agreement with EPA, there is no need for EPA to list the site on the NPL (although the site qualifies for listing on the NPL).

questions about the Site and the remedial alternatives. EPA also used this meeting to solicit formal comments on the Proposed Plan. EPA's response to the comments received during the entirety of the public comment period is included in the Responsiveness Summary, which is Part 3 of this Record of Decision.

In addition, EPA held periodic public meetings about the progress of the RI/FS at the Pines Site in January 2003, April 2004, April 2005, June 2007, and March 2010. In September 2015, EPA held a public meeting to discuss a time critical removal action at the Site that is related to the soil contamination further addressed by this ROD. EPA also provided an update of the RI/FS during the September 2015 meeting.

In April 2005, the Respondents reached an agreement for a technical assistance plan with the community group People in Need of Environmental Safety (P.I.N.E.S.). The agreement provides a mechanism for the Respondents to provide funding for P.I.N.E.S. to hire independent technical advisors to help interpret Site-related information and documents.

EPA and IDEM will continue to work with the local community to keep them informed of the progress and new information related to the Site. In addition, EPA's website for the Site contains updates and documents, including those in the Administrative Record.

11.0 Scope and Role of the Response Action

Most of the investigation of the Site was focused on groundwater contamination derived from coal ash. Initial soil sampling for coal ash-derived contamination did not reveal unacceptable health risks. However coal ash-derived soil contamination was found at levels posing an unacceptable risk late in the investigation. The soil contamination was elevated enough on certain properties to trigger EPA's time critical removal process. This removal action is currently ongoing, and EPA expects most, if not all, of the properties with coal ash-derived soil contamination above cleanup levels to be addressed by this action.

The remedial action for soil selected in this ROD will continue the ongoing investigative and, if necessary, excavation and replacement activities being conducted under the time critical removal action. The remedial action for groundwater selected in this ROD will address the small, isolated areas of coal ash-derived groundwater contamination above cleanup levels.

Though the soil and groundwater contamination are being addressed by two different remedial alternatives, EPA does not find it necessary to separate these two types of contamination into different operable units.

12.0 Site Characteristics

The Site includes the Town of Pines and the "Area of Investigation" as illustrated in Figures 1 and 2 below. The Town of Pines is a predominantly residential town located in Porter County, Indiana, immediately west of Michigan City and approximately 4500 feet from the shore of Lake Michigan. According to the 2010 census, the Town of Pines consisted of 353 housing units, had a population of 708 people, and covered an area of 2.25 square miles. The northern portion of the

Area of Investigation extends into a portion of the Indiana Dunes National Lakeshore (IDNL), managed by the National Park Service (NPS). IDNL is an area of particular ecological importance and extends to the shores of Lake Michigan.

The Yard 520 landfill is located in the southwest portion of the Town of Pines and covers an area of nearly 40 acres. Over 1 million cubic yards of waste (largely coal ash) are contained within the two cells of this landfill. Though the entire landfill is covered by a compacted clay cap, the northern portion of the landfill was not constructed with any barrier material at the bottom. However, the southern portion was constructed by connecting clay walls to the basal clay layer (reported to be approximately 30 feet thick). The southern portion covers less than half of the area and contains less than half of the amount of waste material as the northern portion.

The Area of Investigation includes most of the Town of Pines with the exception of some portions of the town to the north and the west. The Area of Investigation extends beyond the town boundaries to the south and a small portion to the east.

A. Summary of Remedial Investigation

1. Hydrology, Geology, and Hydrogeology

Groundwater is present beneath the Pines Site in the shallow surficial aquifer made up primarily of wind-blown sands associated with the current and former shores of Lake Michigan. The base of the surficial aquifer is formed by a clay confining unit. The surficial aquifer is thickest beneath upland dune areas, is thinner beneath low-lying wetlands areas between the dunes (such as the Great Marsh in the IDNL), and pinches out completely to the south against the silts and clays of the Valparaiso Moraine and/or lacustrine sediments of Glacial Lake Chicago. Regionally, groundwater is also present in deeper, confined aquifers in the area. The investigation focused primarily on the shallow, surficial groundwater aquifer because the coal ash has only affected this aquifer.

Groundwater characteristics in this shallow, surficial aquifer are typical of such aquifers. Groundwater in this aquifer occurs at depths ranging from near the ground surface (in wetland areas) to approximately 25 feet beneath upland dune areas. Groundwater flow is generally from the upland areas to Brown Ditch, a creek that flows along the edge of the landfill known as Yard 520 and into the IDNL, and its tributaries and wetlands located in the low-lying areas, including within the IDNL. In general, during both wet and dry periods, groundwater discharges to the Brown Ditch system (including associated tributaries and wetlands) throughout the Pines Site. A groundwater contour map is shown on Figure 3 (Figure 6 from the FS report). While there might be a few instances where this gradient is variable, these conditions are short-term and local and do not affect the overall groundwater flow.

Groundwater levels fluctuate approximately one to two feet seasonally, with water levels lower in the summer and fall, and higher in the winter and spring. Based on data collected during and after the RI, the hydraulic gradients and directions of groundwater flow do not change seasonally.

The hydraulic conductivity[5] of the surficial aquifer was tested during the RI (slug testing), and estimated values ranged from approximately 5 to 50 feet/day, with a geometric mean of 14.7 feet/day. This is consistent with the fine sands of the surficial aquifer. An average linear groundwater velocity of approximately 0.5 feet/day was calculated.

2. Nature and Extent of Contamination

The contamination associated with the Site and addressed by the cleanup measures presented in this ROD is derived from coal ash. In most of the Site reports, coal ash is also referred to as coal combustion byproducts or CCBs. There are three types of coal ash based on how and where they are generated in the coal combustion process:

- Bottom ash settles to the bottom of the combustion chamber.
- Boiler slag is material that has been melted during combustion in cyclone boilers. It is collected at the base of the boilers and is quenched with water causing it to shatter into black, angular particles that have a smooth glassy appearance.
- Fly ash is also generated in the combustion chamber, but it is lighter and finer than the bottom ash and boiler slag and so is transported in the flue gas. Some fly ash is captured by air pollution controls (e.g., electrostatic precipitators, baghouses, or mechanical collectors) and collected for off-site disposal.

Contaminant levels in fly ash are significantly higher than levels found in bottom ash and boiler slag. As such, fly ash is the primary source of the contaminants of concern (COCs) associated with the Site, which include arsenic, thallium, lead and hexavalent chromium for soil, and boron, arsenic, and molybdenum in groundwater, discussed in more detail below.

a. Yard 520

Coal ash is present in Yard 520 and is the primary source of groundwater contamination discussed below. Direct contact with the coal ash in this landfill does not pose a risk as it is covered by a 2 ½ foot thick compacted clay cover, 6 inches of topsoil, and shallow rooting vegetation.

b. Fill Materials

During the excavation work associated with the MWSE, suspected coal ash was observed in roadbeds and other areas in certain portions of the Pines Site, including residential yards. Composite soil samples were taken at three depths in yards containing coal ash fill materials; 0 to 6 inches, 6 to 18 inches, and 18 to 60 inches. Analyses of these samples found that some properties had concentrations (at various depths) of arsenic, lead, and thallium that pose an unacceptable risk. Preliminary data also indicates that hexavalent chromium may also pose an unacceptable risk, but this is still being evaluated. This contamination on these properties is being mitigated under an ongoing removal action being conducted under the March 2016 removal AOC.

[5] Hydraulic conductivity is a measure of the ease with which groundwater travels in the aquifer.

The coal ash observed during the MWSE is not the same as the coal ash present in Yard 520 nor the coal ash used as landscaping fill in residential yards at the Site. The material observed during the MWSE included a large percentage of coarse grained material (larger than silt and clay), and the sidewalls of the trenches stayed upright during the utility work. In contrast, the material in Yard 520 was observed to be predominantly very fine grained, soupy or muddy, and would not stay upright on an open face. Based on descriptions from Brown Inc., the material brought to Yard 520 was a wet slurry which needed draining/dewatering. The observed differences indicated that the coal material in Yard 520 is primarily fly ash, while the suspected coal ash material along roadways consists primarily of bottom ash and/or boiler slag.

These different coal ash materials have different physical and chemical characteristics. Fly ash generally has higher concentrations of the COCs for the Site than do bottom ash or boiler slag, which has been demonstrated in comparisons of samples collected from Yard 520 and samples collected during the MWSE.

It was initially assumed that the types of coal ash used as landscaping fill were the same as those found along roadways during the MWSE. However, late RI investigative work revealed that the landscaping fill it is primarily fly ash. This sampling, which involved compositing samples from discrete depths within some property quadrants, demonstrated that arsenic and thallium (Tl) concentrations were above removal management levels (RMLs) in some samples collected.

Contaminant	RML	Highest Composited Quadrant Sample Result
Arsenic	67 ppm	888 ppm
Thallium	2.3 ppm	12.1 ppm

Though work was conducted at various stages of the investigation to identify properties with coal ash fill materials at the Site, it is unclear if all properties within the Site containing these fill materials have been identified. Additional property owners continue to request to have their properties sampled for the presence of coal ash and the COCs associated with the Site. This ROD requires the continued sampling and, where appropriate, abatement of additional properties at the Site in accordance with the procedures prescribed by the work plan approved for the removal action.

c. Groundwater

Coal ash-derived constituents in groundwater include boron, sulfate, calcium, magnesium, strontium, and molybdenum. Arsenic also appears to migrate from coal ash to groundwater but data indicates that it has not transported any significant distance with the groundwater. Iron and manganese may also have the potential to migrate from coal ash to groundwater, and their mobility in groundwater is controlled by redox conditions, which are variable at this Site. Boron, molybdenum, sulfate, arsenic, iron, and manganese were present at concentrations above acceptable human health risk-based levels in at least one groundwater sample. Other constituents detected included selenium, chloride, and nitrate. Chloride and nitrate are not likely Site-related

contamination,[6] and selenium was only detected at an elevated level at a single well early in the investigation. It is no longer detected above what would be the applicable cleanup standard (the MCL) so it is not included as a COC[7].

Site background groundwater includes many minerals, typical of most natural fresh waters in the world. These include major ions such as calcium, magnesium, sodium, silicon, bicarbonate, sulfate, chloride, and minor and trace elements such as aluminum, barium, boron, manganese, strontium, and nitrate. Based on RI sampling, background concentrations of boron and molybdenum in the surficial aquifer have been found to be as high as 0.119 milligrams per liter (mg/L) and 0.012 mg/L, respectively[8]. Background concentrations were determined by sampling monitoring wells upgradient of the Site (i.e., wells not affected by the Site-related contamination).

Migration of contaminants from coal ash to groundwater appears to occur where large volumes of coal ash are present, such as at Yard 520. The relationship between the presence of suspected coal ash and boron in groundwater is shown in Figure 8 of the FS report.

The selected remedy will address the groundwater contamination associated with the Site above human health levels of concern, which is limited to three small areas of the surficial aquifer, characterized by monitoring wells MW106, MW111, and MW122 (See Figure 4). The groundwater in MW106 is above the applicable risk based standard for molybdenum. MW111 is above the Maximum Contaminant Level (MCL)[9] for arsenic, and groundwater in MW122 is above the applicable risk based standard for boron.

In at least one monitoring well location (MW111), elevated coal ash-derived groundwater contamination (arsenic) occurs in an area with suspected and known coal ash material, including larger accumulations of coal ash adjacent to this well (to the east of Illinois Avenue). Locations upgradient of MW111 have also been found to have as much as seven feet of fill material. These fill materials could likely be contributing to the elevated arsenic in groundwater samples from this well.

Concentrations of boron, sulfate, calcium, magnesium, strontium, and molybdenum are elevated (i.e., above background levels,) within the Yard 520 monitoring network, but only three other wells at the Site[10] had coal ash-derived constituents above human health risk-based levels. This includes an area downgradient and to the east of the landfill (MW122 with elevated boron), an area to the east by northeast of the landfill that is not affected by groundwater from Yard 520 (MW106 with elevated molybdenum), and another area to the east not affected by groundwater from Yard 520 (MW111 with elevated arsenic).

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[6] Nitrate and chloride are likely from other sources not related to the Site, such as septic systems or a municipal solid waste landfill.

[7] EPA does intend to include it as an analyte in the long term groundwater monitoring required by this ROD.

[8] The applicable cleanup level for boron is the risk-based Regional screening level of 4.0 mg/l and for molybdenum is the MCL of 0.10 mg/l.

[9] MCLs are established under the Safe Drinking Water Act, and though they apply to public drinking water supplies, the MCL for arsenic sets a relevant and appropriate limit to ensure protection of human health.

[10] As Yard 520 is considered a "waste management unit" and is regulated by IDEM's hazardous waste landfill post-closure requirements, this remedial action does not address Yard 520 nor the groundwater directly under Yard 520.

Groundwater migrating from Yard 520 flows into Brown Ditch and its related tributaries and wetlands in the immediate vicinity of Yard 520. Hydrogeologic studies performed as part of the RI demonstrate that groundwater does not flow from Yard 520 to the south. The groundwater contamination in MW111 is localized, and sampling data has shown that it is not migrating to adjacent areas.

Coal ash-derived constituents in groundwater do not extend northward from Yard 520 into the IDNL. Coal ash-derived constituents in groundwater do not extend to areas where residents depending on private water wells are located.

Groundwater in the surficial aquifer beneath the Pines Site shows evidence of other possible sources of impact, including septic system discharges, road salt, and a municipal solid waste (MSW) landfill (i.e., a landfill other than Yard 520). Elevated concentrations of a number of non-coal ash-derived constituents, such as sodium, chloride, nitrate, ammonia (NH_4), and bacteriological parameters, were detected in many samples. In particular, the results of groundwater sampling from wells directly south of Yard 520 and Brown Ditch have shown possible MSW landfill impacts. The RI/FS attributes concentrations of boron in monitoring wells in this area to MSW landfill impacts, but the boron concentrations do not exceed the selected cleanup levels. Iron and manganese are elevated in a number of wells, including from one background well (MW113), for reasons unrelated to coal ash. Natural levels of iron and manganese are common in groundwater in many areas of the country, including in northern Indiana, and are commonly the cause of unpleasant taste and appearance of well water.

For five years after completion of the RI sampling, the Respondents continued to sample a subset of monitoring wells to identify whether coal ash-derived constituents in groundwater are migrating farther northward. The data gathered during this monitoring demonstrates that the extent of coal ash-derived constituents in groundwater has not expanded northward. In fact, concentrations have decreased in some of the wells. For example, boron concentrations at MW101 and MW105 have decreased significantly since their maximum concentrations measured during the RI (from 1.79 mg/L to 0.322 mg/L in MW101 and from 2.02 mg/L to 0.0342 mg/L in MW105). MW110 and MW123 are the northernmost wells, located north of West Dunes Highway and upgradient from the IDNL. The concentration of boron in these wells has consistently remained low, indicating that coal ash-related constituents have not migrated to the IDNL. Furthermore, the hydraulic gradients in the Pines Site determined during the greater than 10 year period that such RI/FS data was gathered, indicate that coal ash contamination from the Pines Site migrates in a consistent pathway and does not reach the IDNL. Table 8 of the FS report includes a summary of boron data from both pre- and post-RI sampling, and the post-RI groundwater data are included in Appendix B3 of the FS Report. Also, Section 4.6.1 of the FS Report provides an updated and expanded discussion of the post-RI monitoring results.

In the spring of 2015, EPA required that the Respondents offer to sample and analyze all remaining private drinking water wells in the Pines Site at residences continuing to receive bottled water service provided by the Respondents under AOC I amended. The primary purpose of this sampling was to determine whether any coal ash-derived contaminants were present at levels exceeding the applicable drinking water standards. Additional constituents were also

included in the analysis that could serve as indicators of other impacts to drinking water quality (e.g. septic systems). None of the samples from these private wells were found to have coal ash-derived contaminants above applicable drinking water standards. Other potential impacts were identified in certain wells, and the data were provided to well owners. However, these other impacts are not subject to this CERCLA action and will not be addressed in this ROD.

13.0 Current and Potential Future Land and Resource Uses

A. Current Conditions

The area in and around the Town of Pines and the Site Area of Investigation consists primarily of residential properties, with some business and industrial use, parks, undeveloped areas, including a number of wetlands, a variety of roadways, and a closed landfill (Yard 520) that contains primarily coal ash. Many residential properties in the area contain coal ash previously used as landscaping fill material.

Though most of the residences at the Site were put on municipal water service as part of early response activities associated with the Site, approximately 40 to 50 residences in the area are still on individual private drinking water wells; none of which have been found to have Site-related contamination above cleanup levels. Most of these wells are believed to be completed in the surficial aquifer at issue, however, there are no remaining drinking water wells in use downgradient of the landfill nor in the vicinity of monitoring wells where samples exceed groundwater cleanup levels. The PRP Respondents have been providing bottled water service to these 40 to 50 residences with private drinking water wells as required by AOC II. Due to the data showing a lack of site-related contamination in these wells, this ROD discontinues the requirement for the PRP Respondents to provide bottled water to these residences.

B. Assessment of Potential Future Use

The current land uses for the area in and around the Town of Pines and Site Area of Investigation is expected to continue in the future. Institutional controls will help ensure that additional drinking water wells not be installed in this aquifer in the areas surrounding known groundwater contamination. The development of infrastructure during the MWSE has expanded the area that could potentially be served by municipal water, should additional development occur.

14.0 Summary of Site Risks

The contaminants of concern (COC) for the Site are all metals derived from coal ash. These include arsenic, boron, and molybdenum in groundwater and arsenic, thallium, lead, and hexavalent chromium in soils. The most current sampling of all monitoring wells associated with the site found that COCs are above selected cleanup levels in groundwater samples from only the monitoring wells in the Yard 520 monitoring network (MW-3, MW-6, MW-8, and MW-10) and three monitoring wells outside of the network (MW106, MW111, and MW122). These three monitoring wells are each in different areas. As of September 15, 2016, COCs above soil cleanup levels had been identified on 15 properties (out of 128 properties sampled); however, investigation of individual properties is ongoing.

The response action selected in this ROD is necessary to protect public health and welfare and the environment from actual or threatened releases of pollutants or contaminants from this site that may present an imminent and substantial endangerment to public health or welfare.

C. Human Health Risk Summary

A baseline human health risk assessment (HHRA) estimates potential human health risks posed by a site if no cleanup action is taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the baseline HHRA for this site.

It is important to note that significant data gathering activities were conducted after the HHRA was completed, and some of the conclusions drawn in the HHRA are no longer valid. Specifically, the extent of groundwater contamination is more limited than what was used for the HHRA, and the Site-related soil contamination values used for the HHRA were based on samples taken of primarily bottom ash materials. Subsequent testing has shown that Site-related soil contamination is much higher than that used for the HHRA so the conclusions drawn in the HHRA regarding soil contamination are no longer valid. Because the new results were clearly above levels representing acceptable risk, EPA chose to conservatively select default risk-based screening levels for cleanup levels rather than delaying the cleanup process by requiring revisions of the HHRA.

In making cleanup decisions, EPA assesses both cancer risks and non-cancer hazards. The likelihood of any kind of cancer resulting from exposure to carcinogens at a Superfund site is generally expressed as an upper bound of incremental probability, such as a "1 in 10,000 chance" (expressed in scientific notation as 1×10^{-4} or simply 10^{-4}). In other words, for every 10,000 people exposed to the Site contaminants under reasonable maximum exposure conditions, one additional cancer may occur as a result of Site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risk of cancer individuals face from other causes such as smoking or too much sun.

The potential for non-cancer health effects is evaluated by comparing an exposure level over a specified time period (such as a lifetime) with a "reference dose" derived for a similar exposure period. A reference dose represents a level that is not expected to cause any harmful effect. The ratio of exposure to toxicity for a specific contaminant is called a hazard quotient (HQ). An HQ < 1 indicates that the dose from an individual contaminant is less than the reference dose, so non-cancer health effects are unlikely. The hazard index (HI) is generated by adding the HQs for all contaminants within a given exposure pathway or pathways. An HI < 1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, non-cancer health effects from all contaminants are unlikely. An HI > 1 indicates that Site-related exposures may present a risk to human health. EPA's acceptable risk range is defined as a cancer risk range of 10^{-6} to 10^{-4} and an HI < 1. Generally, remedial action at a Site is warranted if cancer risks exceed 10^{-4} and/or if non-cancer hazards exceed an HI of 1. In Indiana, IDEM establishes cleanup criteria based on the levels corresponding to a 10^{-5} increased lifetime risk of cancer.

The HHRA was completed in 2012 and assessed a number of different possible exposure pathways (See Table 2 of this ROD). The HHRA found that exposure to contaminated soil and groundwater from certain wells posed a potentially unacceptable human health risk. Additional soil and groundwater investigations conducted after the HHRA revealed that some of the findings in the HHRA were no longer accurate. EPA also changed some of the risk based screening levels for the COCs as it does regularly when updated health information becomes available. The following summary considers the most recent data and the current risk-based screening levels.

1. Identification of Contaminants of Concern

Soil

The COCs for soil (see Table 1) are arsenic, thallium, lead, and hexavalent chromium. It should be noted that hexavalent chromium was not identified as a COC in the 2012 HHRA. Sampling has identified total chromium levels above background. However, the hexavalent fraction of total chromium has not been thoroughly evaluated. Additional chromium speciation samples are being collected to verify whether hexavalent chromium will continue to be identified as a soil COC. The risk based screening level for hexavalent chromium that EPA and IDEM have selected is 4.3 ppm, which is based on a 10^{-5} excess lifetime risk of cancer.

EPA and IDEM have established risk based screening levels for direct contact to arsenic and thallium in soils; however, these levels are within the range of concentrations seen in background soils in the area. Therefore, EPA is selecting cleanup levels for arsenic and thallium based on the 95 percent upper threshold limit (UTL) for the range of background values: 30.1 ppm for arsenic and 1.9 ppm for thallium. EPA has established an acceptable concentration for residential exposure to lead (400 ppm) based on its Integrated Exposure Uptake Biokinetic Model.[11]

The soil investigation analyzed in the HHRA did not identify these contaminants as a concern in soil. This investigation mistakenly assumed that soil samples taken along roadways were representative of soil samples taken from fill areas further away from roadways. It is now known that the fill materials along roadways are primarily comprised of coal bottom ash; whereas, the fill materials within residential and other properties is primarily comprised of coal fly ash. Therefore, the cleanup values identified in the HHRA are not valid, and EPA is using the agreed-upon values described above.

Due in part to the requirement to obtain access from owners for each property, soil sampling is ongoing and is expected to continue after issuance of this ROD. As of September 15, 2016, 15 out of 128 properties sampled had been found to have arsenic, thallium, or lead levels above these selected cleanup levels. Arsenic is the primary soil COC and has been detected as high as 888 ppm. Thallium occurs above cleanup levels where arsenic also exceeds selected cleanup levels, but to a lesser magnitude. Lead has been detected over 400 ppm in some instances where arsenic and thallium are above cleanup levels. It has also been detected over 400 ppm on some properties without exceedances of arsenic and thallium. Because there are other common

[11] https://www.epa.gov/superfund/lead-superfund-sites-software-and-users-manuals

sources of lead contamination in soil, investigations are ongoing to determine if the lead contamination on these properties is Site-related (i.e. from coal ash).

Groundwater

The COCs for groundwater are boron, molybdenum, and arsenic (See Table 1) because these are the only Site-related groundwater contaminants outside of Yard 520 above cleanup levels.

Under the Safe Drinking Water Act, EPA has established a maximum contaminant level (MCL) of 0.010 mg/l for arsenic. EPA has not established MCLs for boron or molybdenum, but it has established a human health risk-based screening level of 4.0 mg/l for boron and 0.10 mg/l for molybdenum[12]. Concentrations of each of these COCs have been detected above these exposure levels in just three wells (MW106, MW111, and MW122) outside of the Yard 520 monitoring well network.

Boron is currently detected above EPA's human health risk based screening level in only a single well outside of Yard 520 (MW122). Elevated boron has consistently been detected in this well since 2006, with the highest result detected at 20.8 mg/l, from a sample taken in April 2014, and the lowest level detected at 13.2 mg/l, from the most recent sample taken (May 2015).

Molybdenum is currently detected above EPA's human health risk based screening level in only a single monitoring well outside of Yard 520 (MW106). Elevated molybdenum has been detected in this well since 2006, with the highest result detected at 0.162 mg/l, from a sample taken in August 2006, and the lowest result detected at 0.102 mg/l, from a sample taken in January 2007. The most recent sample from this well was taken in May 2015, and molybdenum was detected at 0.128 mg/l.

Arsenic has been detected above the MCL in groundwater samples from two wells outside of the Yard 520 monitoring network (MW111 and MW122). In October 2006, a sample from MW122 was just above the MCL at 0.0115 mg/l. The results from none of the other 9 samples taken from this well between August 2006 and May 2015 have been above the MCL for arsenic. The result from the most recent sample taken from MW111 in May 2015 is 0.034 mg/l. Four samples taken from this well in April 2014 are all above the MCL for arsenic (ranging from 0.143 to 0.193 mg/l), and two samples taken from this well is October 2006 were just at and above the MCL (0.010 and 0.0114 mg/l). The results of 12 other samples taken from this well between August 2006 and April 2013 are all below the MCL for arsenic.

2. Exposure Assessment

[12] More specifically, these are the Regional Screening Levels set for these two pollutants. Each are based on levels that limit the non-cancer HQ to no more than 1.

Table 2 includes the exposure pathways assessed in the HHRA (from Table 5-1 in the HHRA). Refer to Tables 5-3 through 5-6 of the HHRA for more detail on the exposure assumptions for each receptor and pathway.

Soil

Though the HHRA did identify limited potential concerns with exposure to coal ash materials in soil, the assumption that samples of coal ash materials taken during the municipal water service extension were representative of the coal ash materials used as landscaping fill in residential yards was found to be incorrect after the HHRA was completed. Therefore, the conclusions drawn in the HHRA regarding soil contamination are largely incorrect. For this reason, soil-based risks and hazards from the HHRA are not summarized in the ROD.

Investigations supplemental to the HHRA identified various properties within the Pines Site with concentrations of contaminants from coal ash fill material (including arsenic, thallium, and lead) that clearly present an unacceptable risk[13]. Recent sampling has also revealed that total chromium is above background, and further analysis is necessary to determine if the fraction of the total chromium posing the biggest threat to human health, hexavalent chromium, is at concentrations posing an unacceptable risk to human health.

Rather than delaying the Site cleanup and redoing entire sections of the HHRA, EPA has established cleanup levels based on the appropriate default risk-based screening levels for the removal action. In the case of arsenic, thallium, and hexavalent chromium, the appropriate screening levels should be based on IDEM's residential soil screening levels[14] because chronic residential exposure to contaminated soil is the exposure scenario that poses the biggest exposure risk for these soil contaminants. In the case of lead, the screening level is based on EPA's Integrated Exposure Uptake Biokinetic Model, and the residential child exposure scenario that poses the biggest risk.

Those properties with exposure point concentrations (EPC) of Site-related contaminants above cleanup levels present an unacceptable future human health risk and a potentially unacceptable current human health risk if the fill materials are at the surface or being disturbed at depth.

There are no issues with the quality of the soil data gathered after the HHRA was completed. EPCs were determined using a composite sampling approach. Each property was divided into four quadrants (where present, garden or play areas were treated as another quadrant) and composite samples were analyzed for each quadrant. As of September 15, 2016, potentially unacceptable exposures had been identified for one or more quadrants on 15 individual properties. However, not all properties in and around the Site have been sampled. Therefore, EPA expects that exposure assessments for additional properties will be forthcoming, and the remedy selected in this ROD includes continued sampling of additional properties as requested by the property owners.

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[13] The EPCs detected are well above the EPCs used in the HHRA as well as EPA's regional, risk-based screening levels.

[14] These correspond to a 10^{-5} increased lifetime risk of cancer for carcinogens and a HQ of one for non-carcinogens.

Groundwater

The HHRA evaluates exposures to contaminated groundwater via potable use from private wells (based on comparison of well-specific concentrations to contaminant-specific tapwater regional screening levels [RSL]), as well as dermal contact and incidental ingestion by construction workers involved in excavation activities. The assessment of ingestion from private wells was limited to those residences outside of the area provided with municipal water and required to use private wells for drinking water. Though these residences were already being provided with bottled water service at the time the HHRA was written, the exposure assessment did not take this into account as this is a limited and potentially temporary protective measure.
The HHRA found potential future unacceptable exposures from the consumption of groundwater near two wells, MW111 and MW122. After the HHRA was completed, additional sampling was conducted to give a more current understanding of groundwater conditions, and the risk-based screening level for molybdenum decreased. Currently, groundwater is above acceptable human health risk-based exposure levels in three isolated locations outside of the Yard 520 monitoring well network (See Figure 4):

MW106 is located in an area north and east of Yard 520. Though this is a residential area, there are no known current exposures as this area has been provided with municipal water.

MW122 is located east of Yard 520 in an undeveloped wetland area that has not been provided with municipal water. No drinking water wells are located in this area, though there are currently no prohibitions for the installation of wells if the area were to be developed.

MW111 is located even further east of Yard 520 than MW122, on the other side of Brown Ditch. This area is also undeveloped and some of it is wetland. There are no drinking water wells near MW111, though there are no prohibitions for the installation of wells if the area were to be developed. The nearest residences (located to the north) are in an area that has been provided municipal water.

The exposure point concentrations used for each groundwater pollutant is the actual result of discreet groundwater grab samples. There are no issues with the quality of the groundwater data gathered to date.

The potential future use of groundwater from these areas as drinking water poses an unacceptable potential risk.

3. Toxicity Assessment

Soil

The unacceptable actual or potential exposures to Site-related soil contamination are all based on chronic exposures.

Arsenic poses both carcinogenic and non-carcinogenic[15] human health risks. The arsenic toxicity evaluation in the HHRA and the FS report is based on toxicity data from EPA's Integrated Risk Information System (IRIS). Arsenic is naturally present in soils (background) at concentrations that correspond with EPCs posing a cancer risk in EPA's risk range of 10^{-4} to 10^{-6} (0.8 to 80 ppm). The arsenic concentration that results in a HQ of 1 is 41 ppm. The State of Indiana has set its default risk-based cleanup levels at concentrations corresponding to a cancer risk of 10^{-5}, which corresponds to a concentration of 8 ppm for arsenic. The risk-based cleanup level of 8 ppm was then compared with the soil background threshold value (BTV) for arsenic, which was calculated as the 95% UTL for background concentrations) - 30.1 ppm. The arsenic soil BTV, 30.1 ppm, was selected as the arsenic soil cleanup level because CERCLA response authorities do not extend to naturally occurring substances; and arsenic concentrations in soil below 30.1 ppm are considered naturally occurring. Although higher than the 10^{-5} risk-based concentration (8.1 ppm), the arsenic soil BTV (30.1 ppm) does correspond to an arsenic cleanup concentration in EPA's acceptable risk range of 10^{-4} to 10^{-6} (0.8 to 80 ppm).

Thallium is not recognized as posing a carcinogenic human health risk. The non-carcinogenic toxicity evaluation for thallium[16] in the HHRA and the FS report is based on EPA's 2010 Published Provisional Peer Reviewed Toxicity Value. The exposure point concentration of thallium that poses a non-cancer HQ of 1 is 1.1 ppm. As described for arsenic, the risk-based value of 1.1 ppm was compared to the thallium BTV of 1.9 ppm. The thallium cleanup level in soil was selected as 1.9 ppm – the higher of the risk-based concentration (1.1 ppm) and the thallium BTV (1.9 pm) because CERCLA response authorities do not extend to naturally occurring substances; and thallium concentrations in soil below 1.9 ppm is considered naturally occurring.

Lead was not identified as a contaminant of potential concern in the HHRA so its toxicity was not evaluated. EPA typically uses its Integrated Exposure Uptake Biokinetic model to determine lead cleanup levels in soil[17]. This model determined that a soil concentration of 400 ppm of lead poses less than a 5% risk that an exposed child's blood lead level will exceed 10 micrograms per deciliter (µg/dl). EPA has also set this as its RSL default value.

Hexavalent chromium poses primarily a carcinogenic human health risk though it also poses some non-carcinogenic health risks. The hexavalent chromium toxicity values in the HHRA and FS report are based on EPA's IRIS. A hexavalent chromium concentration of 0.43 to 43 ppm corresponds to a cancer risk range of 10^{-4} to 10^{-6}. Indiana's default risk-based cleanup level is based on a risk of 10^{-5}, which corresponds to a hexavalent chromium concentration of 4.3 ppm. The hexavalent chromium concentration that corresponds with a non-carcinogenic HQ of 1 is 296 ppm. EPA is setting its cleanup level for hexavalent chromium in soil as 4.3 ppm -- the lower of the cancer-based (4.3 ppm) and the non-cancer-based (296 ppm) values.

Groundwater

[15] The non-carcinogenic health risks from arsenic exposure involve the skin and the circulatory system.
[16] The health risks from thallium exposure involve hair follicle atrophy.
[17] Specifically, lead has been found to cause cognitive developmental issues, specifically in school-aged children.

The unacceptable actual or potential exposures to Site-related groundwater contamination are all based on chronic exposures.

Consumption of arsenic in drinking water poses both carcinogenic and non-carcinogenic health risks. Under the Safe Drinking Water Act, EPA has determined that 0.10 mg/l is a safe concentration of arsenic for drinking water for all receptors.

There are no limits established under the Safe Drinking Water Act for boron or molybdenum in drinking water. However, EPA has set Regional Screening Levels (RSLs) for boron and molybdenum in drinking water. These limits are set using IRIS and an assessment of all receptors. The RSLs correspond with a cancer risk of 10^{-6} or a non-cancer risk with an HQ of one. EPA has set the drinking water RSL for boron at 4.0 mg/l based on a non-carcinogenic HQ of 1[18], and for molybdenum at 0.10 mg/l based on a non-carcinogenic HQ of 1[19].

4. Risk Characterization

Soil

Arsenic concentrations on at least 15 properties contaminated with coal ash pose a cancer risk deemed unsafe by the State of Indiana and are higher than background soils. On some properties, arsenic concentrations are 10 or more times greater than the upper range of background levels. Similarly, arsenic concentrations on several properties pose non-cancer health risks resulting in an HQ of greater than one and are sometimes 10 or more times greater than the level corresponding to an HQ of one.

Thallium concentrations on certain properties contaminated with coal ash are higher than background levels, and have levels above the concentration that poses a non-cancer health risk corresponding to an HQ of one.

Some properties contaminated with coal ash have been found to have lead concentrations that pose a risk of greater than 5% that blood lead levels of exposed children could be 10 µg/dl or higher. However, further evaluation is being conducted to determine if all of these elevated lead concentrations are related to the coal ash as there are numerous other possible sources of lead in soil (e.g. lead paint).

Groundwater

There are currently no drinking water wells in the vicinity of monitoring wells MW106, MW111, and MW122. However, there is currently nothing that prohibits installation of drinking water wells in these areas in the future. MW106 is in an area that has already been provided with municipal water service making the installation of new drinking water wells in this surficial aquifer less likely but still possible.

[18] Boron's toxicity involves developmental effects in children.

[19] Molydenum's toxicity involves the excretory system, with children being the most sensitive receptor.

Table 3 is a summary of the HHRA findings of the risks posed by Site-related groundwater contamination (from the risk and hazard results Table 6-81 in the HHRA). The HHRA found that potential future exposures to boron concentrations in groundwater from the vicinity of MW122, molybdenum concentrations in groundwater from the vicinity of MW106[20], and manganese and thallium from the vicinity of MW111 pose non-cancer health risks corresponding to an HQ of greater than one. The HHRA also found that potential future exposure to arsenic concentrations in groundwater from the vicinity of MW111 and MW122 pose cancer human health risks above levels deemed safe by EPA.

Since the HHRA was completed, the nature and extent of the Site-related groundwater contamination has changed. Thallium is no longer detected in MW111, nor any of the monitoring wells. Arsenic is now below the cleanup level (MCL) in MW122 and no longer poses an unacceptable risk in this well.

Though manganese was identified as posing an unacceptable risk in the HHRA, it is known to occur naturally in groundwater and has been detected in background wells associated with the Site at levels similar to those analyzed in the HHRA and above the current RSL of 430 ppb. In the most recent groundwater sampling, manganese was detected in monitoring well MW105 above levels seen in background wells (2,490 ppb). All previous sampling results for manganese in this well were significantly lower with the highest result at 14.4 ppb. Because this well is located in an area already provided with municipal water and manganese has been shown to occur naturally in this area at elevated levels, and EPA finds that manganese does not pose a current risk at the Site but that it should be included in the long term monitoring plan.

D. Ecological Risk Summary

A Screening Level Ecological Risk Assessment (SLERA) was conducted to evaluate potential risks to ecological receptors posed by coal ash-derived constituents of potential ecological concern (COPECs) in environmental media at the Pines Site. The Pines Site has three geographic areas within or adjacent to it that may substantially account for ecological significance and potential for exposure from Site environmental contaminants: Brown Ditch; Kintzele Ditch; and the IDNL. The IDNL is considered a significant regional ecological resource.

Potential ecological receptors and habitats within the Pines Site, and particularly attributable to these three geographic areas, underwent an environmental assessment and were characterized and evaluated with available maps, historical information, existing field data, literature results, concentrations of environmental contaminants in abiotic matrices, available biological inventories that included consideration for Federal and State listed threatened and endangered species, regulatory agency information regarding other sensitive species and quality of available habitats. A reconnaissance and environmental assessment was conducted as part of the SLERA to identify local biota and habitats that focused the SLERA on areas of potentially significant ecological habitat within the Pines Site and also provided context for the development of the Site model. This environmental assessment identified several potential aquatic exposure areas (Brown Ditch, and open water pond habitats, and wetland areas associated with Brown Ditch), as

[20] Molybdenum was not specifically identified as posing an unacceptable risk in the HHRA; however, had the updated risk-based screening level been used at that time, it would have been identified as such.

well as terrestrial exposure areas where coal ash or coal ash-derived constituents were suspected to be present.

The SLERA used the maximum detected concentrations of coal ash constituent contamination in sediment and surface water and for suspected coal ash samples collected within the Pines Site. COPECs were selected by comparing media concentrations against established criteria or screening benchmarks, referred to as ecological screening values (ESVs), and an evaluation of those values against existing background contaminant concentrations. COPECs were further evaluated using food web models to assess potential risks to wildlife receptors that occupied important aquatic and terrestrial habitats. Table 4 of this ROD is the summary of COPECs selected for the SLERA. For more details on the ESVs used, see Table 3-9 of the SLERA. For more details on the selection of the COPECs, see Tables 4-1 through 4-6 of the SLERA.

The evaluation of potential risks to receptors in the IDNL is discussed separately from the other potential aquatic exposure areas in the SLERA because the IDNL is a particularly significant ecological resource.

Based on the results of the SLERA, currently available data and information indicate that ecological receptors experience low or minimal potential risk from exposure to individual coal ash derived environmental contaminants associated with the Pines Site. However, some uncertainty remains for ecological receptors experiencing possible synergistic, antagonistic, or additive effects from possible exposure to COPEC mixtures occurring in soils, sediments, and surface water. This could potentially result in unacceptable risk to ecological receptors at or associated with the Site. This uncertainty will be addressed by future monitoring of the health and well-being of ecological receptors associated with the Site.

E. Basis for Taking Action

The response actions selected in this Record of Decision are necessary to protect public health or welfare or the environment from actual or threatened releases of pollutants or contaminants from the Site which may present an imminent and substantial endangerment to public health or welfare.

15.0 Remedial Action Objectives

Remedial Action Objectives (RAOs) are goals for protecting human health and the environment from risks associated with current or potential future exposures.

Based on the results of the HHRA as summarized above, there is future risk from exposure to Site-related contaminants in groundwater in two separate areas east of Yard 520. These are small areas of groundwater contamination close to, but above EPA's selected cleanup levels.

> **RAO 1:** Protect humans from unacceptable exposure to Site-related COCs in groundwater.

The surficial aquifer in the Pines Site where suspected coal ash-contamination has been identified is classified as "drinking water class." The MWSE has been sufficient to protect residents from exposure to unacceptable levels of coal ash-derived constituents in drinking water and only a small area within the MWSE area has the potential for drinking water risk. Though there are currently no drinking water wells in the vicinity of wells with unacceptable levels of Site-related contamination, there are no controls in place that would restrict installation of such wells.

> **RAO 2:** Restore groundwater to drinking water standards and/or background levels (whichever is higher)[21] for Site-related COCs within a timeframe that is reasonable.

The following RAO is based on consideration of the selected cleanup levels for solid media (soils).

> **RAO 3:** Protect humans from exposure to unacceptable concentrations of Site-related COCs in contaminated fill areas.

These RAOs were developed based on the current and reasonably anticipated future use of the area in and around the Site. They will address the potential risk to current and future residential, commercial/industrial, and recreational users identified in the human health risk assessment.

16.0 Description of Alternatives

A. Description of Remedy Components

Three soil and five groundwater remedial alternatives were evaluated for cleaning up the Pines Site. Soil Alternative 3 (excavation, off-site disposal, and institutional controls for contaminants left in place) and Groundwater Alternative 4 (phytoremediation, institutional controls, and long-term monitoring) are EPA's selected alternatives.

No action was considered as both a soil and a groundwater alternative to serve as a baseline for comparison of other alternatives. A comparative analysis of the alternatives can be found in Section 17.0 and Appendix 4. The following are the alternatives evaluated for the Site:

Soil Remedial Alternatives

The following soil remedial alternatives were evaluated.

1. Soil Alternative 1 – No Action

   No remedial activities would be implemented under this alternative. Inclusion of this alternative is required by the NCP and serves as a baseline against which all other alternatives are compared.

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[21] CERCLA response action authorities are limited, and with rare exception, cannot address naturally occurring substances, thus EPA generally does not require the cleanup of material below background levels.

- Estimated Capital Cost[22] - $0
- Estimated 30-Year[23] Operation and Maintenance (O&M) Cost - $0
- Estimated Present Worth Cost - $0
- Estimated Construction Timeframe - Not Applicable (N/A)
- Estimated Time to Achieve RAO[24] – RAO would not be met.

2. Soil Alternative 2 – Land Use Controls

This alternative includes implementation of land use controls in the form of restrictive covenants that would prohibit digging or other soil disturbances where coal ash-derived contaminants are present at concentrations above the selected cleanup levels.

- Estimated Capital Cost - $10,000 per property, total unknown
- Estimated 30-Year O&M Cost - $10,000 per property, total unknown
- Estimated Present Worth Cost - $13,000 per property
- Estimated Construction Timeframe - N/A[25]
- Estimated Time to Achieve RAO – RAO would not be met on properties where contamination is at the surface. RAO for other properties would be met in approximately one year.

3. Soil Alternative 3 – Excavation & Off-Site Disposal

This alternative includes outreach to gain access to all properties not addressed by the current removal action and testing to determine if the properties are contaminated. Contaminated materials would be excavated and disposed of off-site. Sampling would be conducted at surface soil (0 - 6 inches below ground surface), near-surface soil (6 - 18 inches below ground surface), and/or subsurface soil (18 - 36 inches below ground surface). Soil with coal ash-derived contamination above selected cleanup levels will be excavated. Excavated soil would be replaced with clean soil backfill from an off-site source and graded to match the surrounding topography. If concentrations above the selected cleanup levels extend beyond target excavation depths (36 inches), the soil backfill would serve as a direct-contact barrier, and restrictive covenants on the property would be applied to mitigate potential exposure risks associated with any deeper contamination left in place. A barrier material such as a geotextile fabric or the like would also be put in place to serve as a visual indicator on top of contaminated soils left at depth. Excavated soils would be tested to determine disposal options and then transported via truck to an appropriate off-site disposal facility approved by

[22] Supporting documentation for all cost estimates is provided in Appendix D of the FS report.
[23] The Respondents estimated the total O&M costs over a 30 year period so that the total costs for each alternative are more comparable. Typically, these costs are presented as annual costs, but several of the alternatives evaluated would not incur the same O&M costs each year.
[24] Only RAO 3 is applicable to the soil remedial alternatives.
[25] No construction is involved in this alternative. It could be implemented very quickly depending on the acceptance of the restrictions from property owners.

EPA. It is expected that the excavated soils will meet requirements for disposal in a RCRA Subtitle D landfill (i.e., a standard, municipal solid waste landfill).

- Estimated Capital Cost - $156 per cubic yard of material removed[26] and $1,800 to $6,900 per property for sampling
- Estimated 30-Year O&M Cost - $0
- Estimated Present Worth Cost - $156 per cubic yard of material removed and $1,800 to $6,900 per property for sampling
- Estimated Construction Timeframe – Approximately one year[27]
- Estimated Time to Achieve RAO - Approximately one year

Groundwater Remedial Alternatives

The following alternatives for groundwater were evaluated:

1) Groundwater Alternative 1 – No Action

No remedial activities would be implemented under this alternative. Inclusion of this alternative is required by the NCP and serves as a baseline against which all other alternatives are compared.

- Estimated Capital Cost - $0
- Estimated 30-Year O&M Cost - $0
- Estimated Present Worth Cost - $0
- Estimated Construction Timeframe - N/A
- Estimated Time to Achieve RAOs – RAOs would not be met.

2) Groundwater Alternative 2 – Land Use Controls

This alternative involves the implementation of institutional controls in the form of a groundwater use restrictive ordinance or restrictive covenants for areas where groundwater is above cleanup levels, or both, primarily in the small areas east and north of Yard 520. This alternative would prohibit the use or installation of private drinking water wells on specific properties or within a designated groundwater management area. Groundwater is currently not used as a source of drinking water in these areas, and these restrictions would mitigate future use of the groundwater in these areas as a drinking water source.

- Estimated Capital Cost - $697,000
- Estimated 30-Year O&M Cost - $644,000

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[26] Using the estimated volume of the first 12 properties identified as needing cleanups, this equates to $7,956,000. However, additional properties have since been identified as needing cleanups so this is likely to be an underestimate.

[27] EPA expects most of the applicable properties will be addressed by the concurrent removal action within one year. Additional properties identified subsequent to the removal action will be addressed on a case by case basis but actual time spent removing and replacing soil in a yard could be several days to several weeks. However, it could be several months between the date of sampling and the date that actual cleanup work begins.

- Estimated Present Worth Cost - $868,000
- Estimated Construction Timeframe - N/A
- Estimated Time to Achieve RAOs – The groundwater restoration RAO would not be met. The RAO to prevent (future potential) exposure to contaminated groundwater would be met in approximately one year.

3) Groundwater Alternative 3 – Long-Term Monitoring

This alternative includes the land use controls described in Groundwater Alternative 2 and adds long-term groundwater monitoring north and east of Yard 520. This remedial action would provide continued assessment of groundwater conditions to evaluate the protectiveness and appropriateness of response actions completed previously (MWSE and Yard 520 Closure). Selected monitoring and private wells within the MWSE Area and east of Yard 520 would be included, in addition to the wells monitored as part of the on-going groundwater monitoring conducted under the approved Post-Closure Plan for Yard 520. Additionally, this alternative includes monitoring upgradient of the IDNL to identify any future potential impacts to this area before they might occur, and periodic monitoring of some residential drinking water wells. The specific constituents to be included in this monitoring will not just include the COCs but will also include constituents such as manganese, thallium, and selenium that have also been detected at levels above background and can be associated with the coal ash present at the Site to assure they will be below health-based limits in the long-term.

- Estimated Capital Cost - $872,000[28]
- Estimated 30-Year O&M Cost - $3,930,000
- Estimated Present Worth Cost - $2,477,000
- Estimated Construction Timeframe - 0 - 6 months[29]
- Estimated Time to Achieve RAOs - The groundwater restoration RAO would not be met. The RAO to prevent (future potential) exposure to contaminated groundwater would be met in approximately one year.[30]

4) Groundwater Alternative 4 – Phytoremediation

This alternative includes the land use controls and long-term monitoring described in Groundwater Alternatives 2 and 3. In addition, this alternative includes phytoremediation which uses specific plant species to intercept groundwater flow and remove contaminants via fixation, transpiration, and other processes. Appropriate plant species (most likely trees) are planted and maintained. Routine harvesting and disposal of biomass (such as leaves) will be implemented as specified in the work plans for the remedial action if needed to control the

[28] The cost estimates provided in the FS report and in this ROD include all facets of each alternative. In this instance, the estimated costs include both the costs of long-term monitoring and land use controls.
[29] Most monitoring wells needed are already installed such that sampling could begin right away. The installation of additional wells is expected to take several months.
[30] If natural processes are found to be reducing concentrations of coal ash-derived groundwater contamination, compliance with RAOs may eventually be possible with this remedy alone. However, there is insufficient evidence to make this determination at this time.

potential reintroduction of retained contaminants. The layout evaluated is shown on Figure 19 of the FS report and focuses primarily on groundwater flowing to the east from the landfill towards monitoring well MW122, which is the only well outside of the landfill monitoring network consistently showing elevated levels of boron, and the only area where Site-related groundwater contamination is migrating from Yard 520.

- Estimated Capital Cost - $1,305,000
- Estimated 30-Year O&M Cost - $6,086,000
- Estimated Present Worth Cost - $3,660,000
- Estimated Construction Timeframe - 2-3 years before plants reach maturity
- Estimated Time to Achieve RAOs - The RAO to prevent (future potential) exposure to contaminated groundwater would be met in approximately one year. The RAO to restore groundwater would be eventually be met, though it could take 20 or more years to achieve.[31]

5) Groundwater Alternative 5 – Barrier Wall

This alternative includes the land use controls and long-term monitoring described in Groundwater Alternatives 2 and 3. It also includes installation of a barrier wall (slurry wall) along the east side of the North Area of Yard 520, as shown on Figure 20 of the FS report. The slurry wall would be keyed (connected together to prevent groundwater flow) into the existing barrier wall of the South Area of Yard 520 and would be extended to the underlying low-permeability clay confining unit to control potential flow under the wall. Groundwater recovery from within the walled area would be performed via a french drain, as needed to control the potential for accumulation of groundwater behind the wall. The groundwater recovery system would be designed to control groundwater flow and mitigate the potential for inducing flow around the north end of the barrier wall. Recovered groundwater would be treated using an appropriate treatment process (adsorption/ion exchange, precipitation/flocculation, or reverse osmosis/membrane filtration). Treated water would then be discharged to groundwater or the surface/wetland in accordance with the appropriate permit requirements.

- Estimated Capital Cost - $7,004,000
- Estimated 30-Year O&M Cost - $21,549,000
- Estimated Present Worth Cost - $14,700,000
- Estimated Construction Timeframe - Approximately 1 year
- Estimated Time to Achieve RAOs – The RAO to prevent (future potential) exposure to contaminated groundwater would be met in approximately one year. The RAO to restore groundwater would be eventually be met, though it could take 20 or more years to achieve.[32]

[31] It is difficult to estimate this until the phytoremediation plants have reached maturity and the rate at which boron is migrating to this area at that time is known.

[32] Compliance with RAOs could happen very quickly, but it is not possible to estimate this until the rate of coal ash-derived contaminants continuing to leave the landfill is measured.

B. Expected Outcomes of Each Alternative

Soil Alternative 1 and Groundwater Alternative 1 do nothing to improve the situation at the Site. Nothing is currently in place to prevent installation of drinking water wells in areas with COCs in groundwater above human health risk-based or drinking water standards. Though there is an ongoing action under EPA's removal program to clean up soil on properties that have been identified as having unacceptably high levels of COCs, not all properties within the Site have been tested for the presence of coal ash-derived COCs above the selected cleanup levels.

Soil Alternative 2 would only have the potential to prevent exposures if contamination existed at depth; however, several properties have been identified as having COC concentrations above cleanup levels in the most surficial layer tested (0 to 6 inches).

Soil Alternative 3 involves removal of contaminated soil and replacement with clean fill on properties with COC concentrations above cleanup levels. Some contaminated soil may remain at depth (3 feet or greater), but digging restrictions and a visual barrier should limit future exposure to these soils.

Groundwater Alternatives 2 and 3 will do nothing to restore the aquifer to below drinking water or human health risk-based standards, though it is possible that natural processes might eventually return this aquifer to acceptable levels. Groundwater Alternative 3 includes monitoring that would track these natural processes if they are occurring.

Both Groundwater Alternatives 4 and 5 will actively treat the area of contaminated groundwater in the vicinity of MW122 (immediately east of Yard 520). Either remedy should return this portion of the aquifer to below cleanup levels for boron, though this will likely take decades[33]. Groundwater Alternative 5 is potentially disruptive to the hydrogeological characteristics of the area and requires partial removal of the protective cap on the landfill; therefore, this action could have deleterious, unintended consequences.

Groundwater Alternatives 2, 3, 4, or 5 would prevent the installation of drinking water wells in areas with groundwater COCs above human health risk-based or drinking water standards. This should prevent potential future exposures to unacceptably high Site-related groundwater contamination.

17.0 Comparative Analysis of Alternatives

Nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to select a remedy. Any selected remedy must meet criteria 1) and 2) below; criteria 3) through 7) are balancing criteria; and criteria 8) and 9) are considered as modifying criteria in the remedy selection process. This section of the Record of Decision profiles the relative performance of each alternative against the nine criteria, noting how it compares to the

[33] Boron is particularly difficult to remove from water, and the available treatment technologies are all of low efficiency compared to options for other metals in water.

other options under consideration. The nine evaluation criteria are described below. The "Detailed Analysis of Alternatives" can be found in the FS.

1) **Overall Protectiveness of Human Health and the Environment** determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

2) **Compliance with ARARs** evaluates whether the alternative meets applicable or relevant and appropriate requirements (ARARs) of Federal and State environmental statutes and regulations, or whether a waiver is justified.

3) **Long-term Effectiveness and Permanence** considers the ability of an alternative to maintain protection of human health and the environment over time.

4) **Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment** evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

5) **Short-term Effectiveness** considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

6) **Implementability** considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

7) **Cost** includes estimated capital and annual operation and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 and -30 percent.

8) **State/Support Agency Acceptance** considers whether the State agrees with the EPA's analysis, recommendations and selected remedy, as described in the Proposed Plan and Record of Decision.

9) **Community Acceptance** considers whether the local community agrees with the EPA's analysis and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

Comparison of Alternatives to the Nine Criteria

A. Soil Alternatives

1. Overall Protection of Human Health and the Environment

Soil Alternative 1, No Action and Soil Alternative 2, Land Use Controls are not fully protective. Soil Alternative 3 (Soil Excavation and Off-Site Disposal) is fully protective of human health.

2. *Compliance with ARARs*

A complete list of ARARs can be found in Appendices 2 and 3. There are no ARARs that apply to the actions in Soil Alternative 1, No Action and Soil Alternative 2, Land Use Controls. Soil Alternative 3 would comply with ARARs that apply to the disposal of contaminated soil, as the contaminated soil will be characterized and disposed of in a landfill that corresponds with its waste characterization.

3. *Long-Term Effectiveness and Permanence*

Soil Alternative 3 (Excavation and Disposal) would be effective and permanent. Excavation and disposal activities result in full removal of soil from the top three feet of a property with contaminant concentrations above selected cleanup levels. Soil Alternative 2 (Land Use Controls) is effective and permanent only where a surficial barrier is in place that can reasonably be expected to be maintained in compliance with the restriction terms (e.g., surface soil/landscaping remains in place, pavement is maintained). There is concern that some properties have contamination at the surface; thus, Soil Alternative 2 is not a long-term, effective, and permanent remedy. Further, land use controls are a less long-term, effective, and permanent remedy than removing contamination from properties.

4. *Reduction of Toxicity, Mobility, or Volume through Treatment*

None of the soil alternatives provide for treatment of the contaminants. There is no practical, cost-effective treatment for this type of contamination.

5. *Short-term Effectiveness*

Soil Alternative 1 (No Action) and Soil Alternative 2 (Land Use Controls) have no negative impact during implementation because only administrative actions would be taken. In contrast, Soil Alternative 3 (Soil Excavation and Off-Site Disposal) would have short-term impacts to workers, residents, and the community during excavation and off-site disposal activities. These potential impacts can be mitigated by implementing a project-specific health and safety plan, keeping excavation areas properly wetted (dust control), planning truck routes to minimize disturbances to the surrounding community, and other construction best-management practices. Risk reduction is immediate upon completion of the cleanup action.

6. *Implementability*

Land use controls in Alternative 2 and 3 will provide challenges associated with securing agreements from the local community and/or land owners for implementation, with Alternative 2 requiring more land use controls than Alternative 3. Soil Alternative 3 will have implementation challenges associated with excavation restrictions associated with properties that may contain mature trees, septic systems, shallow utilities, and other structures.

7. *Cost*

There are no costs associated with Soil Alternative 1 (No Action).

The estimated cost for Soil Alternative 2 is $13,000 present worth per property, with total present worth value at $182,000[34]. The estimated cost for Soil Alternative 3 is $156 per cubic yard of material addressed. The total present worth value for Soil Alternative 3 presented in the FS (when only 12 properties had been identified) was $7,956,000.

8. State Acceptance

The State of Indiana concurs with the selection of Soil Alternative 3.

9. Community Acceptance

Though some community members have expressed concern with the environmental covenants necessary for contamination left at depth, individual property owners have expressed a clear preference for this soil alternative as it is the only one that removes contamination.

Groundwater Alternatives

1. Overall Protection of Human Health and the Environment

All of the groundwater alternatives are currently protective of human health and the environment. Response actions already implemented (MWSE) have eliminated the current groundwater exposure pathway. Alternative 1, the No Action Alternative is not protective in the long-term because it does not provide protection against future exposure to contaminated groundwater.

2. Compliance with ARARs

Groundwater Alternatives 1, 2, and 3 do nothing to comply with chemical-specific ARARs in the areas currently above cleanup standards. Although there is no associated ARAR for boron, Alternatives 4 and 5 will treat contaminated groundwater in the vicinity of MW122 such that it will eventually comply with the tapwater Regional Screening Level for boron. Contaminants in the groundwater above Safe Drinking Water MCLs will be appropriately monitored until the groundwater achieves ARARs.

3. Long-Term Effectiveness and Permanence

Alternative 1, the No Action Alternative, is not permanent nor protective in the long term. Alternatives 2 and 3 do provide long-term protectiveness but rely on administrative controls to provide protection, therefore, they are not as permanent as Alternatives 4 and 5. Groundwater Alternatives 4 and 5 propose measures to remove coal ash-derived contamination from groundwater. Groundwater Alternative 5 would require substantial long-term operation.

[34] As of September 15, 2016, 15 properties had been identified as needing these soil clean-up activities.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

Alternatives 1, 2, and 3 provide no reduction in toxicity, mobility, or volume of contaminants through treatment. Groundwater Alternatives 4 (Phytoremediation) and 5 (Barrier Wall) would result in coal ash-derived contaminant treatment, reducing the mobility and volume of the contaminants in the groundwater.

5. Short-term Effectiveness

Alternatives 1, 2, and 3 would present little/no negative impact to Site workers, residents, and the Town of Pines community during implementation.

Alternative 4 would present some minor short term impacts to the community during implementation of the remedy as the vegetation is planted and maintained.

Groundwater Alternative 5 requires construction efforts, including partial removal of the landfill cap and excavation/grading of coal ash materials. These activities would result in increased risk of human exposure to coal ash, airborne particulate matter, increased mobility of coal ash-derived contaminants due to partial cap removal, and general disruption to the residents and infrastructure within the Town of Pines.

6. Implementability

There are no significant constraints on implementability for Groundwater Alternatives 1 through 3. Implementability considerations for Groundwater Alternatives 4 and 5 include the difficulties associated with construction on the closed landfill in proximity to US Highway 20, on privately-owned properties, in public rights-of-way, and in wetlands as well as the limitations of available technologies to treat boron in recovered groundwater to regulatory criteria (Alternative 5). These implementability issues are more significant with Groundwater Alternative 5 than Alternative 4.

7. Cost

Groundwater Alternative 1 (No Further Action) is the lowest cost option, with no associated costs. The most costly option is Groundwater Alternative 5 (Barrier Wall), with an estimated present worth cost of $14,700,000. Estimated total present worth costs for Groundwater Alternative 2 is $868,000, for Alternative 3 is $2,477,000, and for Alternative 4 is $3,660,000.

8. State Acceptance

The State of Indiana concurs with the selection of Groundwater Alternative 4 in this ROD.

9. Community Acceptance

The overwhelming concern that the community has expressed regarding the Site is with the groundwater in the area that is still used for drinking water. Municipal water service was

extended to most of the community within the designated Area of Investigation; however, several dozen residences still have drinking water wells in this aquifer. In accordance with AOC I, the companies that conducted the RI/FS have been providing bottled water service to those residences within the Area of Investigation that were not extended municipal water service.

Because the data shows that there are no drinking water wells affected by Site-related contamination, EPA is no longer requiring the provision of bottled water service. This was met with concern at the public meeting for the Proposed Plan. It is important to note that the quality of the water in this aquifer is likely adversely affected by other factors not related to the Site (e.g. septic systems). Periodic monitoring of some residential drinking water wells for the COCs and other constituents associated with the coal ash at the Site will be part of the long-term monitoring plan.

Some citizens also expressed disagreement with the phytoremediation alternative, referring to it as a "do nothing" alternative and questioning its effectiveness. Groundwater Alternative 5 would likely be better accepted by the community, provided that disruptions from construction activities were well managed. However, this preference does not justify the additional energy and resources for a remedy that would not likely perform measurably better than the selected groundwater alternative (treatment options for boron have poor removal efficiencies) and that would likely change the hydrogeological conditions in a manner that could complicate the cleanup.

18.0 Principal Threat Wastes

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (40 CFR §300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water or air, or acts as a source for direct exposure.

The coal ash fill materials in soils that pose a significant human health risk are considered principal threat wastes. EPA is requiring that these materials be excavated and disposed of properly so as to no longer pose an unacceptable risk. However, this does not meet the NCP expectation to use treatment to address principal threats. Treatment of these soils to remove the metal contaminants posing the human health risk is impractical.

19.0 Selected Remedy

A. Summary of the Rationale for the Selected Remedy

Based on considerations of the requirements of CERCLA, the NCP, and balancing of the nine criteria, U.S. EPA has determined that Soil Alternative 3 and Groundwater Alternative 4 are the most appropriate remedial alternatives for the Pines Site.

Soil Alternative 3 and Groundwater Alternative 4 are protective of human health and the environment, meet all Federal and State ARARs, provide the best balance of the modifying evaluation criteria, and collectively meet all RAOs. These remedial actions are cost-effective and use permanent solutions and alternative treatment technologies to the maximum extent practicable. Soil Alternative 3 does not meet the statutory preference for the selection of a remedy that involves treatment as a principal element because no practical treatment is available for the contaminated fill materials. Groundwater Alternative 4 does meet the statutory preference for the selection of a remedy that involves treatment as a principal element through the phytoremediation treatment of contaminated groundwater.

Soil Alternative 3 was selected because it results in removal of contaminated soil from properties with Site-related contamination that exceeds the selected cleanup levels.

Groundwater Alternative 4 was selected because it is the most cost-effective and least disruptive (to both the local community and hydrogeology) of the two groundwater alternatives that involve active treatment. The other groundwater alternatives were not selected as they do nothing to actively restore the aquifer to beneficial use.

Because Soil Alternative 3 and Groundwater Alternative 4 will leave some hazardous substances, pollutants, or contaminants on-site above levels that allow unrestricted use and unlimited exposure, periodic five-year reviews will be required. The selected alternatives rely, in part, on institutional controls to restrict Site use to control exposure to hazardous substances, pollutants, or contaminants.

B. Description of the Selected Remedy

EPA's selected remedial alternative for soil, Soil Alternative 3, will achieve RAO 3 and involves:

- Access to additional properties at the Site will be gained, and outreach activities will continue.
- These properties will be tested for contamination using the quadrant and composite sampling approach utilized in previous sampling.
- Where testing shows coal ash-derived contaminants above the selected cleanup levels, the contamination will be excavated to a target depth of three feet for off-site disposal; if such contamination extends below three-feet the contamination would be left in place.
- Contaminated soils will be disposed of off-site.
- Excavated areas will be replaced with clean fill to match the existing grade and other conditions.
- Institutional controls will be implemented (specifically the implementation of restrictive covenants), and a visual barrier will be put in place as an indicator of contaminated soils left in place. Each of these measures will serve to restrict digging or other disturbance of any contaminated soil left in place at depth (no less than 3 feet below ground surface).

These sampling and remediation procedures are currently documented in the removal AOC and removal work plan with the removal AOC Respondent (NIPSCO) leading this portion of the Site clean-up.

EPA's selected remedial alternative for groundwater, Groundwater Alternative 4, will achieve RAOs 1 and 2 and involves:

- Phytoremediation will be implemented east of the North (Type II) area of Yard 520, in the direction of groundwater flow from this portion of the landfill towards MW122. The plants used will probably be a type of tree, but the specific tree or other plant used will be selected during the remedial design process based on its ability to uptake boron.
- All or part of the phytoremediation plants will be routinely harvested to remove the boron from the system.
- The harvested plants or plant material will be appropriately disposed of off-site.
- Long term monitoring of ground water will be conducted to measure the effectiveness of phytoremediation and to monitor Site conditions. In addition to monitoring groundwater in monitoring wells in and around the Site, concentrations of coal ash-derived contaminants in surface water, sediments, and, as needed, in local biota will be monitored to ensure that ecological habitats continue to not be adversely affected by Site contamination. This strategy will be especially focused on protection of the IDNL. In addition, periodic monitoring of some identified residential drinking water wells will continue to ensure drinking water wells are not impacted by Site contaminants.
- Institutional controls (local ordinance or restrictive covenants) will be implemented to prohibit the installation of new drinking water wells in the vicinity of the three wells with Site-related contamination above cleanup levels (MW106, MW122, and MW111).

The phytoremediation will only be implemented in the vicinity of MW122 where it appears that groundwater contamination from the landfill continues to or has recently migrated. The other wells located outside of the Yard 520 monitoring network with groundwater above cleanup levels, MW111 and MW106, show an exceedance of the selected cleanup level for arsenic and molybdenum, respectively. This contamination is localized and is not migrating. There are no drinking water wells near MW111. MW106 is located in the area that has been provided with municipal water. This localized contamination will be monitored as long as the groundwater exceeds the selected cleanup levels for arsenic and molybdenum. The institutional controls (local ordinances or restrictive covenants prohibiting installation of new drinking water wells in these areas) will prevent human exposure to contaminated groundwater.

C. Summary of the Estimated Remedy Costs

Soil Alternative 3

Based on estimates from the contractors conducting the soil excavation and replacement work under the current removal action at the Site, a cost of $156 per cubic yard of contaminated soil removed is estimated. Based on the estimated volume of material to be removed from the first 12 properties identified, this works out to a total present worth cost of $7,956,000. However, the

total volume of contaminated soil that will be required to be removed in accordance with the soil remedy required by this ROD is unknown at this time.

Similarly, it is estimated that the present net worth of the cost to sample a property is $1,800 to $6,900 per property and to obtain a deed restriction is $13,000 per property. However, the number of properties where sampling will occur or deed restrictions will be required by this ROD is unknown at this time.

No operation and maintenance costs are expected under this alternative.

Groundwater Alternative 4

The estimated capital cost to implement this remedial alternative $1,305,000. The total estimated 30-year operation and maintenance cost is $6,086,000. This equates to a present worth cost of $3,660,000. These costs were provided in the FS report and were generated using the 2012 version of EPA's Remedial Action Cost Engineering and Requirements System software (RACER).

The information in this cost estimate summary is based on the best available information regarding the anticipated scope of the remedial alternatives. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternatives. Any changes may be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Differences, or a ROD amendment depending on the extent of the change. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

D. Expected Outcomes of the Selected Remedy

At the completion of the remedial action for soil, exposures to contaminated soil should be controlled on each property tested and, if needed, cleaned up. However, this remedial action is currently not fully determined, as only those properties for which owners provide access will be tested. It is possible that the only properties sampled and cleaned up under the removal action and identified as having Site-related contaminants in excess of the selected cleanup levels, will be those properties cleaned up. It is also possible that some properties will be identified for cleanup under the removal action but cleaned up under the remedial action. Once these properties are cleaned up, the only limited use will be excavation activities below 3 feet in depth on any of the properties with soil contamination left at or below that depth. However property owners will be able to arrange to have additional project-specific excavation performed should they choose to take on their own improvements.

At the completion of the remedial action for groundwater, EPA expects that the aquifer will be restored to drinking water and other health-based standards for all Site-related groundwater contaminants. However, potential exposure to Site-related groundwater contaminants should be controlled within several months of the initiation of this remedial action as institutional controls will prevent the installation of drinking water wells in the areas where these contaminants exceed selected cleanup levels.

20.0 Statutory Determinations

The selected remedy must satisfy the requirements of Section 121(a) through (f) of CERCLA to:

1. Protect human health and the environment;
2. Comply with ARARs or justify a waiver;
3. Be cost effective;
4. Utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and
5. Satisfy a preference for treatment that reduces toxicity, mobility, or volume as a principal element of the remedy.

The implementation of the selected remedy at the Pines Site satisfies these requirements of CERCLA Section 121 as follows:

A. Protection of Human Health and the Environment

Implementation of the selected remedy will reduce future risk to human health and the environment from exposure to soil and groundwater with Site-related contamination. Protection of human health and the environment will be achieved through phytoremediation, soil excavation, and the implementation of institutional controls. The cleanup levels for Site-related contaminants will attain or exceed the $1x10^{-4}$ to $1x10^{-6}$ cancer risk level or the HQ of one non-cancer risk level as required by the NCP.

No unacceptable short-term risks are anticipated by implementation of the remedy. Some short-term risks will be created by on-site construction and off-site disposal activities, but these risks can be minimized through proper mitigation measures during construction.

B. Compliance with Applicable or Relevant and Appropriate Requirements

CERCLA §121(d) states that remedial actions must attain or exceed ARARs. The location-specific, chemical-specific, and activity-specific ARARs for the Site can be found in Appendices 2 and 3.

The selected remedy of soil excavation and phytoremediation will comply with all federal and any more stringent state ARARs that are applicable or relevant and appropriate to the Site. The soil excavation remedial activities will comply with ARARs that apply to the disposal of contaminated soil because the contaminated soil will be characterized and disposed of in a landfill that corresponds with its waste characterization. Although there are no ARARs for boron in groundwater, the selected remedy will treat contaminated groundwater in the vicinity of MW122 such that it will eventually comply with the tapwater Regional Screening Level for boron. Contaminants in the groundwater above Safe Drinking Water MCLs will be appropriately monitored until the groundwater achieves these ARARs.

C. Cost Effectiveness

The selected remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost effective if its costs are proportional to its overall effectiveness." (NCP §300.430(f)(1)(ii)(D)). This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing the following three of the five balancing criteria used in the detailed analysis of alternatives: (1) Long-term effectiveness and permanence; (2) Reduction of toxicity, mobility and volume (TMV) through treatment; and, (3) Short-term effectiveness. Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of these remedial alternatives were determined to be proportional to their costs and hence these alternatives represent a reasonable value for the money to be spent.

The estimated present worth cost of the selected groundwater remedy is $3,660,000. EPA believes that the additional cost to implement this groundwater remedy compared to simply monitoring or implementing institutional controls is justified as it is expected to meet the RAO to restore the aquifer. EPA also believes that this groundwater remedial alternative is more cost effective than the alternative involving the installation of a barrier wall as it is expected to achieve the same outcome at much lower cost and with less risk.

The present worth cost of the selected soil remedy cannot be fully determined, though the estimate to clean up the first 12 properties is $7,956,000. The selected soil remedy removes or reduces the unacceptable risk to exposure to contaminated soils at the surface, EPA finds its costs to be justified.

D. Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

EPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that the Selected Remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element, bias against off-site treatment and disposal, and considering State and community acceptance.

The Selected Remedy best treats the materials constituting a potential risk to human health at the Site, achieving significant reductions in arsenic, molybdenum, and boron in ground water at the Site. The Selected Remedy satisfies the criteria for long-term effectiveness by treating groundwater contamination and removing soil contamination. The 3 foot layer of clean fill material backfilled over areas where contaminated soil is left in place will reduce mobility of and potential for direct contact with contaminants from these soils. The Selected Remedy poses little short-term risk.

E. Preference for Treatment as a Principal Element

By treating the contaminated groundwater at the Site, the selected Groundwater Alternative addresses the potential risk posed by contaminated groundwater at the Site through the use of treatment technologies. By utilizing treatment as a significant portion of the groundwater remedy, the statutory preference for remedies that employ treatment as a principal element is satisfied.

The selected Soil Alternative does not meet the statutory preference for treatment technologies. However, there are no practical treatment technologies available for removing metals from soils.

F. Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action, and every five years subsequent, to ensure that the remedy is, or will be, protective of human health and the environment.

G. Summary

Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that the selected remedy provides the best trade-offs in terms of long-term effectiveness and permanence; reduction in toxicity, mobility, or volume achieved through treatment; short-term effectiveness; implementability; cost; and consideration of state and community acceptance.

The selected remedy offers a high degree of long-term effectiveness and permanence. These benefits are achieved at a reasonable cost.

21.0 Documentation of Significant Changes

There are no significant changes between the Selected Alternatives and the preferred alternatives listed in the Proposed Plan that was issued on May 16, 2016.

PART 3: RESPONSIVENESS SUMMARY

Overview

The Proposed Plan (PP) for the Pines Site was released for public comment on May 16, 2016. A 30 day extension was requested so the public comment period lasted until July 15, 2016.

The PP identified the Preferred Alternative of phytoremediation for groundwater contamination and excavation of soils with Site-related contamination posing an unacceptable human health risk followed by replacement with clean fill material.

EPA held a public meeting regarding the PP on Wednesday, June 8th, 2016 at the Clarion Inn, 8802 Franklin Street, Michigan City, Indiana. Approximately 30 people attended the public meeting. Representatives from EPA and IDEM were present at the public meeting. The transcript from the entire public meeting is included in the Administrative Record for the Site.

Comments were received from five individuals during the comment portion of the public meeting in addition to another six sets of written comments received during the public comment period. EPA has included all of these comments in the Administrative Record for the Site.

The responses to these comments have been divided into two parts. The first part includes the responses to most of the comments grouped by common theme. The second part includes the full comment and response to a single set of comments submitted by the PRP respondents. The nature of this set of comments was such that the full comment is needed for context.

Responses to Comments Grouped by Common Theme

Common Theme 1: Concern regarding the Devaluation of Homes and Property Values
One or more commenters discussed concerns regarding the devaluation of homes and/or property values within the Town of Pines as well as financial compensation for homeowners.

Response:
EPA recognizes that environmental contamination impacts communities in a variety of ways, including potentially impacting property values. There are also a number of other factors that affect property values unrelated to environmental contamination, including the current economy and the local housing market. EPA is an environmental regulatory agency that does not have a role in determining impacts to property values. EPA is responsible for making sure that environmental laws and regulations are implemented and followed.

However, EPA is aware that economists have been interested in the relationship between housing prices and hazardous waste sites, such as Superfund sites, for quite a while. Researchers typically gather data about single-family, owner-occupied, detached homes located near sites with hazardous substances on them, usually NPL[35] sites. The data they gather includes sales price and

[35] The National Priorities List. Inclusion on this list is what gives sites the common moniker of "Superfund site."

date, home location, size, age, and sometimes neighborhood data like typical income levels and racial makeup. Each study typically uses information about thousands of homes near one or a few nearby sites. The economists then apply statistical methods (called regression analyses) to separate the effect of being close to the hazardous waste site from other effects, such as inflation and differences in house size.

The results of these studies vary quite a bit, partly because they try to answer different questions, partly because they use data from different places, and partly because they use slightly different methods. Nonetheless, some general findings do seem to emerge:

- The value of homes close to NPL sites is decreased, and the effect varies with distance. Homes right next to NPL sites suffer a larger effect, while the effect seems to disappear at two to three miles away.
- The discovery of the problem is what causes home prices to decline. The reason for this is simple: home buyers and real estate agents learn about the presence of hazardous substances at sites from the media faster than EPA can act.
- Cleaning up the site tends to restore the value of nearby homes. The housing market seems to respond to signs that the site will be cleaned up, such as issuance of an interim plan for cleanup, and not to the cleanup itself. The reason for this seems to be that home buyers take movement toward clean up as a signal that the site eventually will be cleaned up and not left to pose continued health risks or contribute to ongoing blight.

As a result of regulatory actions, EPA believes that any potential detrimental impact that environmental contamination has on property values near this Site will be mitigated.

Common Theme 2: Concerns regarding Human Health and Medical Complications
One or more commenters expressed concerns regarding human health and medical complications of residents living within or near the Town of Pines.

Response:
EPA has thoroughly reviewed the threats posed to human health by Site-related contamination within the Town of Pines and the Area of Investigation. EPA finds that the clean-up procedures (removal of contaminated soil, groundwater use restrictions, and phytoremediation) prescribed by this ROD will effectively reduce any remaining threats to human health posed by such Site-related contamination. EPA notes that there are some property owners within the Town of Pines or the Area of Investigation that have refused consent for access to EPA for sampling soils for Site-related contamination. While EPA would be authorized to seek a warrant from the courts to sample such properties without the owner's consent, Site-related groundwater contamination above cleanup levels has not been found to originate from these properties and EPA has not sought warrants in these cases. (See the discussion in response to Common Themes 3 and 22, below, regarding groundwater contamination.)

Common Theme 3: Blocking the flow of Contaminants from Yard 520
One or more commenters discussed the lack of clean up for contaminated groundwater in the impacted areas beneath residences, and the implications of consequent deed restrictions.

Response:
Groundwater contamination above cleanup levels is only found in three monitoring wells that represent three different areas (MW106, MW111, and MW122). MW106 is located in an area that has already been provided with municipal water, therefore exposures to Site-related groundwater contamination in this area is controlled. MW111 and MW122 are located in two separate undeveloped, wetland areas. Though no exposures are currently present, future development – while not currently anticipated - could lead to an exposure risk if drinking water wells were to be installed. Environmental covenants required by this record of decision (ROD) will prohibit the installation of drinking water wells in these specific areas. In addition, long-term groundwater monitoring required by this ROD will determine if the area affected by site-related contamination increases and additional usage restrictions or cleanup activities are needed.

Common Theme 4: Maintenance of Remediation and Prevention of Future Contamination
One or more commenters discussed the maintenance of remedial actions and prevention of future contamination of properties in Pines.

Response:

Under the terms of the remedial action selected by the ROD, long term groundwater monitoring (including the monitoring of some drinking water wells) will demonstrate whether the extent of groundwater contamination changes. Environmental covenants will prevent future exposures from groundwater contamination by preventing the installation of new drinking water wells in the specific areas where contamination is found.

Through its five-year review process, EPA regularly evaluates the effectiveness of implemented remedies. If the extent of groundwater contamination changes or becomes a concern, EPA has the ability to require the implementation of additional remedies or modification of implemented remedies.

Common Theme 5: Issues and Concerns regarding connection to Municipal Water
One or more commenters expressed concerns that additional connections to Municipal Water should be provided for residents in the Remedial Investigation area of Pines.

Response:
EPA is generally not authorized to proceed with a response action like providing additional municipal water service connections without evidence showing risks to human health, for example, from actual or potential exposures to site-related groundwater contamination above cleanup levels. Groundwater has been extensively sampled at the Site, and Site-related groundwater contamination above cleanup levels has not been found in the vicinity of properties at the Site not previously offered a municipal water service connection (primarily an area to the northeast and to the south within the Area of Investigation).

If long term monitoring detects an exacerbation of site-related groundwater contamination, the addition of expanded municipal water service connections may be evaluated. However, the data gathered to date would suggest that this is not expected.

Common Theme 6: Issues and Concerns Regarding Well Water Monitoring
One or more commenters expressed the need for monitoring of well water for Pines' residents.

Response:
EPA agrees that long term monitoring should include the sampling of some private drinking water wells and has included this in the ROD. Wells will be selected based on a hydrogeological evaluation of contaminant migration, and will represent areas of concern. Final selection of wells for long term monitoring will be determined during design.

Common Theme 7: Restorations of Wetlands and Changes in Water Levels
One or more commenters expressed concerns related to changes in water table levels caused by the provision of municipal water and the restoration of wetlands, including specifically the concern that the water table could rise and cause local flooding.

Response:
EPA has reviewed a hydrogeological evaluation from a consultant for a group of PRPs of the effects of the provision of municipal water to the Town of Pines on the elevation of the water table. EPA concurs with the findings that the impact to water table levels caused by the cessation of drinking water well usage is insignificant compared to changes in groundwater recharge rates caused by changes in precipitation rates.

Furthermore, as one commenter mentions, this is an area with a large amount of wetlands and the water table is already relatively close to the ground surface. It is expected that large precipitation events could lead to increased water infiltration into underground structures such as basements.

EPA does not agree that restoration of wetlands could lead to an increase in water table elevation. Wetland vegetation provides additional storage volume for precipitation, which limits the amount of water entering the surficial aquifer; though this too would be insignificant compared to even small changes in precipitation rates.

Common Theme 8: Detection of all Properties Containing Fly Ash
One or more commenters called for further investigation to determine all properties containing fly ash materials.

Response:
All properties within the Town of Pines and/or Pines Area of Investigation are eligible to be tested for coal ash-derived soil contamination upon request from the property owner. As of September 15, 2016, 128 such properties had been sampled, and Site-related contamination above cleanup levels have been discovered at 15 properties. (See response to Common Theme 2 above regarding property owners that have refused consent for access to sample their properties.) It is doubtful whether the flyover investigatory technique proposed by a commenter would be effective at identifying properties containing the coal ash materials because of the relatively low difference between the radioactivity found in coal ash and that of background soil, as concluded from a thorough investigation of Site-related radioactivity.

Common Theme 9: Concerns Regarding the Depth of Soil Cleanups and Deed Restrictions for the Materials Left in Place
One or more commenters expressed concern regarding the depth of the excavation of contaminated soil, and the implementation of deed restrictions for the materials left in place.

Response:
EPA guidance generally provides that cleaning up contaminated soils to a two-foot depth is protective of human health. In this case, however, when preparing the work plan for the removal action, NIPSCO proposed to excavate contaminated soils to a depth of three feet, rather than two feet, based on the following goals: 1) controlling the exposure pathway by removing surface impacts; 2) allowing complete removal of target contaminants at many properties, which would limit the need for (and cost of) implementing institutional controls (called AULs in the removal work plan); 3) allowing most routine activities such as gardening and landscaping; and 4) complying with local building codes. (The removal work plan also noted that excavating deeper than three feet increased the risk of compromising the integrity of structures adjacent to the excavation.) The ROD for this Site carries over the three-foot target depth for excavation of contaminated soils from the removal action.

One or more comments expressed the view that excavation of contaminated soils should go deeper than three feet, drawing comparisons to cleanup of soil contaminated by radionuclides. The comparison that the commenters drew to sites cleaned up due to radioactive contamination is inappropriate, however, since radiation can affect human beings and environmental receptors through soils at depth; whereas, the non-radioactive contamination present at the Pines Site requires direct contact, inhalation, or ingestion risk to have a negative impact on human beings and environmental receptors. These exposures will be controlled by a 3 foot barrier of clean soils.

The proposed deed restrictions for contaminated soils remaining at depth after the remedial action has been completed will require the PRPs and their successors (provided EPA is successful in negotiating an acceptable cleanup agreement with the PRPs) or another party acceptable to EPA to safely excavate and dispose the material if greater than 3 feet of excavation is necessary. The State of Indiana will also be a party to these restrictions.

Common Theme 10: Cleanup of Bottom Ash
One or more commenters expressed concerns regarding the presence of bottom ash materials not addressed by this cleanup.

Response:
EPA concurs with the investigation findings discussed in the feasibility study report (located in the Administrative Record) that coal ash materials consisting primarily of bottom ash, such as those found in and along roadways, do not pose an unacceptable risk and do not require cleanup action. It was later in the investigation when it was determined that coal ash materials used as landscaping fill (i.e. in yards) are primarily flyash, which pose a more significant human health risk due to higher concentrations of constituents such as arsenic and thallium. Properties with

this fill were separately and thoroughly evaluated, and some were found to pose an unacceptable human health risk such that removal of the contaminated soil is necessary.

Common Theme 11: Clarification Regarding Efficacy and Maintenance of Phytoremediation
One or more commenters expressed concerns regarding the efficacy of phytoremediation and the maintenance of the phytoremediation action for future generations.

Response:
Phytoremediation is a technology with demonstrated effectiveness at other sites, and the uptake of boron by plants is well documented[36]. The specific requirements for harvesting all or portions of the phytoremediation plants will be determined by EPA in the remedial design phase.

Common Theme 12: Issues Regarding Yard 520
One or more commenters discussed the integrity of the cap on Yard 520, containment of seeps and contaminant flow to groundwater, fencing, and warning signage around the area.

Response:
The cap on Yard 520 consists of 2.5 feet of compacted clay, with 6 inches of topsoil and shallow-rooted vegetation on top of the cap. EPA and IDEM find this to be a sufficient barrier to protect direct contact exposures and that this cap significantly reduces the rate of infiltration of precipitation into the waste materials in the landfill. Maintenance of this cap is mandated by post-closure regulations enforced by IDEM.

Seeps did occur in the past, but the Respondents have taken protective measures to correct these and prevent future seeps. Seeps have not been observed in over 5 years, despite the occurrence of heavy rain events.

EPA agrees that a fence around the Yard 520 landfill would be a more effective barrier to prevent access. However, due to the final extent of the cap, there is not sufficient area to safely place a fence between the landfill and US 20. Damage to the landfill cap and the possible increased infiltration of precipitation into the landfill far outweigh the benefit of access prevention. Access roads are gated and no trespassing signage is posted. Most importantly, the cap itself provides a barrier to direct contact, inhalation, or ingestion of the waste materials in the landfill.

EPA concurs with the investigative findings that the flow of contamination in groundwater from the landfill is limited to the area under and immediately surrounding the landfill but for a single easterly flow towards MW122. The phytoremediation element of the groundwater portion of the remedy addresses this area of the groundwater contamination. The long-term monitoring element of the groundwater portion of the remedy will detect any other potential future contaminant flow pathways from the landfill, though the large amount of data collected to date suggests this is unlikely.

[36] Boron is actually a micronutrient that many organisms, including species of plants, require for survival.

Common Theme 13: Community Relations in Pines, Concern Regarding Access and Full Cleanup
One or more commenters discussed issues regarding public opinion on cleanup actions, obtaining residents' permission to access properties, and the extent of property cleanup.

Response:
The current process being used to clean up soils is EPA's time critical removal process. EPA has been using this process to remove soils posing an unacceptable threat to human health so that the remedial process can safely reach the point where these activities can be conducted using this more deliberate but slower process. The time critical removal process is designed to be a relatively quick response to an environmental threat so it does not have a public comment process. The soil removal activities were incorporated into the proposed plan thus opportunity to comment on those activities was provided within the 60 day public comment period.

See EPA's response to Common Theme 8 for further explanation of the properties to be sampled and cleaned up. EPA and the Respondents have made numerous efforts to inform property owners in the area of the possible contamination. Should any new requests be made, this ROD requires Respondents to continue sampling properties where owners have granted access.

Common Theme 14: Clarification as to Which Contaminants are to be Included in Remedial Actions
One or more commenters called for clarification regarding which contaminants are included in remedial actions.

Response:
The contaminants of concern for groundwater at the Site are arsenic, molybdenum, and boron. EPA concurs with the findings of the remedial investigation that the areas contaminated with molybdenum and arsenic, in the vicinity of MW111 and MW106, respectively, are localized and not migrating. The active treatment required by this ROD (phytoremediation) will only address the area with elevated boron contamination.

Exposures to unacceptable levels of arsenic and molybdenum will be protected by environmental covenants prohibiting drinking water wells in these areas. Long term monitoring of groundwater will determine if the Site-related contamination in these areas decreases to acceptable levels or increases such that other treatment or protective measures need to be considered.

Though it is often associated with coal ash, selenium was only detected at elevated levels in a single well. It is no longer detected above what would be the applicable cleanup level (the MCL of 0.05 mg/l) so it is not included as a contaminant of concern.

The contaminants of concern for soil are arsenic, thallium, lead, and hexavalent chromium. Arsenic is the primary contaminant of concern that has led to the ongoing removal activities involving soil excavation and replacement, but excessive thallium contamination has been associated with the coal ash as well. Lead has been detected above acceptable cleanup levels and can be associated with some coal ash; however, additional analysis is ongoing to determine if the elevated lead levels found on properties that do not also have elevated arsenic and thallium are

from coal ash and are Site-related. The ROD calls for excavation off-site disposal of soils with Site-related arsenic, thallium, and lead contamination above cleanup levels.

Soil samples have been analyzed for total chromium and some were above background levels. The hazardous form of chromium is hexavalent chromium. Additional soil samples have recently been taken and are being analyzed for hexavalent chromium to determine if properties not already identified for cleanup (i.e. those with soil COC concentrations above cleanup levels) are above hexavalent chromium levels. If properties at the Site are found to contain coal ash-derived hexavalent chromium above cleanup levels, these properties will be cleaned up using the soil excavation and replacement procedures required by this ROD.

Common Theme 15: Land Controls-Local Ordinances versus Parcel-by-Parcel Approach
One or more commenters discussed the benefits and drawbacks of local ordinances as compared to a parcel-to-parcel approach for land controls and for groundwater restrictions.

Response:
EPA notes the input on the type of land use control mechanism to implement for groundwater restrictions. The ROD simply requires implementation of land use controls to restrict the installation of new drinking water wells in specific areas, but it does not specify the mechanism to be used. The full suite of possible institutional control mechanisms will be evaluated and selected in the design plan, and will be based on the type of contamination or risk present.

Common Theme 16: Town of Pines' role as PRP and Responsibility for Maintenance of Remedial Cleanup
One or more commenters discussed the roles and responsibilities in remedial cleanup for the Town of Pines.

Response:
To date, EPA has not identified the Town of Pines as a PRP. However, the Town of Pines could still be involved in some portion of the remedial activities, such as implementation of land use controls.

Common Theme 17: Division of Remediation into 2 Parts: Questions, Clarification, and Purpose
One or more commenters requested an explanation of the division of the response actions at the Site into two parts.

Response:
The remedial action will involve both groundwater and soil components. However, EPA believes the commenters were referring to the fact that the soil cleanup activities have begun as a removal action and will continue as a remedial action.

The removal action was implemented to begin soil cleanup activities as quickly as possible, and the remedial action will include these same activities.

Common Theme 18: Scope of the Removal Action

One or more commenters questioned the identification of properties to be cleaned up under the removal action.

Response:
Soil sampling activities are ongoing. This ROD requires that additional properties within the Site boundaries be sampled upon request from the property owners. The ROD also requires that properties identified under the sampling program (either during the removal or the remedial action) as having Site-related contamination above cleanup levels which were not cleaned up during the removal action, shall be cleaned up under the remedial action.

As of September 15, 2016, 15 properties had been identified with Site-related soil contamination above cleanup levels. Cleanup of several of these properties is ongoing under the removal action. EPA expects that all of these properties, and possibly several others identified under subsequent testing, will be cleaned up under the removal process.

The linkage of sampling data results with specific private property is considered personally identifiable information that is entitled to certain protections under current law so EPA cannot provide a detailed list of all properties identified. Some of the comments expressed concerns about specific properties that might contain deposits of coal ash materials. All such properties have been screened by EPA and most if not all such properties have been found to contain bottom ash. EPA concurs with the findings from testing conducted early in investigation that fill materials consisting primarily of bottom ash, such as those found in and along roadways, do not pose an unacceptable health risk

Common Theme 19: Concerns with Radiation
One or more commenters discussed concerns with radiation.

Response:
Coal ash is known to have a slightly elevated level of radioactivity compared to the radioactivity of some native soils. Under EPA's oversight, the PRPs thoroughly analyzed exposures to radiation and determined that radiation is well below the cleanup levels EPA would establish (located in 40 CFR Part 192).

Common Theme 20: Preference of Barrier Wall
One or more commenters expressed a preference for the barrier wall groundwater alternative.

Response:
EPA finds that the installation of a barrier wall with pumping and treatment of groundwater will provide little to no additional benefit compared to phytoremediation. The treatment technologies that are available for boron are of limited efficiency, and it is unclear that this technology would achieve cleanup levels any sooner than would phytoremediation.

The installation of a barrier wall could have also deleterious effects on groundwater flow. Since the groundwater contamination at issue is in a limited, undeveloped area, the significant added

energy, disruption, and cost[37] of constructing and maintaining a barrier wall system compared to phytoremediation is not justified.

Common Theme 21: Quality of Water from the Surficial Aquifer
One or more commenters discussed general concerns with the quality of water from the surficial aquifer under the Town of Pines.

Response:
Though this remedial action is limited to addressing Site-related contamination, EPA notes that there are likely other issues that adversely affect water quality in this aquifer. Respondents were only required to analyze groundwater samples for Site-related contaminants; however, contaminants from other possible sources were included in some analyses. Monitoring well data are included in the Administrative Record, and private well data have been provided to individual property owners.

Common Theme 22: Further Contamination of Groundwater from Flyash used as Fill
One or more commenters expressed concerns with additional groundwater contamination from flyash used as landscaping fill.

Response:
Much of this fly ash material will be removed under the ongoing removal action, and EPA expects that the long term monitoring plan required by this ROD would identify any groundwater contamination or area of contamination at the Site from flyash fill materials not already identified and removed. Additionally, flyash materials used as landscaping fill were deposited over 40 years ago, and EPA expects that groundwater contamination from these materials would already have been detected and identified in the thorough sampling conducted under this Site investigation. The groundwater at this Site has been extensively investigated with only one area of contamination above cleanup levels that is not localized. Specifically, boron in monitoring well MW122 is indicative of contamination migrating from Yard 520. The other monitoring wells with Site-related contamination above cleanup levels appear to be localized and not posing a risk to human health. Long-term monitoring will test the accuracy of these findings and provide data for any potential necessary decision changes in the future.

Common Theme 23: Yard 520 Liners
One or more commenters commented on the liner material for Yard 520.

Response:
The south cell of Yard 520 was reported to have been constructed by keying in clay walls to the underlying clay strata. The north cell of Yard 520 was not reported to have been constructed in such a manner or with a bottom liner. Therefore, the north cell is assumed to be the primary source for contamination. Regardless, monitoring conducted under the remedial investigation would have detected any groundwater contamination from either cell of Yard 520, and the

[37] It is important to note cost would not by itself be the deciding factor in selecting a remedy if EPA found the more costly remedy would be more protective to human health and the environment, but is one of several factors that would be considered.

phytoremediation is to be located in the path of the only well outside of the landfill monitoring network from which groundwater samples exceed cleanup levels for site related contaminants.

Common Theme 24: Efficacy of Phytoremediation and Constructed Wetlands
One or more commenters expressed concerns with the efficacy of phytoremediation, and one commenter further suggested the use of constructed wetlands.

Response:
See EPA's response to Common Theme 20. EPA finds that phytoremediation will be of equivalent effectiveness to a more involved capture and control technology (the installation of a barrier wall with pump and treat technologies). EPA agrees that constructed wetlands would provide additional benefits to this area where historically wetlands have been drained and filled. However, EPA finds that the phytoremediation required by this ROD will adequately address the groundwater contamination at issue at the Site and that requiring construction or restoration of wetlands at the Site is not necessary to address the potential threats posed by the groundwater contamination.

Common Theme 25: Provision of Bottled Water Implies Site-related Contamination has affected these Properties.
One or more commenters asserted that the provision of bottled water services indicates that these properties were affected by Site-related groundwater contamination.

Response:
Out of an abundance of caution, bottled water service was provided to all residents within the Area of Investigation who did not receive municipal water service extensions. EPA now has investigative data that shows the Site-related contamination is not detected in groundwater for these properties above cleanup levels. Additionally, groundwater from Yard 520, the primary if not sole source of Site-related groundwater contamination, does not migrate towards properties at the Site that were not offered municipal water service. Therefore, there is no need to continue providing bottled water.

Common Theme 26: Phytoremediation Details
One or more commenters requested more details about the phytoremediation techniques to be employed.

Response:
The species of the plants and techniques to be used will be determined during the remedial design phase of the site cleanup. EPA will continue to conduct community outreach moving forward with site activities.

Common Theme 27: Superfund Alternative Status Allows for Poor Quality Submittals
One or more commenters expressed concern that the fact that the Site is a Superfund Alternative Site allows the Respondents to submit poor quality information.

Response:
EPA's oversight role at a Superfund Alternative Site is the same as that in connection with a Site led by responsible parties listed on the National Priorities List. The cleanup process and the Site oversight, management, data collection and verification procedures are all the same.

Common Theme 28: Contaminant Spread
One or more commenters expressed concern that Site-related contamination would spread, and that sampling of only those properties identified with coal ash fill materials is not enough.

Response:
EPA is requiring the sampling of all properties whose owners request it, regardless of any known or suspected coal ash fill materials. Even if no fill materials are visible, surface samples are collected and analyzed for Site-related contaminants.

Groundwater contamination from coal ash materials associated with the Site is very limited. The coal-ash derived groundwater contaminants are of limited solubility and the coal ash fill materials have been in place for more than 40 years. EPA expects that much of the flyash fill material will be removed under the removal action and, possibly, the remedial action. Regardless, the long term monitoring required by this ROD will allow EPA to detect whether fill materials are leading to previously unidentified areas of Site-related groundwater contamination above cleanup levels.

Common Theme 29: Life Expectancy of Geotextile Material
One or more commenters expressed concern that geotextile barriers are generally expected to only be effective for 30 years.

Response:
The geotextile fabric used to demarcate contaminated soils left at depth are only a visual indicator and are not serving as a barrier to prevent infiltration of liquids or other materials. EPA expects the geotextile fabric to remain visually apparent well after 30 years.

Comments from PRP Respondents with EPA Responses

Comment 1
Page 1, footnote 2
The definition provided should be clarified so a reader does not mistakenly interpret a low permeability unit or a confining unit as an aquifer to consist of a cave or lake below the ground surface and to include the characteristic of groundwater yield. We suggest rewording as follows:

An aquifer refers to a geologic unit below the ground that contains water (groundwater) and easily transmits water, for example, to wells ~~body of water located in the spaces below ground~~.

Response:
While EPA agrees that this would have been a more accurate definition in the proposed plan, the term "aquifer" is not defined again in the ROD.

Comment 2
Page 2, paragraph 2, sentence 1
The specific constituents of concern are also naturally-occurring elements and are only considered "contaminants" under specific conditions. As such, the term "contaminants" should be amended to "coal-ash-derived constituents" in this paragraph, consistent with the terminology in the approved FS.

Response:
While EPA agrees that the contaminants of concern for the Site can be naturally occurring, these metals are exceeding clean-up levels because they were introduced into the environment. Therefore, they are contamination.

Comment 3
Page 2, paragraph 3, sentence 1
This statement should clarify that coal ash is being remediated only where specific conditions exist. Specifically, we recommend the sentence be revised to read:

EPA is proposing the following soils cleanup plan for specific areas of the coal ash fill where the fill contains constituent concentrations above EPA's approved Remedial Cleanup Levels in the area of the Pines site.

Response:
EPA concurs that this change would have made the Proposed Plan statement more accurate. Though this statement is not found in the ROD, EPA believes that the ROD is clear that soil cleanups are only required where Site-related contamination is above cleanup levels and that the presence of coal ash in and of itself does not necessarily require a yard to be cleaned up.

Comment 4
Page 4, section 2003 AOC I to Address Drinking Water, paragraph 2, sentence 1
The use of coal ash as road bed and landscaping fill material within the Town of Pines was well-documented prior to installation of the MWSE. We recommend the term "discovered" be replaced with "confirmed" to accurately convey this information.

Response:
EPA concurs that the use of confirmed is a more accurate statement. This wording change was made to similar language in the ROD.

Comment 5
Page 4, section 2004 AOC II to Conduct RI/FS, paragraph 2
We recommend that a statement be added to reflect that the group was provided with two funding awards from the Respondents.

Response:
The proposed plan included a statement that a technical assistance plan agreement had been reached between P.I.N.E.S. and the PRP Respondents in April 2005. EPA did not intend to

include specific details about the funding of the agreement as part of the proposed plan nor is it included in this ROD.

Comment 6
Page 4, section 2016 Removal AOC to Address Coal Ash Fill, paragraph 1, sentence 1 and sentence 2
The use of the terms "contaminants" is not accurate in this context and should be replaced with "coal ash-derived constituents."

Response:
See response to Comment 2.

Comment 7
Page 5, section Hydrology, Geology, and Hydrogeology, paragraph 3
Groundwater elevations and flow patterns have been reviewed in detail. A copy of the technical memorandum, dated January 6, 2015, is attached for your reference.

Response:
EPA has previously reviewed this technical memorandum and concurs with the general finding that changes in the depth to the water table caused by the provision of municipal water to much of the Town of Pines (and subsequent cessation of private well usage) are insignificant compared to changes in precipitation levels. This is also addressed in EPA's response to Comment Theme 7 above.

Comment 8
Page 6, section Nature and Extent of Contamination, paragraph 1, sentence 1
This sentence, as stated, is not clear with respect to contaminants present in the Town of Pines groundwater that are not related to coal ash (see paragraph 9 of the Groundwater section of the Proposed Plan and the approved FS). We recommend the sentence be revised to state:

~~All~~ The contamination ~~associated with the site is~~ addressed in this proposed plan is derived from coal ash where constituents are present at concentrations above Remedial Cleanup Levels.

Response:
EPA agrees that this wording would have made the Proposed Plan clearer. EPA made similar changes to an equivalent sentence at the beginning of Section 12.A.2. of the ROD, though these changes are not identical to those suggested in this comment.

Comment 9
Page 6, section Nature and Extent of Contamination, paragraph 1, bullet 2
The definition of boiler slag is not correct. We recommend the definition be revised to state:

Boiler slag represents material that has been melted during combustion in cyclone boilers. It is collected at the base of the boilers and is quenched with water causing it to shatter into black, angular particles that have a smooth glassy appearance ~~accumulates on surfaces within the boiler and tends to be collected with the bottom ash~~.

Response:
EPA agrees that this is better definition of boiler slag and has changed the definition for the ROD (Section 12.A.2.).

Comment 10
Page 6, footnote 6
Groundwater flow rate depends on a combination of factors, only one of which is hydraulic conductivity. This sentence should be revised to state:

Hydraulic conductivity is a measure of the ~~rate at~~ ease with which groundwater travels in the aquifer.

Response:
EPA concurs that this is a more accurate definition of hydraulic conductivity and has corrected this definition in the ROD (footnote in Section 12.A.1.)

Comment 11
Page 7, table
We suggest adding a note to the table clarifying that the "Contaminants" listed are also naturally-occurring and are only of concern where the concentrations are above the USEPA-approved Remedial Cleanup Levels.

Response:
While EPA agrees that arsenic and thallium are naturally occurring, these two metals are present at elevated levels because of coal ash that was placed in soils, making them contaminants. EPA finds that a discussion of their natural occurrence would be misleading in this section. Note that their natural occurrence is addressed in the discussion of background concentrations.

Comment 12
Page 7, first paragraph following the table, sentence 2
This statement is incomplete and somewhat misleading. Properties that contained "coal ash fill materials" were identified during early stages of the Remedial Investigation.
Subsequent testing conducted during the Remedial Investigation revealed that elevated levels of coal ash-related contaminants were present on a few of those properties, indicating the type of fill on those properties are mainly fly ash, in contrast to the coal ash used as road base (and as fill on other properties), which is mainly bottom ash and boiler slag. In addition to the properties previously identified in the Remedial Investigation, 61 property owners requested that their properties be inspected and tested. Of those 61 properties, 12 were found to have coal ash fill materials present, but testing has shown that none have yet been found to contain coal ash requiring removal.

Response:
EPA agrees that the language in this statement in the Proposed Plan is not entirely clear, and reworded similar language found in Section 12.A.2.b. of the ROD.

Comment 13
Page 13, paragraph 2
The PRG and cancer risk level noted are incorrect. Per the FS, the PRG should be 4.3 ppm and the cancer risk level should be 10^{-5}.

Response:
EPA agrees that, in this case, the cleanup level should be set at the 10^{-5} risk level, per IDEM guidelines. EPA is setting the cleanup level for hexavalent chromium at 4.3 ppm, though it is still unclear if hexavalent chromium will remain a contaminant of concern as very limited hexavalent chromium data has been gathered to date.

Comment 14
Page 14, section "2) Soil Alternative 2 – Land Use Controls", bullets 1 through 3
These cost estimates are "per property." Clarifying notation should be added.

Response:
EPA agrees that this is an important clarification and has added it to the equivalent language in the ROD in Section 16.A.2.

Comment 15
Page 14, section "2) Soil Alternative 2 – Land Use Controls", bullet 5, sentence 2
The implementation schedule for this alternative will be subject to acceptance by property owners. The statement should be revised to state:

RAOs for other properties would be met upon acceptance of the restrictions from property owners ~~in approximately one year~~.

Response:
While EPA recognizes that acceptance by property owners is necessary for the implementation of the restrictive covenants, the burden of implementation of the restrictive covenants will fall upon the parties conducting the cleanup work. The suggested rewording is misleading in that it could be construed as passing that burden on to property owners. Therefore, EPA does not find necessary any revision to similar language found in the ROD. Discussion of the possibility of property owners refusing access is discussed in the Response to Common Theme 8.

Comment 16
Page 22, section Compliance with ARARs (under Soil Alternative 3)
Page 29, section Compliance with ARARs (under Soil Alternatives)
Soil Alternative 3 complies with ARARs, not just those specific to off-site disposal. The sentence should be revised to state:

Soil Alternative 3 complies with chemical-, location-, and action-specific ARARs ~~associated with the off-site disposal of contaminated soil~~.

Response:

EPA concurs with this added specificity and has made the change in the equivalent language in Section 17.A.2. of the ROD.

Comment 17
Page 23, section Compliance with ARARs (under Groundwater Alternative 1), sentence 2
MCLs are relevant and appropriate, but are not applicable, as outlined in Table 4 of the FS. Therefore, MCLs should not be cited as the chemical-specific ARAR. Rather, the applicable chemical-specific ARAR, IDEM Groundwater Quality Standards (327 IAC 2-11) should be cited.

Response:
This language is not found in the ROD. However, it should be noted that EPA would typically require restoration of a potable aquifer to MCLs even if the aquifer is not a public water supply because it would be relevant and appropriate to do so. Under CERCLA a requirement under federal or state law qualifies as an ARAR if it is "relevant and appropriate" or if it is "applicable". Further there can be more than a single chemical-specific ARAR. In such cases, the remedy would need to satisfy the most stringent of the chemical-specific ARARs. Safe Drinking Water Act MCLs are chemical specific ARARs for the groundwater.

Comment 18
Page 23, section Compliance with ARARs (under Groundwater Alternative 1), sentence 2
COC concentrations above PRGs are not found "throughout the Pines Site," but rather in "very small areas of the surficial aquifer," as stated on page 7 of the Proposed Plan.
Therefore, this phrase should be deleted.

Response:
EPA agrees that this statement could be seen as misleading and that the groundwater exceedances of PRGs (now selected cleanup levels) are limited to just three areas. This language is not in the ROD.

Comment 19
Page 24, section Compliance with ARARs (under Groundwater Alternative 2), sentence 2
Page 25, section Compliance with ARARs (under Groundwater Alternative 3), sentence 2
Page 26, section Compliance with ARARs (under Groundwater Alternative 4), sentence 2
As noted in comment 75, the IDEM Groundwater Quality Standards should be cited as the applicable chemical-specific ARAR.

Further, the addition of institutional controls that would prohibit the use of groundwater as a drinking water source would meet applicable ARARs specific to groundwater quality at points of use. We recommend the sentence be revised, consistent with the language in the approved FS, to state:

Chemical-specific ARARs ~~(Safe Drinking Water Act Maximum Contaminant Levels)~~ would ~~not~~ be met at points of use ~~throughout the Pines Site groundwater~~.

Response:

This language is not found in the ROD. However, EPA again notes that the RAO (and NCP goal) to restore the aquifer, which is a current source of drinking water, to drinking water quality makes drinking water standards (such as MCLs) relevant and appropriate. Limiting the installation of drinking water wells in areas not meeting cleanup levels is a temporary protective measure.

Comment 20
Page 28, section Compliance with ARARs (under Groundwater Alternative 5), paragraph 1
As noted in comment 75, the IDEM Groundwater Quality Standards should be cited as the applicable chemical-specific ARAR.

Response:
See responses to Comments 17 and 19.

Comment 21
Page 31, section Compliance with ARARs (under Groundwater Alternatives), sentence 1
As noted in the comments above, the statement regarding the alternatives' compliance with ARARs should be consistent with the summary in the approved FS. Therefore, this sentence should be revised to state:

Groundwater Alternatives 1, 2, and 3 would do nothing to enhance compliance with the chemical ARARs where they are not currently met within specific areas (note that there are currently no drinking water wells in these areas) ~~do not comply with ARARs as the groundwater is not restored to drinking water standards~~.

Response:
EPA has changed the equivalent language in the ROD to read that these alternatives do nothing to comply with chemical-specific ARARs in the areas currently above cleanup standards.

Comment 22
Page 34, section Ecological Monitoring
Ecological monitoring was not included as a component of the Feasibility Study as it was not necessary based on the results of the USEPA-approved Ecological Risk Assessment Report. It is understood that protection of the IDNL is a priority. This section should indicate that surface water sampling and analysis of Brown Ditch are included as a component of the Yard 520 monitoring program. If the results of the Brown Ditch monitoring indicate that surface water concentrations are at levels that would pose an ecological risk (evaluated in the context of the approved ecological risk assessment), additional actions will be discussed with EPA.

Response:
Though EPA did approve the screening level ecological risk assessment (SERA), the uncertainties in the SERA coupled with the details in the cleanup plan, have led EPA to determine that the monitoring of some ecological parameters will need to be conducted. EPA is not suggesting that duplicative monitoring be required if it determines that the necessary parameters are being monitored as part of the Yard 520 monitoring program.

Comment 23
Figures 1 through 4
For consistency, we recommend EPA use the figures from the approved FS, dated May 2016, rather than earlier versions.

Response:
EPA did pull these figures from an earlier version of the FS. However, as they did not change, EPA did not feel it was necessary to change them in the proposed plan. The most current versions are in the ROD.

Comment 24
Page 1, paragraph 4, line 2
IDNL's location is non-specific in this description and may be clarified as "about four miles west of Michigan City," consistent with USEPA's Pines web site.

Response:
EPA included more detail in the description of the site location in the ROD. This should allow readers to determine the location of the IDNL.

Comment 25
Page 1, paragraph 4, second bullet
The term "numerous" is non-specific and unnecessary to convey the information accurately; the term may be struck.

Response:
EPA agrees that the word "numerous" is unnecessary. Similar language is not found in the ROD.

Comment 26
Page 15, footnote 12
There is a typographic error in the phrase "... contamination about EPA's PRGs." The word "about" should be "above."

Response:
EPA concurs that this is a mistake. Similar language is not found in the ROD.

Comment 27
Page 27, The first sentence under "Implementability
"Phytoremediation" is misspelled – it is missing the "e"

Response:
EPA notes this mistake.

Table 1

Contaminants of Concern (COCs) and Selected Cleanup Levels

COC	Medium Contaminated	Selected Cleanup Level	Basis for Cleanup Level
Arsenic	Soil	30.1 ppm	95% UTL for the background dataset
Thallium	Soil	1.9 ppm	95% UTL for the background dataset
Lead	Soil	400 ppm	EPA's Integrated Exposure Uptake Biokinetic Model and the RSL
Hexavalent Chromium	Soil	4.3 ppm	Indiana's Default Risk-Based Screening Level based on a 10^{-5} Cancer Risk
Boron	Groundwater	4.0 mg/l	EPA's RSL based on a HQ of 1
Arsenic	Groundwater	0.10 mg/l	EPA's Drinking Water MCL
Molybdenum	Groundwater	0.10 mg/l	EPA's RSL based on a HQ of 1

Table 2

Receptors and Exposure Pathways Considered for the Human Health Risk Assessment

Receptor	Medium	Pathway
Resident (Adult and Child)		
	Surface Suspected CCBs	Incidental Ingestion Inhalation of Particulates Dermal Contact External Exposure to Gamma Radiation
	Groundwater (a)	Currently incomplete where municpal water or bottled water is supplied
	Sediment (b)	Incidental Ingestion Dermal Contact External Exposure to Gamma Radiation
	Surface Water (b)	Incidental Ingestion (c) Dermal Contact
	Produce	Ingestion (d)
	Fish Fillets	Ingestion (e)
Recreational Child		
	Surface Suspected CCBs	Inhalation of Particulates External Exposure to Ionizing Radiation
	Sediment	Incidental Ingestion Dermal Contact External Exposure to Gamma Radiation
	Surface Water	Incidental Ingestion (c) Dermal Contact
	Fish Fillets	Ingestion (e)
Recreational Fisher		
	Surface Suspected CCBs	Inhalation of Particulates External Exposure to Gamma Radiation
	Fish Fillets	Ingestion (e)
	Sediment	Incidental Ingestion (e) Dermal Contact (e) External Exposure to Gamma Radiation (e)
	Surface Water	Dermal Contact (e)
Construction/Utility Worker		
	Combined Surface and Subsurface Suspected CCBs	Incidental Ingestion Inhalation of Particulates Dermal Contact External Exposure to Gamma Radiation
	Groundwater	Incidental Ingestion Dermal Contact
Outdoor Worker		
	Surface Suspected CCBs	Incidental Ingestion Inhalation of Particulates Dermal Contact External Exposure to Gamma Radiation

Notes:
CCB - Coal Combustion By-Product.
(a) - Pathway potentially complete only in areas using private water wells under the current scenario: however, groundwater in areas serviced by private water wells has been shown not to be significantly impacted by CCBs, thus, this pathway has been determined not to be complete (see Section 6.4). Pathway could become complete in the future if private wells are installed in areas impacted by CCBs. Figure 16 indicates where groundwater concentrations exceed regulatory targets.
(b) - Potential risks for the residential child were included with the residential calculations. Potential risks for the adult were included with the Recreational Fisher and are added into the residential totals.
(c) - Ponds only, under the swimming scenario.
(d) - Pathway potentially complete where gardens exist in areas containing CCBs. See Appendix H (Produce) for evaluation of potential chemical risks.
(e) - Potential risks and hazards calculated for this pathway for the recreational child and recreational fisher will also be added to the residential receptor totals.

Table 3

Summary of the HHRA Findings for Site-related Risks from Groundwater

Well	Cancer Risk	Non-cancer Risk (HI)
MW106	NA	*
MW111	2.38E-04 (arsenic [2.38E-04])	8.39 (Manganese** [1.59] and Thallium [4.05])
MW122	2.56E-04 (arsenic [2.56E-04])	5.53 (Boron [2.79])

* After a reduction in the EPA tapwater risk-based screening level, molybdenum now poses a HI of greater than 1 at MW106.
**Manganese is identified in background wells at levels that pose an unacceptable risk

Table 4

Summary of COPECs Evaluated in the SLERA

	Brown Ditch Exposure Area							Pond Exposure Area				Terrestrial Exposure Area	
	Benthic Community		Aquatic Community (c)		Brown Ditch Aquatic Food Web (d)	Root Zone Exposure		Benthic Community	Aquatic Community (c)		Pond Exposure Area Aquatic Food Web (d)	Terrestrial Plant and Invertebrate Community (g)	
Constituent	Sediment (a)	Groundwater (b)	Surface Water-Dissolved	Surface Water-Total Recoverable		Sediment (e)	Groundwater (f)	Sediment (a)	Surface Water - Dissolved	Surface Water - Total Recoverable		Suspected CCBs	Terrestrial Food Web (h)
ALUMINUM	YES	YES	YES		YES		YES		YES	YES	YES		
ANTIMONY													
ARSENIC	YES				YES	YES	YES	YES			YES	YES	YES
BARIUM	YES	YES			YES			YES			YES	YES	YES
BERYLLIUM													
BORON	YES	YES		YES	YES	YES	YES			YES	YES	YES	YES
CADMIUM													
CALCIUM													
CHROMIUM						YES						YES	YES
CHROMIUM (HEXAVALENT)												YES	YES
COBALT												YES	YES
COPPER	YES				YES			YES			YES		
IRON	YES	YES		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
LEAD								YES			YES		
MAGNESIUM													
MANGANESE	YES	YES			YES	YES		YES	YES	YES	YES		
MERCURY													YES
MOLYBDENUM	YES				YES	YES						YES	YES
NICKEL	YES				YES			YES			YES	YES	YES
POTASSIUM													
SELENIUM	YES				YES	YES		YES			YES	YES	YES
SILICA													
SILICON													
SILVER													
SODIUM													
STRONTIUM	YES	YES			YES	YES	YES	YES			YES		
THALLIUM												YES	YES
URANIUM-TOTAL		YES											
VANADIUM	YES	YES			YES	YES		YES			YES	YES	YES
ZINC	YES				YES	YES		YES			YES		

Notes:
CCB - Coal Combustion By-Product.
COPEC - Constituent of Potential Ecological Concern.
ESV - Ecological Screening Value.
YES - Constituent was retained as a COPEC.
Blank cells within the table indicate these constituents were not included as chemicals of potential concern and will not be carried forward in the risk assessment for that specific media of concern.
(a) Sediment COPEC selection for Brown Ditch and Pond Exposure Area benthic community receptors presented in Table 4-1. Constituents retained after comparison to ESVs and background
(b) Groundwater COPEC selection for Brown Ditch benthic community receptors presented in Table 4-2. Constituents retained after comparison to surface water ESVs.
(c) Surface water COPEC selection for Brown Ditch and Pond aquatic community receptors presented in Table 4-3. Constituents retained after comparison to ESVs and background.
(d) COPECs retained for food web model were based on COPECs retained in sediment or total recoverable fraction of surface water.
(e) Sediment COPEC selection for root zone exposure presented in Table 4-4 Constituents retained after comparison to ESVs and background
(f) Groundwater COPEC selection for root zone exposure presented in Table 4-5. Constituents retained after comparison to phytotoxicity-based ESVs
(g) Suspected CCB COPEC selection for terrestrial plant and invertebrate community receptors presented in Table 4-6. Constituents retained after comparison to ESVs and background
(h) COPECs retained for food web model were based on COPECs retained in suspected CCBs Mercury retained due to status as Bioaccumulative Chemical of Concern (BCC) in 40 CFR 132.6 Table 6.

Figure 1

Town of Pines Site Area of Investigation

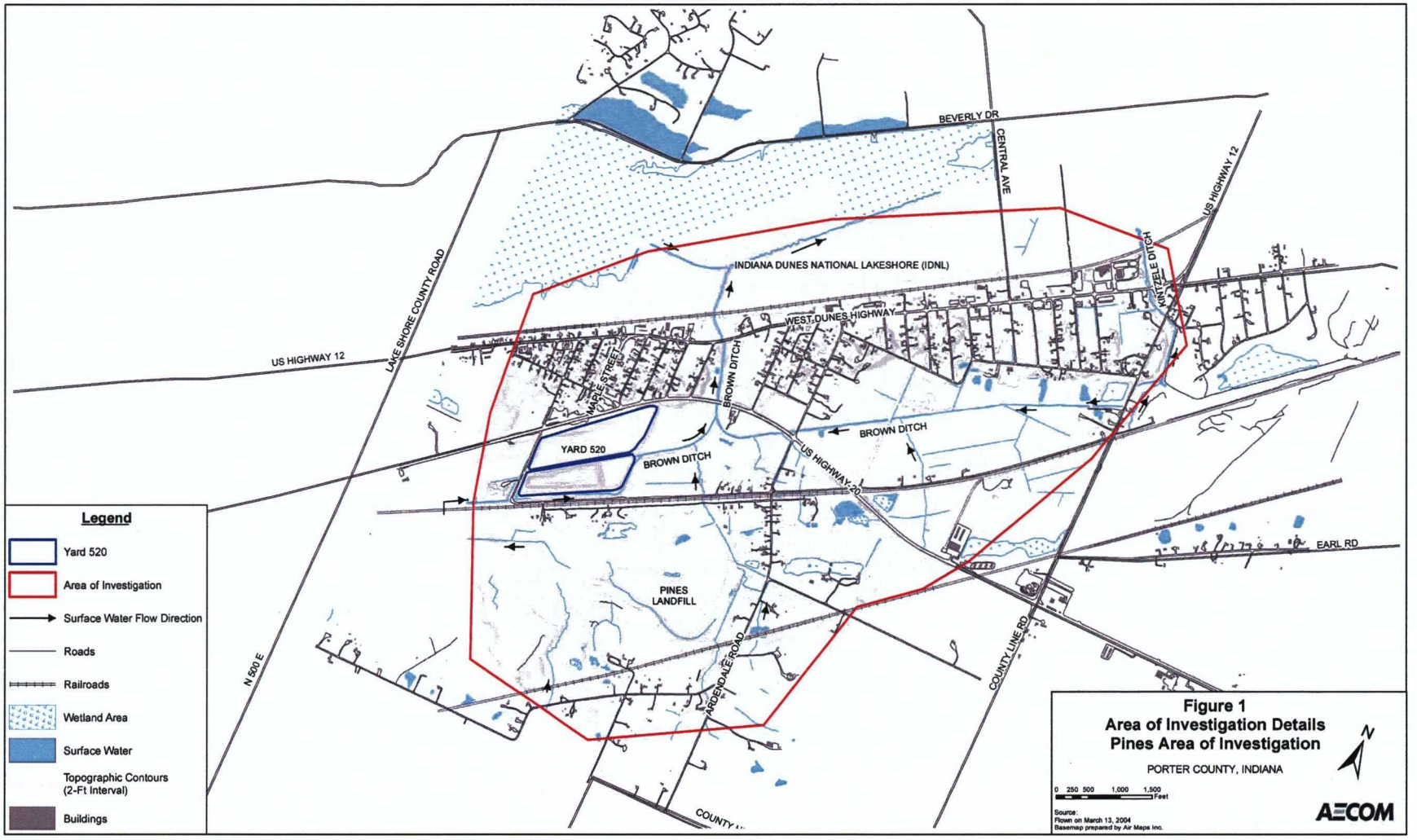


Figure 2

Town of Pines Site Area of Investigation Shown on a USGS Topographical Map

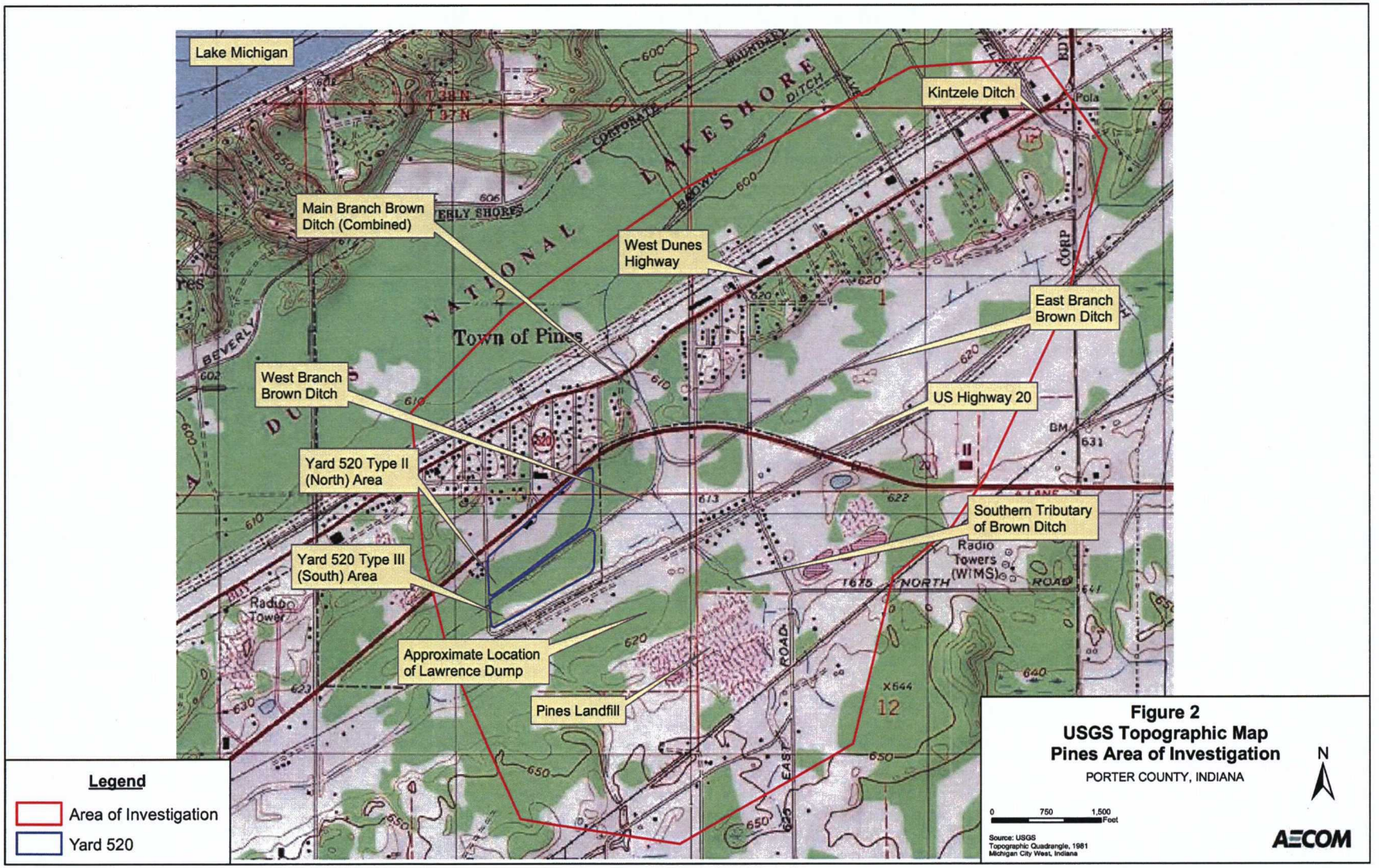


Figure 3

Town of Pines Site Groundwater Contour Map

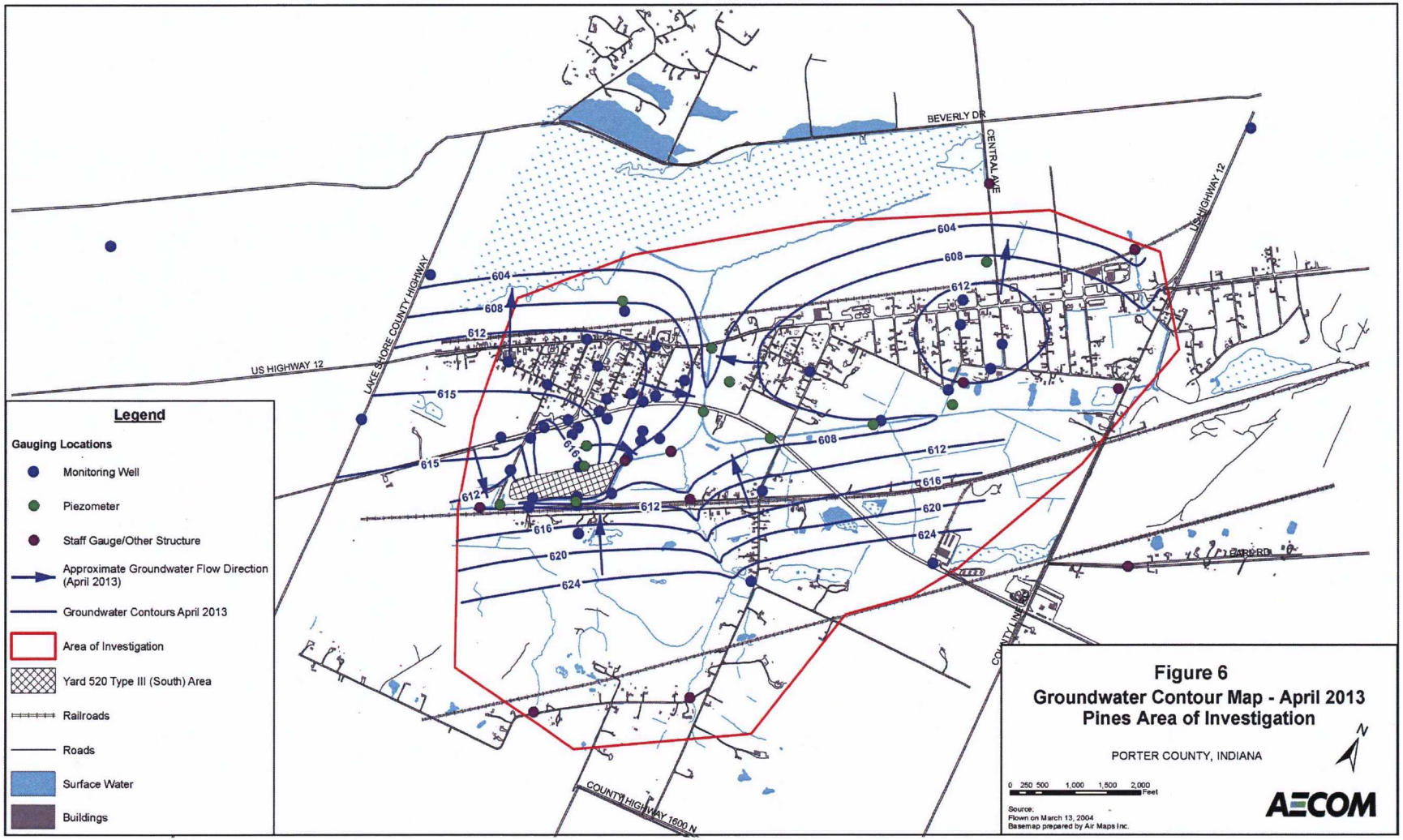
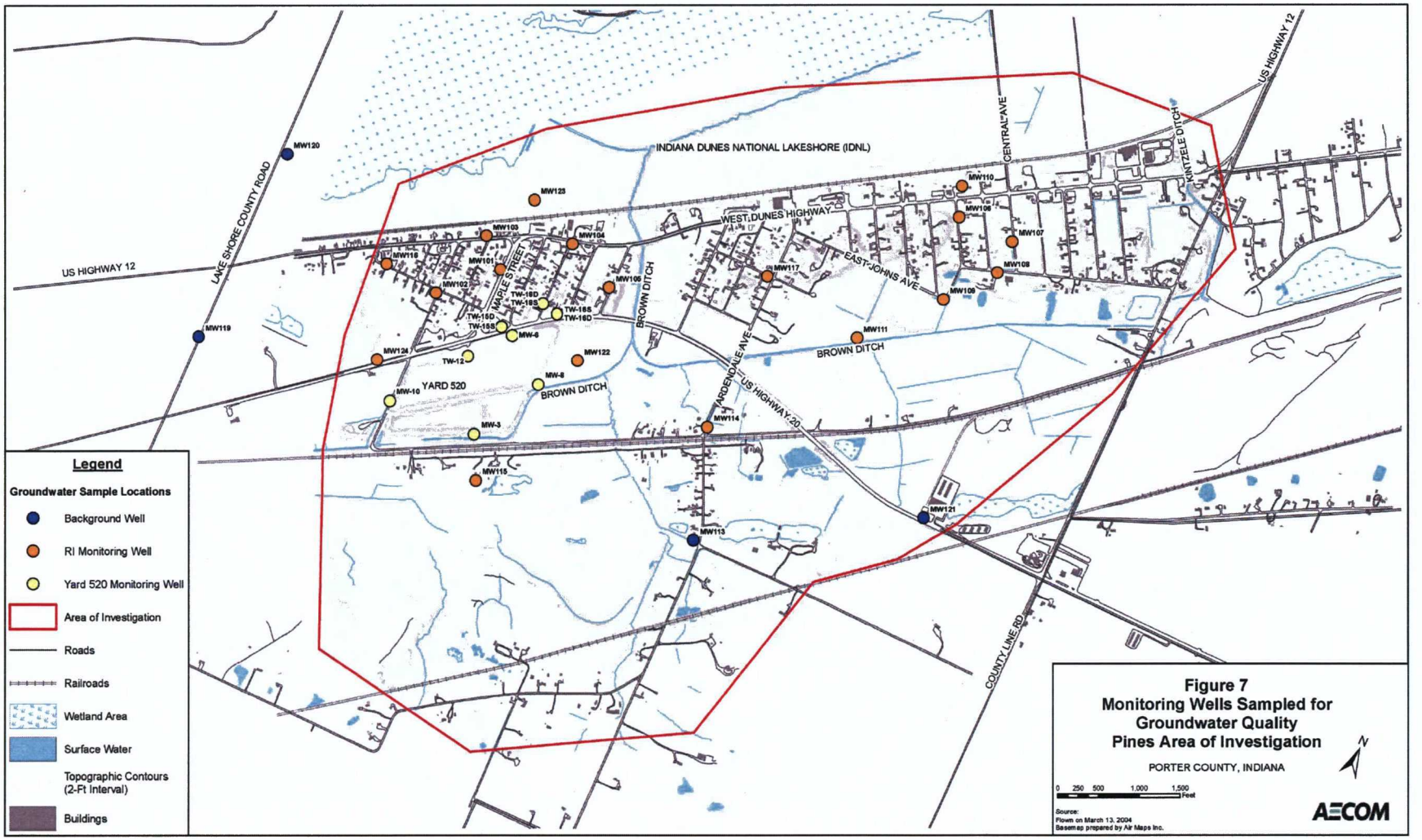


Figure 4

Groundwater Wells Associated with the Town of Pines Site



Appendix 1

Letter of Concurrence on Remedy from IDEM

Indiana Department of Environmental Management
We Protect Hoosiers and Our Environment.
100 N. Senate Avenue • Indianapolis, IN 46204
(800) 451-6027 • (317) 232-8603 • www.idem.IN.gov

Michael R. Pence
Governor

Carol S. Comer
Commissioner

August 29, 2016

Mr. Robert Kaplan
Acting Regional Administrator
U.S. EPA, Region V
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Dear Mr. Kaplan:

Re: Draft Record of Decision (ROD)
Town of Pines
Superfund Alternative Site
Town of Pines, Indiana

The Indiana Department of Environmental Management (IDEM) has reviewed the U.S. Environmental Protection Agency's draft Record of Decision (ROD) document for the Town of Pines Superfund Alternative site located in the Town of Pines, Indiana. IDEM is in full concurrence with the major components of the selected remedy outlined in the document which include the following:

- Excavation and off-site disposal of contaminated soil where coal ash-derived contamination is above EPA's selected clean-up levels;
- Restoration of excavated properties using clean backfill;
- Use of phytoremediation to remove site-related contaminants from ground water;
- Performance of long-term ground water monitoring to measure and demonstrate the effectiveness of the ground water remedy; and
- Implementation of Environmental Restrictive Covenants to legally restrict the installation of new drinking water wells in areas where coal ash–derived contamination is present.

IDEM staff agree that the selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. IDEM staff have been working closely with EPA Region V staff in the selection of an appropriate remedy and are satisfied with the selected alternative.

Please be assured that IDEM is committed to accomplish cleanup at all Indiana sites on the National Priorities List and intends to fulfill all obligations required by law to achieve that goal. We look forward to the beginning of remediation work on this project.

Sincerely,

Peggy Dorsey
Deputy Assistant Commissioner
Office of Land Quality

PD:DP:tr
cc: Bruce Oertel, IDEM
Rex Osborn, IDEM
Erik Hardin, EPA

Appendix 2

Letter from IDEM Listing Potential State ARARs for the Pines Site

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We Protect Hoosiers and Our Environment.
100 N. Senate Avenue • Indianapolis, IN 46204
(800) 451-6027 • (317) 232-8603 • www.idem.IN.gov
Michael R. Pence
Governor
Thomas W. Easterly
Commissioner

August 11, 2015

Mr. Erik Hardin
U.S. EPA, Region V
77 West Jackson Blvd.
Chicago, IL 60604
Mail Code: SR-6J

Dear Mr. Hardin:

Re: Applicable or Relevant and Appropriate Requirements (ARARs)
Town of Pines Superfund Alternative Site
Town of Pines, Indiana

In accordance with your request, Indiana Department of Environmental Management (IDEM) staff have determined the State's ARARs for the Remedial Action (RA) at the Town of Pines Superfund Alternative Site in the Town of Pines, Indiana based on the following potential activities to be performed at the site:

- Perform soil sampling to determine which yards will require remediation;
- Excavate site soils exceeding the remedial action levels to the necessary depth for off-site disposal;
- Transport and dispose off-site those soils excavated from the site;
- Place clean soil in yards requiring remediation, and then re-vegetate the yards.
- Perform groundwater sampling associated with Monitored Natural Attenuation (MNA).
- Perform the systematic planting of trees at the edge of Yard 520 for phytoremediation.
- Install a slurry wall along the eastern side of Yard 520, with a groundwater recovery system treating the collected ground water ex situ prior to discharge back to the groundwater or surface water.

IDEM staff recognize this list includes only potential Remedial Action activities, and that the site may require one or a combination of these activities to complete an action that is protective of human health and the environment. The following is a list of ARARs identified by IDEM as pertinent to the aforementioned remedial action activities proposed for the site:

Action Specific:

1. Pursuant to 326 IAC 6-4-2(4), visible fugitive dust must not cross an adjacent property line.
2. Pursuant to 326 IAC 6-4-4, any vehicle driven on any public right of way must not allow its contents to escape and form fugitive dust.
3. 312 IAC 10 regulates the construction, excavation, or filling within a floodway and would be applicable for such activities within the floodway of a stream or other flowing waterbody which has a drainage area of one square mile or greater.
4. If the remedial action will result in leaving contamination in place such that unrestricted land use is not permitted (i.e., residential land use remediation objectives are not achieved), an Environmental Restrictive Covenant (ERC) should be recorded for the property per Indiana Code (IC) 13-25-4-24.

Chemical Specific:

1. 329 IAC 3.1 regulates the management of hazardous wastes. Indiana rule 329 IAC 3.1-1-1 adopts RCRA regulations of 40 CFR 260 through 40 CFR 270. More specifically:

   - 40 CFR 262.11 (329 IAC 3.1-6) requires that a proper hazardous waste determination must be made on all wastes generated from remedial actions.

   - 40 CFR 262.12 (329 IAC 3.1-6) requires a generator of hazardous waste to obtain an EPA identification number before treatment, storage, disposal, or offering for transport.

   - All hazardous waste must be properly packaged, with labels, markings and placards, prior to transport (40 CFR 262.30, 262.31, 262.32, and 262.33)(329 IAC 3.1-7 and 329 IAC 3.1-8).

   - Hazardous waste stored onsite in containers for 90 days or less shall be managed in accordance with the standards of 40 CFR 265, Subpart I (329 IAC 3.1-10). Hazardous waste stored onsite in containers for greater than 90 days shall be managed in accordance with 40 CFR 264, Subpart I (329 IAC 3.1-9).

   - 40 CFR 261, Subpart B requires that hazardous waste must be manifested as such for transport to a permitted treatment, storage, or disposal facility (TSDF) in accordance with 40 CFR 262, Subpart B (329 IAC 3.1-7 and 329 IAC 3.1-8).

   - For all hazardous waste related equipment, remove or decontaminate all hazardous waste residues, contaminated containment components, contaminated soils, and structures and equipment contaminated with waste, and manage them as hazardous waste unless 40 CFR 261.3(d) applies.

   - Any excavated soils determined to be hazardous must not be placed back on the ground so as to create a waste pile as defined in 40 CFR 264, Subpart L. Covered roll-offs may be used.

- Hazardous waste destined for land disposal (as defined in 40 CFR 268.2) must meet the applicable Land Disposal Restrictions of 40 CFR 268.

2. 329 IAC 10 regulates the management of solid wastes.

   - 329 IAC 10-7.2-1 requires all wastes to undergo a waste determination, and if found to be nonhazardous, be disposed of in a permitted solid waste disposal facility.

3. 327 IAC 2-11 regulates groundwater quality impacts and would be relevant if private drinking water wells exist in the area of the remedial action. More specifically:

   - 327 IAC 2-11-2(e) states that no person shall cause the groundwater in a drinking water supply well to have a contaminant concentration that results in an exceedance of numeric criteria contained within the rule for drinking water class groundwater, creates a condition that is injurious to human health, creates an exceedance of specific indicator criteria levels contained within the rule, or renders the well unusable for normal domestic use.

4. In the event that the remedial option selected results in a direct discharge to a water of the State or a tributary thereof, the substantive requirements of 327 IAC 5, pertaining to the National Pollutant Discharge Elimination System (NPDES), would need to be followed.

Thank you for the opportunity to provide the State's ARARs. If you have any questions, or wish to discuss this matter further, please contact me at your convenience at (317) 234-7179.

Sincerely,

Douglas Petroff

Douglas Petroff, Project Manager
Federal Programs Section
Office of Land Quality

DP:rr
cc: Rex Osborn, IDEM

Appendix 3

Tables 4, 5, and 6 from the Pines Site Feasibility Study Report Listing Potential Chemical-, Location-, and Action-Specific ARARs for the Site

TABLE 4
SUMMARY OF CHEMICAL-SPECIFIC ARARS

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

Media	Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Surface Water	Surface Water Quality Standards 327 IAC 2-1.5	The State of Indiana has promulgated SWQS for surface waters within the Great Lakes System (327 IAC 2-1.5) and waters not within the Great Lakes System (327 IAC 2-1). Surface waters within the Pines Area of Investigation are within the Great Lakes System, thus 327 IAC 2-1.5 apply.	The State regulations state that the chemical, physical, and biological integrity of the waters within the Great Lakes system shall be maintained or restored; thus, the discharge of toxic substances in toxic certain amounts is prohibited, and persistent and bioaccumulating toxic substances shall be reduced or eliminated (these are further discussed below). Further, for all surface waters of the Great Lakes system, existing instream water uses and the level of water quality necessary to protect existing uses shall be maintained and protected. Because the State of Indiana has promulgated surface water standards, they replace the federal WQC as ARARs for surface water in the Pines Area of Investigation.	Applicable
Groundwater	Groundwater Quality Standards 327 IAC 2-11	These regulations provide groundwater protection to drinking-water and non-drinking-water wells and allow for the classification of groundwater. The rule states that all groundwater of the state shall be classified as "drinking water class" groundwater unless it is classified as "limited class" groundwater or "impaired drinking water class" groundwater. The regulations also provide qualitative and quantitative groundwater quality standards for compounds of concern.	Groundwater in the Pines Area of Investigation has not been classified as "limited class" or "impaired drinking water class"; so is considered a drinking water class groundwater. Thus, for the Pines Area of Investigation, the Indiana GQS are applicable to drinking-water and non-drinking-water wells in the Area of Investigation.	Applicable
Groundwater and Surface Water	NPDES and NPDES General Permit Rule 327 IAC 5 327 IAC 15	These regulations establish NPDES general permit rules for certain classes or categories of point source discharges by prescribing the policies, procedures, and technical criteria to operate and discharge under the requirements of a NPDES general permit rule.	These requirements will be met if a discharge from a groundwater treatment system is made to surface waters. However, it is noted that such a remedial action would be considered "on-site" as per the CERCLA On-Site Policy, and so only substantive requirements must be complied with to the maximum extent practicable.	Relevant and Appropriate
Groundwater	Safe Drinking Water Act MCLs 40 CFR Part 141 Subpart B (141.11 – 141.13)	MCLs are enforceable standards that regulate the concentration of specific organic and inorganic constituents, radionuclides, and other contaminants that have been determined to adversely affect human health in public drinking water supplies. They may be considered relevant and appropriate for groundwater aquifers potentially used for drinking water.	MCLs are only applicable where groundwater undergoing a CERCLA cleanup is delivered through a public water supply system, if that system has at least 15 service connections or serves at least 25 year-round residents. Groundwater in the Area of Investigation is tapped by some households for potable use (other households have access to a municipal water supply). However, groundwater is typically tapped for potable use on an individual basis, and, no well serves more than 25 year-round residents. Thus the federal MCLs are not applicable. MCLs are potentially relevant and appropriate for groundwater this is a current or potential source of drinking water (USEPA, 1991a). Groundwater in the Pines Area of Investigation is considered by the State of Indiana a drinking water class groundwater; thus, the federal MCLs are relevant and appropriate.	Relevant and Appropriate

TABLE 4
SUMMARY OF CHEMICAL-SPECIFIC ARARS

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

Media	Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Groundwater, Soil, and Sediment	Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings 40 CFR §192.12	This statute was established to protect human health and the environment from mining and milling activities associated with the nation's nuclear program at 24 sites that were identified by name in the statute.	While these regulations are only applicable to the control of residual radioactive material at designated processing or depository sites under Section 108 of UMTRCA, USEPA has suggested (and provided guidance) where these criteria should be considered relevant and appropriate at other CERCLA sites. These regulations identify a standard of 5 pCi/g above background for use in assessing the combined levels of Ra-226 and Ra-228. Further, these regulations state that if either uranium-234 or uranium-238 is a constituent of concern in groundwater that is current or potential sources of drinking water, and the site is not a Title I UMTRCA site, then the uranium UMTRCA standard of 30 pCi/L is a potentially relevant and appropriate requirement. http://www.epa.gov/superfund/health/contaminants/radiation/pdfs/umtrcaqu.pdf	Relevant and Appropriate
Groundwater and Soil	USEPA RSL for Chemical Constituents at Superfund Sites, June 2015	RSLs are developed by the USEPA using risk assessment guidance from the USEPA Superfund program. They are risk-based concentrations derived from standardized equations combining exposure information assumptions with USEPA toxicity data. RSLs are generic; they are calculated without site-specific information. They may be re-calculated using site-specific data.	An RSL is typically used for initial site "screening". An RSL is not a de facto cleanup standard and should not be applied as such. The role of an RSL in site "screening" is to help identify areas, constituents, and conditions that require further attention at a particular site. Generally, where a constituent concentration falls below an RSL, no further action or study is warranted under the Superfund program. A constituent concentration above an RSL would not automatically call for a response action. RSLs have been included as a TBC criterion for the Pines Area of Investigation, in the consideration of establishing RAOs.	To Be Considered
Soil	IDEM Remediation Closure Guide, March 2012, Updated July 2012	The Remediation Closure Guide is a non-rule policy document intended to clarify for the public IDEM's interpretation of relevant environmental statutes and rules. It does not have the effect of law. The Remediation Closure Guide became effective on March 22, 2012. It is a revision of the 2001 RISC Technical Resource Guidance Document.	The Remediation Closure Guide is a non-rule policy document, which means that it does not have the force and effect of law and is not an ARAR for the Pines Area of Investigation. It is classified only as a TBC criterion. The Closure Guide provides soil direct contact screening levels for several exposure scenarios. As stated in the Guide, "A comparison....of [exposure point concentrations]...derived from site analytical data against appropriate screening levels is usually the first step when evaluating potential exposure risk. Appropriate screening levels depend on the likely exposure scenario."	To Be Considered
Groundwater, Soil, and Sediment	Hazardous Waste Management 329 IAC 3.1	This regulation establishes hazardous waste management programs for Indiana consistent with federal RCRA Subtitle C regulations, including applicable sections of 40 CFR 260-270 (see Action-Specific ARARs for additional details).	These regulations, along with their federal counterpart, establish requirements for identifying any hazardous wastes that may be generated in the course of the remedial action. Further, if an alternative involves the off-site transportation of hazardous wastes, the material must be managed and shipped/transported in accordance with these regulations.	Applicable

TABLE 4
SUMMARY OF CHEMICAL-SPECIFIC ARARS

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

Media	Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Groundwater, Soil, and Sediment	Hazardous Waste Determination 329 IAC 10-7.2-1	This regulation provides generator responsibilities for waste information. Specifically, a person who generates a solid waste is required to carry out the hazardous waste determination required by 40 CFR Part 262, which is incorporated by reference at 329 IAC 3.1.	Remediation alternatives that involve soil excavation or generation of other remediation wastes will include a determination of whether the wastes generated are hazardous or non-hazardous. If the wastes are determined to be non-hazardous, they may be disposed at a permitted disposal facility, per this regulation.	Applicable

Acronyms and Abbreviations:

ARAR – Applicable or Relevant and Appropriate Requirements

CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act

CFR – Code of Federal Regulations

GQS – Groundwater Quality Standards

IAC – Indiana Administrative Code

IDEM – Indiana Department of Environmental Management

MCL – Maximum Contaminant Level

pCi/g – PicoCuries per gram

RSL – Regional Screening Level

SWQS – Surface Water Quality Standard

TBC – To Be Considered

UMTRCA – Uranium Mill Tailings Radiation Control Act

USEPA – United States Environmental Protection Agency

WQC – Water Quality Criteria

AECOM

TABLE 5
SUMMARY OF LOCATION-SPECIFIC ARARS

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

Media	Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Wetlands	Fish and Wildlife Coordination Act Regulations 33 CFR Part 320.3 (16 USC 661 et seq.)	Requires that the U.S. Fish and Wildlife Services and National Marine Fisheries Service be consulted prior to structural modification of any stream or other water body (e.g., wetland). It also requires adequate protection of fish and wildlife resources, and consultation with state agencies to develop measures to prevent, mitigate, or compensate for project-related losses to fish and wildlife.	If wetlands within the Area of Investigation are subject to investigation or remediation activities, then these regulations may apply. A proposed action would have to show that "no practicable alternative exists" to the work proposed, and construction activities will be conducted in such a manner to mitigate impacts to fish and wildlife resources. Relevant federal and state agencies must be provided with the engineering design and/or work plan for the proposed action for review prior to implementation of the work.	Relevant and Appropriate
Wetlands	Clean Water Act Guidelines for Specification of Disposal Sites for Dredged or Fill Material CWA Section 404(b)(1) 40 CFR Part 230	These guidelines apply to all existing, proposed, or potential disposal sites for discharges of dredged or fill material into U.S. waters (including wetlands). A discharge is not allowed if there is a practicable alternative that would have a less adverse impact on the aquatic ecosystem. Also, a discharge is not allowed unless appropriate and practicable steps are taken to minimize potential adverse impacts on the aquatic ecosystem. These guidelines must be met before a CWA Section 404 permit can be issued. These guidelines also include specifications for compensatory mitigation.	If a remedial action for the Area of Investigation requires the discharge of dredged or fill material into a wetland, or the excavation of material from a wetland, and there is no practicable alternative that would have a less adverse impact on the aquatic ecosystem, the remedial action would have to minimize potential adverse impacts to the aquatic ecosystem and any adverse impacts would have to be mitigated.	Applicable to actions that may involve the discharge of dredged materials to a wetland or the excavation of material from a wetland
Wetlands	CWA Section 401 Water Quality Certification	These regulations provide for the state Water Quality Certification as per Section 401 of the CWA. These regulations cover dredging, filling, excavation and placement of structures in all wetlands, tidal waters, and navigable freshwaters.	If wetlands within the Area of Investigation are subject to investigation or remediation activities, and CWA Section 404 applies, then a Section 401 WQC must be obtained from IDEM.	Applicable
Water	CWA Section 404	These regulations provide the Federal wetlands and navigable waters regulatory program, which is administered by the USACE. It covers dredging, filling, excavation and placement of structures in all wetlands, tidal waters, and navigable freshwaters. Issuance of these permits requires compliance with Section 401 WQC (of which the IDEM has been given the authority to implement), and compliance with the Federal Endangered Species Act and Section 106 of the National Historic Preservation Act (Historic and Archaeological Features).	If wetlands within the Area of Investigation are subject to investigation or remediation activities, then these regulations would apply. The investigation or remedial actions would be considered "on-site" as per the CERCLA On-Site Policy, and so only substantive requirements must be complied with to the maximum extent practicable. A proposed action must show that "no practicable alternative exists" to the work being proposed, and that any construction activities will be conducted in such a manner to mitigate impacts and minimize harm to the wetlands.	Relevant and Appropriate

AECOM

TABLE 5
SUMMARY OF LOCATION-SPECIFIC ARARS

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

Media	Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Floodplains	Flood Control Act and Flood Plain Management Rule 312 IAC 10	These requirements regulate certain activities within the floodway produced by the regulatory flood. The "regulatory flood" is equivalent to the base flood or the 100-year frequency flood. "Floodway" means "the channel of a river or stream and those portions of the flood plains adjoining the channel that are reasonably required to efficiently carry and discharge the peak flow of the regulatory flood of any river or stream." These regulations are intended to control and minimize the extent, height, and force of potential floods. Regulated activities include vegetation clearing in buffers, and the placement of structures within the floodway, flood fringe, or flood plain.	Projects or portions of projects are not subject to Indiana regulation if a waterway's drainage area at the downstream end of the project site is less than one square mile (640 acres), or if the total length of the stream or drain is less than or equal to 10 miles. If these regulations apply, impacts against the following criteria should be reviewed: 1) whether or not the project will adversely affect the efficiency of, or unduly restrict the capacity of, the floodway; 2) whether or not the project will constitute an unreasonable hazard to the safety of life or property; and 3) whether or not the project will result in unreasonably detrimental effects upon fish, wildlife, or botanical resources.	Potentially applicable
Floodplains	Indiana Drainage Code IC 36-9-27 Section 53.5	Section 53.5 states that if a reconstruction or maintenance project is subject to regulation under the Indiana Flood Control Act, or if it requires a permit under Section 404 of the federal CWA, the county surveyor or drainage board shall request an on-site field review of the project. The on-site field review is conducted by one or more staff representatives from the county, the IDNR, including one engineer each from the Division of Water, IDEM, and the local Soil and Water Conservation District, if applicable.	If floodplains within the Area of Investigation are subject to investigation or remediation activities, then these regulations may apply.	Potentially applicable
Endangered Species	Endangered Species Act 50 CFR 17	These regulations provide for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The U.S. Fish and Wildlife Service maintains the list of endangered and threatened species. These regulations prohibit any action, administrative or real, that results in a "taking" of a listed species, or adversely affects habitat.	If endangered or threatened species are present within areas that may be subject to investigation or remediation activities, then these regulations may apply. Precautions to prevent impacts to identified habitats would be imposed during investigation or remediation activities.	Applicable

AECOM

TABLE 5
SUMMARY OF LOCATION-SPECIFIC ARARS

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

Media	Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Endangered Species	Non-Game and Endangered Species Conservation IC 14-22-34	These regulations provide for the conservation of threatened and endangered plants and animals and the habitats in which they are found. These regulations prohibit any action, administrative or real, that results in a "taking" of a listed species, or adversely affects habitat.	If endangered or threatened species are present within areas that may be subject to investigation or remediation activities, then these regulations may apply. Precautions to prevent impacts to identified habitats would be imposed during investigation or remediation activities.	Potentially Applicable

Acronyms and Abbreviations:

ARAR – Applicable or Relevant and Appropriate Requirements.
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
CFR – Code of Federal Regulations
CWA – Clean Water Act
IAC – Indiana Administrative Code
IC – Indiana Code
IDEM – Indiana Department of Environmental Management
IDNR – Indiana Department of Natural Resources
USACE – United States Army Corps of Engineers
USC – United States Code
WQC – Water Quality Certification

TABLE 6
SUMMARY OF ACTION-SPECIFIC ARARS

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

AECOM

Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Federal Regulatory Requirements			
Fish and Wildlife Coordination Act Regulations 33 CFR Part 320.3 (16 USC 661, et seq.)	Requires that the U.S. Fish and Wildlife Services and National Marine Fisheries Service be consulted prior to structural modification of any stream or other water body (e.g., wetland). It also requires adequate protection of fish and wildlife resources, and consultation with state agencies to develop measures to prevent, mitigate, or compensate for project-related losses to fish and wildlife.	If a remedy includes excavation of material from a wetland or construction of extraction wells or treatment system components (e.g. piping) in the wetlands, these regulations are relevant and appropriate. Such activities would be necessary to meet Remedial Action Objectives (RAOs), and thus, no practicable alternative to this construction exists. Such a remedy would be considered "on-site" as per the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) On-Site Policy, and so only substantive requirements must be complied with to the maximum extent practicable. Any excavation or construction activities under such a remedy will be conducted in a manner to mitigate impacts to fish and wildlife resources. Relevant federal and state agencies will be provided with the engineering design and/or work plan for the proposed action for review prior to implementation of the work.	Relevant and Appropriate
Clean Water Act (CWA) National Pollutant Discharge Elimination System (NPDES) 40 CFR Parts 122 and 125	These regulations establish discharge limitations, monitoring requirements, and best management practices for any direct discharge from a point source, such as a treatment system, into surface waters, including wetlands.	These requirements will be met if a discharge from a groundwater treatment system is made to surface waters.	Applicable

TABLE 6
SUMMARY OF ACTION-SPECIFIC ARARS

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

AECOM

Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
CWA Section 404	These regulations provide the Federal wetlands and navigable waters regulatory program, which is administered by the U.S. Army Corps of Engineers. It covers dredging, filling, excavation and placement of structures in all wetlands, tidal waters, and navigable freshwaters. Issuance of these permits requires compliance with Section 401 Water Quality Certification (WQC) (of which the Indiana Department of Environmental Management or IDEM has been given the authority to implement), and compliance with the Federal Endangered Species Act and Section 106 of the National Historic Preservation Act (Historic and Archaeological Features).	If a remedy includes excavation of material from a wetland or construction of extraction wells or treatment system components (e.g. piping) in the wetlands, these regulations are relevant and appropriate. Such activities would be necessary to meet RAOs, and thus, no practicable alternative to this construction exists. Such a remedy would be considered "on-site" as per the CERCLA On-Site Policy, and so only substantive requirements must be complied with to the maximum extent practicable. Any excavation or construction activities under such a remedy will be conducted in a manner to mitigate impacts and minimize harm to the wetlands.	Relevant and Appropriate
CWA Section 401 Water Quality Certification	These regulations provide for the state Water Quality Certification as per Section 401 of the CWA. These regulations cover dredging, filling, excavation and placement of structures in all wetlands, tidal waters, and navigable freshwaters.	If wetlands within the Area of Investigation are subject to remediation activities, and CWA Section 404 applies, then a Section 401 WQC must be obtained from IDEM.	Applicable
Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) 40 CFR Part 141 Subpart B (141.11 – 141.13)	MCLs are enforceable standards that regulate the concentration of specific organic and inorganic contaminants that have been determined to adversely affect human health in public drinking water supplies. They may be considered relevant and appropriate for groundwater aquifers potentially used for drinking water.	MCLs are potentially relevant and appropriate for groundwater this is a current or potential source of drinking water (USEPA, August 1991, PB 9234.2-15/FS). Groundwater in the Pines Area of Investigation is considered by the State of Indiana a drinking water class groundwater; thus, the federal MCLs are relevant and appropriate. MCLs will be met if a discharge from a groundwater treatment system is made to groundwater.	Relevant and Appropriate
SDWA Underground Injection Control 40 CFR 124, 144, 146, 148	These regulations establish minimum program and performance standards for underground injection programs. Technical criteria and standards for siting, operation, maintenance, reporting, and recordkeeping are included, as well as provisions for protection of underground sources of drinking water.	Discharge of treated water, by well injection, must be in accordance with all criteria and standards in these regulations. Treated groundwater must meet all SDWA standards for reinjection prior to well injection. In Indiana, the UIC Program is administered by the US Environmental Protection Agency (EPA) in accordance with these regulations for Class I, III, IV and V wells.	Applicable

TABLE 6
SUMMARY OF ACTION-SPECIFIC ARARS

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

AECOM

Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Resource Conservation and Recovery Act (RCRA) Identification and Listing of Hazardous Waste 40 CFR 261	This rule defines those solid wastes that are subject to regulation as hazardous waste under 40 CFR Parts 262-265.	These regulations establish requirements for identifying any hazardous wastes that may be generated in the course of the remedial action. If a remedial alternative involves the excavation of soil or generation of other remediation wastes, a determination of whether the wastes are hazardous or non-hazardous will be made.	Applicable
RCRA Standards Applicable to Generators of Hazardous Waste 40 CFR 262	These regulations establish standards for generators of hazardous waste that address waste accumulation, preparation for shipment, and completion of the uniform hazardous waste manifest.	If an alternative involves generation of hazardous wastes, the generator will have an EPA generator ID number prior to treatment, storage, disposal, or transporting the wastes. If an alternative involves the off-site transportation of hazardous wastes, the material must be managed, manifested, packaged, labeled, and placarded in accordance with these regulations.	Applicable
RCRA Standards Applicable to Transporters of Hazardous Waste 40 CFR 263	These regulations establish procedures for transports of hazardous waste with the US if the transportation requires a manifest under 40 CFR Part 262.	If an alternative involves the off-site transportation of hazardous wastes, the waste must be shipped/transported in accordance with these regulations. Further, if a remedial alternative involves the management of hazardous waste, the equipment used to excavate or manage hazardous wastes will be decontaminated and the removed residue will be managed as hazardous, unless 40 CFR Part 261.3(d) applies.	Applicable
RCRA Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities – Use and Management of Containers 40 CFR 264, Subpart I	These regulations apply to owners and operators that store containers of hazardous waste.	If a remediation alternative includes excavating soil or generating other remediation wastes, and that waste is determined to be hazardous per 40 CFR Part 261, the waste will not be placed back on the ground so as to create a waste pile as defined by 40 CFR Part 264, Subpart I. If a remediation alternative includes excavating soil or generating other remediation wastes, and that waste is determined to be hazardous per 40 CFR Part 261, and that hazardous waste is managed in a container, and the container is being stored on the site for greater than 90 days, the container will be managed in accordance with 40 CFR 264 Subpart I.	Applicable

TABLE 6
SUMMARY OF ACTION-SPECIFIC ARARS

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

AECOM

Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
RCRA Interim Status Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities – Use and Management of Containers, 40 CFR 265, Subpart I	These regulations provide minimum national standards that define the acceptable management of hazardous waste during the period of interim status and until certification of final closure or until post-closure responsibilities are fulfilled.	If a remediation alternative includes excavating soil or generation of other remediation wastes, and that waste is determined to be hazardous per 40 CFR Part 261, and that hazardous waste is managed in a container, and the container is being stored on the site for less than 90 days, the container will be managed in accordance with 40 CFR 265 Subpart I.	Applicable
RCRA Land Disposal Restrictions 40 CFR 268	These regulations define hazardous wastes that are restricted from land disposal and defines those limited circumstances under which an otherwise prohibited waste may continue to be land disposed.	If a remediation alternative includes excavating soil that is determined to be hazardous per 40 CFR Part 261, the waste will be managed in accordance with these land disposal requirements.	Applicable
Clean Air Act National Primary and Secondary Ambient Air Quality Standards 40 CFR 50	This rule provides emission standards, which are promulgated to attain the National Ambient Air Quality Standards, and monitoring requirements.	Engineering controls are required to reduce emissions associated with excavation and transportation as needed to maintain ambient air quality standards.	Relevant and Appropriate

TABLE 6
SUMMARY OF ACTION-SPECIFIC ARARS

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

AECOM

Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
State Regulatory Requirements			
Surface Water Quality Standards 327 IAC 2-1.5	The State of Indiana has promulgated Surface Water Quality Standards for surface waters within the Great Lakes System (327 IAC 2-1.5) and waters not within the Great Lakes System (327 IAC 2-1). Surface waters within the Pines Area of Investigation are within the Great Lakes System, thus 327 IAC 2-1.5 apply. Because the State of Indiana has promulgated surface water standards, they replace the federal Water Quality Criteria as applicable or relevant and appropriate requirements for surface water in the Pines Area of Investigation.	If a remedy includes discharge of treated water to surface water, these standards apply. This rule states that the chemical, physical, and biological integrity of the waters within the Great Lakes system shall be maintained or restored; thus, the discharge of toxic substances in certain amounts is prohibited, and persistent and bioaccumulating toxic substances shall be reduced or eliminated. Further, for all surface waters of the Great Lakes system, existing instream water uses and the level of water quality necessary to protect existing uses shall be maintained and protected.	Applicable
Groundwater Quality Standards 327 IAC 2-11	These regulations provide groundwater protection to wells and allow for the classification of groundwater. The rule states that all groundwater of the state shall be classified as "drinking water class" groundwater unless it is classified as "limited class" groundwater or "impaired drinking water class" groundwater. The regulations also provide qualitative and quantitative groundwater quality standards for compounds of concern. Groundwater in the Pines Area of Investigation has not been classified as "limited class" or "impaired drinking water class"; so is considered a drinking water class groundwater.	If a remedy includes the discharge of treated water to groundwater, these standards apply.	Applicable

TABLE 6
SUMMARY OF ACTION-SPECIFIC ARARS

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

AECOM

Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Wastewater Treatment Facilities 327 IAC 3	This regulation prescribes policies, procedures, and technical criteria for the construction of water pollution treatment/control facilities. Per 3-1-2, "water pollution treatment/control facility" means any equipment, device, unit, or structure at a site that is used to control, prevent, pretreat, or treat any discharge or threatened discharge of pollutants into any waters of the state of Indiana including public or private sewerage systems.	If a remedy includes the construction of a treatment system for extracted groundwater, this rule would apply. However, it is noted that such a remedial action would be considered "on-site" as per the CERCLA On-Site Policy, and so only substantive requirements must be complied with to the maximum extent practicable.	Applicable
NPDES and NPDES General Permit Rule 327 IAC 5 327 IAC 15	These regulations establish NPDES general permit rules for certain classes or categories of point source discharges by prescribing the policies, procedures, and technical criteria to operate and discharge under the requirements of a NPDES general permit rule.	These requirements will be met if a discharge from a groundwater treatment system is made to surface waters or for stormwater discharges associated with construction or soil excavation activities. However, it is noted that such a remedial action would be considered "on-site" as per the CERCLA On-Site Policy, so only substantive requirements must be complied with to the maximum extent practicable.	Relevant and Appropriate
Water Well Drilling Requirements 312 IAC 12-3-1	This regulation establishes standards for the installation of water wells.	The remedial alternatives being evaluated may require installation of water wells (such as extraction wells). This rule provides construction standards for water wells drilled in unconsolidated aquifers.	Applicable
Water Well Driller Licensing Requirements 312 IAC 13	This regulation provides for licensing of water well drillers.	Installation of water wells (such as extraction wells) may be required under the selected remedy.	Applicable
Classification of Underground Injection Wells 329 IAC 3.1-10-3	This rule provides definitions for the classes of underground injection wells.	If a remedy includes injection of treated groundwater via well, such a well would be a Class V well per this rule. Indiana regulates the Underground Injection Control Program for Class II wells; otherwise, EPA administers the program for Class I, III, IV and V wells under the SDWA.	Applicable

TABLE 6
SUMMARY OF ACTION-SPECIFIC ARARS

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

AECOM

Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Hazardous Waste Management 329 IAC 3.1	This regulation establishes hazardous waste management programs for Indiana consistent with federal RCRA Subtitle C regulations.	These regulations, along with their federal counterpart, establish requirements for identifying any hazardous wastes that may be generated in the course of the remedial action. Further, if an alternative involves the off-site transportation of hazardous wastes, the material must be managed and shipped/transported in accordance with these regulations.	Applicable
Hazardous Waste Determination 329 IAC 10-7.2-1	This regulation provides generator responsibilities for waste information. Specifically, a person who generates a solid waste is required to carry out the hazardous waste determination required by 40 CFR Part 262, which is incorporated by reference at 329 IAC 3.1.	Remediation alternatives that involve soil excavation or generation of other remediation wastes will include a determination of whether the wastes generated are hazardous or non-hazardous. If the wastes are determined to be non-hazardous, they may be disposed at a permitted disposal facility, per this regulation.	Applicable
Solid Waste Land Disposal Facilities Restricted Waste Sites Waste Criteria 329 IAC 10-9-4	329 IAC Article 10 establishes solid waste management programs for Indiana consistent with federal RCRA Subtitle D regulations. Specifically, 329 IAC 10-9-4 provides regulations for Restricted Waste Sites (RWS), which includes the regulation of the landfill disposal of coal ash (CCBs).	For remediation alternatives that involve off-site disposal of CCBs or soil with concentrations of CCB-derived COCs exceeding the PRGs, which are determined to be non-hazardous, the receiving facility should be in compliance with these regulations.	Applicable
Solid Waste Land Disposal Facilities Restricted Waste Site Closure and Post Closure Monitoring 329 IAC 10-30 and 10-31 (Type II) 329 IAC 10-38(Type III)	329 IAC Articles 30, 31, and 38 provide Closure and/or Post Closure Requirements for Type II and Type III RWS.	Yard 520 is a permitted, closed RWS facility regulated by IDEM and subject to IDEM Regulations for RWS. Yard 520 is in compliance with applicable IDEM regulations, including groundwater impact regulations. Remediation alternatives that involve disturbance and/or repair of the landfill cap should comply with these regulations. The on-going Post-Closure Monitoring activities (which are considered a component of the baseline conditions in this evaluation) should also be performed in accordance with these regulations.	Applicable

TABLE 6
SUMMARY OF ACTION-SPECIFIC ARARS

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

AECOM

Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Indiana Air Quality Standards 326 IAC 6-4-2, 6-4-4	This rule provides emission standards, which are promulgated to attain the Indiana Ambient Air Quality Standards, and monitoring requirements.	Engineering controls are required to reduce emissions associated with excavation and transportation as needed to maintain ambient air quality standards. Pursuant to 326 IAC 6-4-2, visible fugitive dust must not cross an adjacent property line. Pursuant to 326 IAC 6-4-4, any vehicle driven on any public right of way must not allow its contents to escape in the form of fugitive dust.	Relevant and Appropriate
Restrictive Covenants Indiana Code 13-25-4-24	This law applies to real property on which a hazardous substance has been deposited, stored or disposed and that is or was listed on CERCLIS.	Remediation alternatives that do not achieve residential land use remediation objectives will require an Environmental Restrictive Covenant to be recorded on the property.	Applicable
Flood Control Act and Flood Plain Management Rule 312 IAC 10	These requirements regulate certain activities within the floodway produced by the regulatory flood. The "regulatory flood" is equivalent to the base flood or the 100-year frequency flood. "Floodway" means "the channel of a river or stream and those portions of the flood plains adjoining the channel that are reasonably required to efficiently carry and discharge the peak flow of the regulatory flood of any river or stream." These regulations are intended to control and minimize the extent, height, and force of potential floods. Regulated activities include vegetation clearing in buffers, and the placement of structures within the floodway, flood fringe, or flood plain.	Projects or portions of projects are not subject to Indiana regulation if a waterway's drainage area at the downstream end of the project site is less than one square mile (640 acres), or if the total length of the stream or drain is less than or equal to 10 miles. If these regulations apply, impacts against the following criteria should be reviewed: 1) whether or not the project will adversely affect the efficiency of, or unduly restrict the capacity of, the floodway; 2) whether or not the project will constitute an unreasonable hazard to the safety of life or property; and 3) whether or not the project will result in unreasonably detrimental effects upon fish, wildlife, or botanical resources.	Potentially applicable

TABLE 6
SUMMARY OF ACTION-SPECIFIC ARARS

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

AECOM

Requirement	Requirement Synopsis	Action to be Taken to Attain Requirement	Status
Acronyms and Abbreviations: CCB – Coal Combustion By-product CERCLA – Comprehensive Environmental Response, Compensation and Liability Act CFR – Code of Federal Regulations CWA – Clean Water Act USEPA – US Environmental Protection Agency IDEM – Indiana Department of Environmental Management MCL – Maximum Contaminant Level NPDES – National Pollutant Discharge Elimination System RAO – Remedial Action Objective RCRA – Resource Conservation and Recovery Act RWS – Restricted Waste Site SDWA – Safe Drinking Water Act WQC – Water Quality Certificate			

Appendix 4

Tables 22 and 23 from the Pines Site Feasibility Study Report, Comparative Analysis of Soil and Groundwater Remedial Alternatives

AECOM

TABLE 22
COMPARATIVE ANALYSIS OF SOIL REMEDIAL ALTERNATIVES

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

Evaluation Criterion	Soil Alternative 1 No Action	Soil Alternative 2 Land Use Controls	Soil Alternative 3 Excavation & Off-Site Disposal
THRESHOLD CRITERIA			
Overall Protection of Human Health and the Environment	Not protective at specific properties where CCB-derived constituents are above PRGs, as identified during Supplemental Soil Characterization.	Not protective at specific properties identified during the Supplemental Soil Characterization with CCB-derived COC above PRGs at depths where exposure could reasonably be expected to occur unless a surficial barrier (e.g., soil/vegetation, pavement) is in place and can be expected to remain in place/be maintained.	Protective.
Criterion (Pass or Fail)	Fail	Fail	Pass
Compliance with ARARs	Does not comply with ARARs at specific properties identified during the Supplemental Soil Characterization with CCB-derived COC above PRGs at depths where exposure could reasonably be expected to occur.	Does not comply with ARARs at specific properties identified during the Supplemental Soil Characterization with CCB-derived COC above PRGs at depths where exposure could reasonably be expected to occur.	Complies with ARARs.
Criterion (Pass or Fail)	Fail	Fail	Pass
BALANCING CRITERIA			
Long-Term Effectiveness and Permanence	Ineffective at specific properties where CCB-derived COCs are above PRGs, as identified during the Supplemental Soil Characterization.	Ineffective at specific properties where CCB-derived COCs are above PRGs in surface soil, as identified during the Supplemental Soil Characterization. Effective and permanent, provided that deed restrictions are maintained and complied with.	Soil excavation is effective and permanent; soil cover and deed restriction components would be permanent and effective provided that they are maintained and complied with.
Criterion Score (1-5)	1	3	5

TABLE 22
COMPARATIVE ANALYSIS OF SOIL REMEDIAL ALTERNATIVES

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

Evaluation Criterion	Soil Alternative 1 No Action	Soil Alternative 2 Land Use Controls	Soil Alternative 3 Excavation & Off-Site Disposal
Reduction of Toxicity, Mobility, and Volume (TMV) Through Treatment	Does not reduce TMV.	Does not reduce TMV.	Reduces mobility at the remediated property via excavation/placement of a soil cover; toxicity and volume are not reduced because no treatment is conducted.
Criterion Score (1-5)	1	1	3
Short-Term Effectiveness	Effective; no worker or public impacts during implementation, as there is no construction element of this alternative. Does not provide any short-term risk reduction.	Effective; no worker or public impacts during implementation, as there is no construction element of this alternative. Is immediately effective upon implementation.	Moderately effective; implementation of excavation could extend over a period of months depending on areas identified during the property sampling. Worker risks associated with excavation include moderate dermal contact, inhalation, and ingestion of dust. Risks are controllable. Community impacts associated with dust, noise, traffic. Risk reduction at treated properties is immediate upon implementation.
Criterion Score (1-5)	1	5	3
Implementability	Easy	Easy to Moderate	Easy to Moderate; excavation on private and/or public properties; heavy equipment and traffic; possible interference with buried or surficial features are limiting factors.
Criterion Score (1-5)	5	3	2
Estimated Unit Future Cost (Present-Worth)	$ 0	$13,000 [1]	$11,000 [2]
Criterion Score (1-5)	5	3	2

TABLE 22
COMPARATIVE ANALYSIS OF SOIL REMEDIAL ALTERNATIVES

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

Evaluation Criterion	Soil Alternative 1 No Action	Soil Alternative 2 Land Use Controls	Soil Alternative 3 Excavation & Off-Site Disposal
ADDITIONAL CRITERIA			
Green and Sustainable Remediation	Sustainable; no action.	Sustainable; only administrative actions.	Not a sustainable option during excavation phase: heavy equipment, off-site disposal. Sustainable in the long-term, no additional actions after implementation.
Criterion Score (1-5)	5	5	3
Alternative Total Score	NA Fails protectiveness and compliance with ARARs criteria for specific properties identified during the Supplemental Soil Characterization	NA Fails protectiveness and compliance with ARARs criteria for specific properties identified during the Supplemental Soil Characterization	NA This is the only alternative that passes the threshold criteria of protectiveness and compliance with ARARs.

Notes:

The Threshold Criteria are evaluated on a pass/fail basis. An alternative must pass both threshold criteria in order to be considered as a remedial action. Alternatives that fail either threshold criterion are marked as "not applicable" (NA) for the alternative total score.

Balancing and Additional Criteria are scored on a scale of 1-5, with 1 being the least favorable and 5 being the most favorable.

Rank is based on overall score for each alternative, with 1 indicating the most favorable.

As the Supplemental Soil Characterization work is on-going, the alternatives are assessed based on property sampling data obtained as of September 2015.

[1] The cost for this alternativerepresents a unit cost for obtaining the necessary land use controls for 1 assumed typical residential property.

[2] The cost for this alternative represents a unit cost for removing soil from one yard unit that is approximately 1,076 square feet (100 m2) to a depth of 18 inches, hauling the excavated material to an off-site disposal facility, backfilling with clean soil material/ fill from a local borrow source, and grass seeding. If residual soils remain in place after excavation, then Soil Alternative 2 costs would also apply. A 1-acre lot may be comprised of up to 40 100 m² units.

Acronyms and Abbreviations:

ARAR – Applicable or Relevant and Appropriate Requirements

CCB – Coal Combustion By-products

COC – Constituents of Concern

NA – Not Applicable

PRG – Preliminary Remediation Goal

TMV – Toxicity, Mobility, and Volume

TABLE 23
COMPARATIVE ANALYSIS OF GROUNDWATER REMEDIAL ALTERNATIVES

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

Evaluation Criterion	Groundwater Alternative 1 No Action	Groundwater Alternative 2 Land Use Controls	Groundwater Alternative 3 Long-Term Monitoring	Groundwater Alternative 4 Phytoremediation	Groundwater Alternative 5 Barrier Wall
Overall Protection of Human Health and the Environment	Protective	Protective	Protective	Protective	Protective
Criterion Score (Pass or Fail)	Pass	Pass	Pass	Pass	Pass
Compliance with ARARs	Does not comply with chemical-specific ARARs	Complies with ARARs.	Complies with ARARs.	Complies with ARARs.	Complies with ARARs
Criterion Score (Pass or Fail)	Fail	Pass	Pass	Pass	Pass
Long-Term Effectiveness and Permanence	No long-term effectiveness or permanence.	Effective and Permanent	Effective and Permanent; see Groundwater Alternative 2; also requires long term groundwater monitoring.	Effective and Permanent; see Groundwater Alternative 3.	Effective and Permanent; see Groundwater Alternative 3; may interfere with natural processes, if occurring, that may be reducing TMVs outside Yard 520; also requires long-term O&M and performance monitoring.
Criterion Score (1-5)	1	3	4	5	4

TABLE 23
COMPARATIVE ANALYSIS OF GROUNDWATER REMEDIAL ALTERNATIVES

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

Evaluation Criterion	Groundwater Alternative 1 No Action	Groundwater Alternative 2 Land Use Controls	Groundwater Alternative 3 Long-Term Monitoring	Groundwater Alternative 4 Phytoremediation	Groundwater Alternative 5 Barrier Wall
Reduction of Toxicity, Mobility, and Volume (TMV) Through Treatment	Does not reduce TMV.	See Groundwater Alternative 1; Groundwater Ordinance does not reduce TMV..	See Groundwater Alternative 2; Monitoring does not reduce TMV, but documents TMV reductions, if they occur naturally.	Reduces TMV. Estimated mass reduction at 30 years: 10-20%.	Reduces TMV; may interfere with natural processes, if occurring, that may be reducing TMVs outside Yard 520. Estimated mass reduction at 30 years: 10-20%.
Criterion Score (1-5)	1	1	1	3	3
Short-Term Effectiveness	Effective; no worker or public impacts during implementation, as there is no construction element of this alternative. Does not control against potential groundwater use in areas where CCB-derived COCs are above PRGs. .	Effective; no additional actions except administrative filings. Residual risk associated with potential groundwater use is addressed upon implementation.	Effective; no additional actions except administrative filings and monitoring. See Groundwater Alternative 2.	Effective; no limited short term risk associated with grading and plantings. See also Groundwater Alternative 3.	Limited effectiveness; significant construction activities; increased potential for CCB-derived COCs migration during construction. See also Groundwater Alternative 3.
Criterion Score (1-5)	3	4	5	4	3

TABLE 23
COMPARATIVE ANALYSIS OF GROUNDWATER REMEDIAL ALTERNATIVES

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

Evaluation Criterion	Groundwater Alternative 1 No Action	Groundwater Alternative 2 Land Use Controls	Groundwater Alternative 3 Long-Term Monitoring	Groundwater Alternative 4 Phytoremediation	Groundwater Alternative 5 Barrier Wall
Implementability	Easy	Easy to Moderate	Easy to Moderate	Moderate	Difficult; construction on closed landfill; construction in proximity to Town of Pines infrastructure, wetlands, and private properties; limited effectiveness of available boron treatment technologies.
Criterion Score (1-5)	5	4	4	3	1
Estimated Future Cost (Present-Worth)	$0	$868,000	$2,477,000	$3,660,000	$14,700,000
Criterion Score (1-5)	5	4	3	3	1
Green and Sustainable Remediation	Sustainable.	Sustainable; no additional actions other than maintenance and limited monitoring.	Sustainable; no additional actions other than maintenance and monitoring, and possible installation of a limited number of monitoring wells.	Sustainable; limited additional actions; low-impact energy, waste, and water demands.	Not a sustainable option during construction phase: heavy equipment, off-site disposal. Moderate sustainability for O&M component: requires electrical energy consumption, some process waste.
Criterion Score (1-5)	5	5	5	5	1

TABLE 23
COMPARATIVE ANALYSIS OF GROUNDWATER REMEDIAL ALTERNATIVES

PINES AREA OF INVESTIGATION
FEASIBILITY STUDY

AECOM

Evaluation Criterion	Groundwater Alternative 1 No Action	Groundwater Alternative 2 Land Use Controls	Groundwater Alternative 3 Long-Term Monitoring	Groundwater Alternative 4 Phytoremediation	Groundwater Alternative 5 Barrier Wall
Alternative Total Score	NA Fails Compliance with ARARs Criterion	21	22	23	13
Overall Rank		3	2	1	4

Notes:

The Threshold Criteria are evaluated on a pass/fail basis. An alternative must pass both threshold criteria in order to be considered as a remedial action. Alternatives that fail either threshold criterion are marked as "not applicable" (NA) for the alternative total score.

Balancing and Additional Criteria are scored on a scale of 1-5, with 1 being the least favorable and 5 being the most favorable.

Rank is based on overall score for each alternative, with 1 indicating the most favorable.

Acronyms and Abbreviations:

ARAR – Applicable or Relevant and Appropriate Requirements

NA – Not Applicable

O&M – Operation and Maintenance

PRG – Preliminary Remediation Goal

TBD – To Be Determined (following completion of Property Sampling and USEPA approval of PRGs and BTVs)

TMV – Toxicity, Mobility, and Volume

Appendix 5

Administrative Record Index

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION

ADMINISTRATIVE RECORD
FOR THE
PINES GROUNDWATER CONTAMINATION SITE
TOWNSHIP OF PINES, PORTER COUNTY, INDIANA

ORIGINAL
JUNE 21, 2001
SEMS ID: 179938

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	179939	2/1/01	Atkinson, H., IDEM	Nachowicz, L., U.S. EPA	Letter re: IDEM's Request for U.S. EPA Assistance to Conduct a Removal Assessment for the Town of Pines	1
2	926445	5/30/01	Tetra Tech EM, Inc.	U.S. EPA	Letter Report for the Pines Groundwater Site (Analytical Results for VOCs, SVOCs and Metals Attached) ***(Privacy information has been redacted)***	123
3	179941	6/21/01	Theisen, K., U.S. EPA	Karl, R., U.S. EPA	Action Memorandum re: Request for an Emergency Removal Action at the Pines, Indiana Groundwater Contamination Site (Signed) ***(Redacted)***	9

UPDATE 1
AUGUST 8, 2002
SEMS ID: 179934

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	179935	1/7/02	U.S. EPA	File	Tables: Sampling Data for the Pines, Indiana Groundwater Contamination Site	4
2	179937	8/8/02	Theisen, K., U.S. EPA	Karl, R., U.S. EPA	Action Memorandum re: Request for a Second Emergency Removal Action at the Pines, Indiana Groundwater Contamination Site (Signed) (Redacted)	9

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
3	926446	12/30/02	Tetra Tech EM, Inc.	U.S. EPA	Final Site Investigation Report for the Groundwater Contamination Site in the Township of Pines ***(Privacy information has been redacted)***	251

UPDATE 2
APRIL 13, 2006
SEMS ID: 249418

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	255857	1/1/84	U.S. Geological Survey	File	Shallow Groundwater Flow and Drainage Characteristics of the Brown Ditch Basin Near the East Unit, Indiana Dunes National Lakeshore 1982	28
2	255858	1/1/94	U.S. Geological Survey	File	Hydrogeology and Hydrochemistry of Dunes and Wetlands Along the Southern Shore of Lake Michigan	20
3	926449	6/30/01	IDEM	U.S. EPA	Integrated Assessment Report (PA/SI Equivalent) for the Town of Pines Groundwater Plume Site Volume I ***(Portions of this document have been redacted)***	79
4	255861	6/30/01	IDEM	U.S. EPA	Integrated Assessment Report (PA/SI Equivalent) for the Town of Pines Groundwater Plume Site Volume II ***(Portions of this document have been redacted)***	549
5	339528	6/14/02	U.S. Dept. of Health and Human Services/ATSDR	U.S. EPA	Health Consultation for the Town of Pines Groundwater Plume Site	24
6	926450	12/7/02	IDEM	U.S. EPA	Expanded Site Inspection Report for the Town of Pines Groundwater Plume Site Volume I ***(Portions of this document have been redacted)***	389
7	255863	12/7/02	IDEM	U.S. EPA	Expanded Site Inspection Report for the Town of Pines Groundwater Plume Site Volume II	579

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
8	171789	1/24/03	U.S. EPA	Respondents	Administrative Order by Consent (V-W-03-C-730) for the Town of Pines Groundwater Contamination (Signed)	33
9	255864	2/9/03	Severn Trent Laboratories	Indiana Dunes National Lakeshore	Indiana Dunes National Lakeshore Drinking Well Locations (Analytical Report Attached)	229
10	207481	5/4/04	U.S. EPA	Respondents	Administrative Order by Consent (V-W-04-C-784) for the Town of Pines Groundwater Contamination (Signed)	47
11	926447	5/4/04	U.S. EPA	Respondents	Amendment to the Administrative Order by Consent (V-W-03-C-730) for the Town of Pines Groundwater Contamination Site (Signed) ***(Portions of this document have been redacted)***	9
12	255865	10/19/04	ENSR International	U.S. EPA	Municipal Water Service Extension Sampling and Analysis Plan for the Pines Area of Investigation	165
13	255866	1/4/12	Tetra Tech EM Inc.	U.S. EPA	Final Community Involvement Plan for the Town of Pines Groundwater Plume Site	25
14	255867	1/1/05	ENSR International	U.S. EPA	Site Management Strategy for the Pines Area of Investigation Volume I Main Text	97
15	255868	5/4/05	ENSR International	U.S. EPA	Technical Assistance Plan for the Pines Area of Investigation	107
16	255869	2/9/05	ENSR International	U.S. EPA	Yard 520 Sampling and Analysis Plan for the Pines Area of Investigation	568
17	253861	9/16/05	ENSR International	U.S. EPA	RI/FS Study Work Plan for the Pines Area of Invetigation Volume 1 Work Plan Overview	168

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
18	926448	9/16/05	ENSR International	U.S. EPA	RI/FS Study Work Plan for the Pines Area of Invetigation Volume 2 Field Sampling Plan ***(Portions of this document have been redacted***	375
19	253863	9/16/05	ENSR International	U.S. EPA	RI/FS Study Work Plan for the Pines Area of Invetigation Volume 3 QAPP	729
20	253864	9/16/05	ENSR International	U.S. EPA	RI/FS Study Work Plan for the Pines Area of Invetigation Volume 4 Health and Safety Plan	103
21	253865	9/16/05	ENSR International	U.S. EPA	RI/FS Study Work Plan for the Pines Area of Invetigation Volume 5 Human Health Risk Assessment Work Plan	99
22	253866	9/16/05	ENSR International	U.S. EPA	RI/FS Study Work Plan for the Pines Area of Invetigation Volume 6 Ecological Risk Assessment Work Plan	72
23	253867	9/16/05	ENSR International	U.S. EPA	RI/FS Study Work Plan for the Pines Area of Invetigation Volume 7 Quality Management Plan	114

UPDATE 3
MAY 12, 2015
SEMS ID: 915361

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	925620	1/12/95	Weaver Boos Consultants, Inc.	File	Clay Barrier Wall CQA Report	12
2	171789	1/24/03	Muno, W., U.S. EPA	Northern Indiana Public Service Company, et al.	Administrative Order by Consent VW-03-C-730 (Signed)	33
3	207481	5/4/04	Karl, R., U.S. EPA	Northern Indiana Public Service Company, et al.	Administrative Order on Consent for Remedial Investigation/Feasibility Study	47
4	207610	5/4/04	Karl, R., U.S. EPA	Northern Indiana Public Service Company, et al.	Amendment to Administrative Order on Consent for Groundwater Removal Action (Signed)	9

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
5	926442	4/13/04	Marilyn M. Jones & Associates, Ltd.	U.S. EPA	Transcript of Public Meeting for the Town of Pines Superfund Site ***(Privacy information has been redacted)***	95
6	925618	4/20/04	Severn Trent Laboratories	Town of Pines Resident	Analytical Report- Brown Ditch	18
7	339498	7/28/04	Rundio, L., McDermott, Will, & Emery	Theissen, K., U.S. EPA	Final Report Town of Pines Groundwater Remedial Action AOC V-W-03-C-730 (With Cover Letter Attached)	7
8	926418	12/8/04	Weaver Boos Consultants, Inc.	File	Supplemental Closure and Post Closure Plan	55
9	255867	1/1/05	ENSR	File	Site Management Strategy Volume 1 Main Text	97
10	926443	1/1/05	ENSR	File	Site Management Strategy Volume 2 Appendices ***(Privacy information has been redacted)***	459
11	926426	1/18/05	ENSR	Brown, Inc.	RI/FS Work Plan Volume 3 QAPP	674
12	919291	5/4/05	U.S. EPA	File	Technical Assistance Plan	99
13	926427	5/23/05	ENSR	Brown, Inc.	RI/FS Work Plan Volume 3 QAPP Revision 1	727
14	926423	3/6/05	ENSR	Brown, Inc.	QAPP Yard 520 Sampling and Analysis Plan	458
15	925619	7/20/05	ENSR	File	Summary of Changes Made to the May 23, 2005 Submittal of the Yard 520 SAP and RI/FS Work Plan	7
16	926424	2/9/05	ENSR	Brown, Inc.	QAPP Yard 520 Sampling and Analysis Plan Revision 1	458
17	926380	9/14/05	ENSR	U.S. EPA	Municipal Water Service Extension Sampling and Analysis Plan	236
18	253863	9/16/05	ENSR	U.S. EPA	Remedial Investigation/Feasibility Study Work Plan- Volume 3 QAPP	729

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
19	926378	11/30/05	ENSR	U.S. EPA	Remedial Investigation/Feasibility Study Work Plan- Pines Area of Investigation AOC II Docket No. V-W-04-C-784 Addendum to Volume 4 Health and Safety Plan	7
20	926377	2/5/06	U.S. EPA	File	MWSE SAP Validated Sample Results for Arsenic	2
21	926428	9/8/06	ENSR	Brown, Inc.	RI/FS Work Plan Volume 3 QAPP Revision 3	143
22	926417	10/6/10	Perry, E., ENSR	Drexler, T., U.S. EPA and K. Herron, IDEM	Memo re: Groundwater Monitoring Program	5
23	925616	2/16/07	Archer, C. and D. Mitchell, ENSR	Drexler, T. and E. Karecki, U.S. EPA	Memo re: Evaluation of Ecological Screening Levels and Risk Values for Boron in Surface Water	6
24	926407	2/16/07	Archer, C. and D. Mitchell, ENSR	Drexler, T. and E. Karecki, U.S. EPA	Memo re: Uranium Screening Levels	2
25	925621	2/16/07	Archer, C. and D. Mitchell, ENSR	Drexler, T. and E. Karecki, U.S. EPA	Memo re: Dioxin/Furan Screening Levels	5
26	926416	7/3/07	Perry, A., ENSR	Drexler, T., U.S. EPA and K. Herron, IDEM	Memo re: Proposed Adjustments to Field Sampling Plan	4
27	926393	6/25/07	Perry, A., ENSR	Drexler, T. and E. Karecki, U.S. EPA	Technical Memo re: Work Plan, Groundwater Flow Modeling	6
28	926434	7/27/10	U.S. EPA	File	Yard 520 Landfill Photographs	4
29	919282	7/31/07	ENSR	File	Town of Pines Groundwater Superfund Site Chemical Analysis Data	234
30	925609	8/24/07	Perry, A., ENSR	Drexler, T., U.S. EPA and K. Herron, IDEM	Memo re: Information about Origins of CCBs Pines Area of Investigation	1
31	926386	9/18/07	Perry, A., ENSR	Drexler, T., U.S. EPA and K. Herron, IDEM	Technical Memo re: Revised Work Plan, Groundwater Flow Modeling	37
32	926388	9/18/07	Perry, A., ENSR	Drexler, T., U.S. EPA and K. Herron, IDEM	Memo re: Response to Comments on Groundwater Flow Modeling Work Plan	4

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
33	925607	10/18/07	Krowitz, L., ENSR	Bradley, L., ENSR	Memo re: Data Validation Radiological Analyses Yard 520 Pines Area of Investigation	17
34	926403	10/22/07	Spindler, K., IDEM	Herron, K., IDEM	Memo re: Revised Groundwater Modeling QAPP and Response to Comments	4
35	926387	4/7/12	Perry, A., ENSR	Drexler, T., U.S. EPA and K. Herron, IDEM	Technical Memo re: Revision 1 Work Plan, Groundwater Flow Modeling	40
36	926404	4/7/12	Perry, A., ENSR	Drexler, T., U.S. EPA and K. Herron, IDEM	Memo re: Response to Comments on Groundwater Flow Modeling Work Plan	6
37	925608	2/21/08	Perry, A., ENSR	Drexler, T., U.S. EPA and K. Herron, IDEM	Memo re: Results of Additional Soil Sampling for Arsenic Pines Area of Investigation	2
38	926429	3/31/08	ENSR	Brown, Inc.	RI/FS Work Plan Volume 3 QAPP Revision 4	798
39	926425	4/18/08	ENSR	Brown, Inc.	QAPP Yard 520 Sampling and Analysis Plan Revision 2	505
40	926385	8/8/10	Perry, A., ENSR	Drexler, T., U.S. EPA and K. Herron, IDEM	Draft Technical Memo re: Discussion of Hydrogeologic Conditions In and Around Yard 520	8
41	925615	5/8/12	ENSR	File	Remedial Investigation Report, Appendix L Numerical Groundwater Flow Modeling Report	81
42	926394	3/19/09	Perry, A., ENSR	Drexler, T., U.S. EPA and K. Herron, IDEM	Memo re: Miscellaneous Requested Information	35
43	376388	5/5/09	PINES	Northern Indiana Public Service Company, et al.	First Amendment to Technical Assistance Plan Agreement	5
44	926453	9/8/09	Burden, D., U.S. EPA	Drexler, T., U.S. EPA	Memo re: Additional Comments of the Numerical Ground-Water Flow Model for the Town of Pines, IN Ground-Water Plume	4

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
45	926441	10/27/09	Jensen, L., PINES	File	Gamma Count Rate Survey in Pines, Indiana ***(Privacy information has been redacted)***	38
46	926410	12/28/09	Simmons, J., IDEM	Blumenfeld, V., Brown, Inc.	Letter re: Inspection Summary/Violation Letter	8
47	925611	1/25/10	Bradley, L., and E. Perry, AECOM	Drexler, T., U.S. EPA	Letter re: Pines Area of Investigation- Response to Comments on Numerical Groundwater Model	2
48	925610	10/2/10	Drexler, T., U.S. EPA	Waters, B., Indiana Dunes National Lakeshore	Letter re: Comments to the January 14, 2010 Draft Final RI Report	3
49	926419	2/25/10	Maxwell, M., and T. Perkins, Weaver Boos Consultants	Snyder, A., IDEM	Letter re: Inspection Summary Yard 520 RWS	4
50	926452	5/3/10	AECOM	File	Remedial Investigation Report ***(Privacy information has been redacted)***	3742
51	920832	5/3/10	AECOME	U.S. EPA	Evaluation of Data Collected Under the Yard 520 Sampling and Analysis Plan	403
52	926408	3/17/10	Snyder, A., IDEM	Perkins, T., Weaver Boos Consultants	Letter re: Remediation Plan Yard 520 Landfill	2
53	926411	7/28/10	Simmons, J., IDEM	Blumenfeld, V., Brown, Inc.	Letter re: Revised Summary/Violation Letter Yard 520 Landfill	10
54	926376	12/11/10	Jensen, L., PINES	File	Letter re: Comment on Review of PINES Radiation Survey	3
55	926439	1/1/12	AECOM	File	Technical Memo re: Remedial Action Objectives ***(Privacy information has been redacted)***	60
56	926391	2/29/12	Ohl, M., U.S. EPA	Kysel, P., PINES	Letter re: Response to October 12, 2011 Comments and October 2009 Risk Assessment Comments	9
57	926396	4/18/12	Ohl, M., U.S. EPA	Bradley, L., AECOM	Letter re: Remedial Action Objectives	10

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
58	926397	6/13/12	Ohl, M., U.S. EPA	Bradley, L., AECOM	Letter re: Revised Remedial Action Objectives	2
59	926382	1/7/12	AECOM	U.S. EPA	Human Health Risk Assessment	1865
60	926383	1/7/12	AECOM	U.S. EPA	Screening Level Ecological Risk Assessment	1068
61	925613	8/31/12	Ohl, M., U.S. EPA	Bradley, L., AECOM	Letter re: AOC Docket No. V-W-04-C-784 Alternatives Screening Technical Memorandum	16
62	926406	12/9/12	Ohl, M., U.S. EPA	Kysel, P., PINES	Letter re: Response to July 9, 2012 Comments on the Alternative Screening Technical Memorandum	6
63	926389	3/20/13	Ohl, M., U.S. EPA	Kysel, P., PINES	Letter re: AOC Docket No. V-W-04-C-784	12
64	926392	9/30/13	Krowitz, L., and K., Vosnakis, AECOM	Hardin, E., U.S. EPA	Memo re: Use of J Qualified Data	12
65	926420	1/13/11	AECOM	File	QAPP Addendum Supplemental Soil Characterization Work Plan	125
66	926421	1/4/14	AECOM	File	QAPP Addendum Supplemental Soil Characterization Work Plan-Revision 1	244
67	926379	8/18/14	U.S. EPA	File	Background Statistics for Uncensored Full Data Sets	2
68	926412	1/9/14	U.S. EPA	File	Background Sample Location Information	1
69	919280	1/14/11	AECOM	U.S. EPA	Supplemental Soil Characterization Work Plan	60
70	926431	1/14/11	AECOM	U.S. EPA	Supplemental Soil Characterization Work Plan-Appendices	426
71	925623	6/14/11	Hardin, E., U.S. EPA	Murray, C. People in Need of Environmental Safety	Letter re: AOC Docket No. V-W-04-C-784	13
72	926422	7/14/11	AECOM	U.S. EPA	Supplemental Soil Characterization Work Plan Revision 2	246

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
73	926381	11/19/14	U.S. EPA	File	Table 1 Validated Radiological Results Supplemental Soil Characterization	27
74	925622	4/13/15	Hardin, E., U.S. EPA	Murray, C. People in Need of Environmental Safety	Email re: Pines RAD Data	2
75	926414	4/28/15	Perry, A., AECOM	Hardin, E., U.S. EPA	Memo re: Pines Area of Investigation, Groundwater and Private Well Sampling QAPP Addendum, Spring 2015	275
76	926413	7/5/15	U.S. EPA	File	Validated Data Table	1
77	926432	8/5/15	AECOM	U.S. EPA	Appendix H- Expanded Properties Sampling and Analysis Plan	189
78	926401	5/21/15	Jensen, L., PINES	Hardin, E., U.S. EPA	Letter re: Comments on the NIPSCO/Brown and PINES Soil Radiation Data	1
79	925624	5/27/15	Hardin, E., U.S. EPA	Jensen, L., PINES	Email re: Comments on Pines Radiation Data	2
80	926400	5/27/15	Jensen, L., PINES	Hardin, E., U.S. EPA	Letter re: Comments on the Feasibility Study	3
81	926398	11/8/15	Petroff, D., IDEM	Hardin, E., U.S. EPA	Letter re: Applicable or Relevant and Appropriate Requirements (ARARs)	3
82	925614	8/26/15	Hardin, E., U.S. EPA	Gahala, A., USGS	Email re: Pines Groundwater Data Review and Meeting Availability	3
83	926384	10/15/15	-	File	All Groundwater Results	1
84	922152	10/15/15	Hassan, J., U.S. EPA	Karl, R., U.S. EPA	Enforcement Action Memorandum re: Determination of Threat to Public Health, Welfare or Environment, Town of Pines Groundwater Plume Site, Town of Pines (Signed) (Redacted)	27
85	926402	10/20/15	Gahala, A., USGS	Hardin, E., U.S. EPA	Letter re: Pines FS Review and Selection of Remedy	6

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