US EPA ARCHIVE DOCUMENT

Comments on Indianapolis Power & Light Harding Street Station Report

EPA: None

State: None

Company: See attached letter dated August 19, 2010.

And:

One error IPL recently noticed in the IPL Harding Street FINAL report is:

Last paragraph section 1-2, second to last sentence: this should read
0.5 feet or 6 inches as opposed to 5 feet.

US EPA ARCHIVE DOCUMENT

August 19, 2010

Mr. Stephen Hoffman
US Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: June 4, 2010, Draft Report of Assessment of Dam Safety of Coal Combustion Surface Impoundments Indianapolis Power & Light Company Harding Street Generating Station

Dear Mr. Hoffman:

On behalf of Indianapolis Power & Light Company ("IPL"), this letter provides comments on the above-referenced draft report. The draft report contains very detailed information and IPL has reviewed the report to the extent possible within the 44 days allotted, but reserves its rights to submit further comments if new information arises. IPL appreciates the opportunity to provide comments on this draft report.[1]

IPL provides the following comments:

1. IPL believes that Ash Ponds 2, 3, and 4 should not be designated as "high" hazards, but should be listed as "significant" hazard, at most. The actual basis for the hazard classifications as set forth in Section 4.1 conflicts with the criteria set out in EPA Form xxxx-xxx, Jan 09. That form states that a dam has a "high" hazard potential "where failure or misoperation will *probably* cause loss of human life." The basis set forth in Section 4.1 states that certain breaches could "*possible* [*sic*] result in workers loss of life." IPL believes that a low probability of loss of human life associated with Ponds 2, 3, and 4 is a reasonable assessment based on a worst case breach of each pond. Any breach associated with Ponds 2 and 3 will flow towards the White River, which contains a dam such that any excess flow would be minimized. In addition, Ponds 3 and 4 have levee heights less than 20 feet. These types of "dams" are typically considered "small" dams and the potential loss of life is low. Moreover, placing a "high hazard" label on these ponds is misleading because it falsely implies that an event or release of ash is imminent

[1] IPL intends to undertake EPA's recommendations. However, nothing in this letter is intended to be a waiver of any legal arguments IPL may have and/or an admission of any liability whatsoever.

and such release has a high likelihood to cause loss of life. This is not the case with respect to the ash ponds at the Harding Street Station.

Furthermore, the draft report provides no rational basis for these classifications. For example, the draft report identifies no criteria such as distance, flow rates, or other evidence that would support a finding that a breach would probably result in loss of human life. Without clear definition and examples, a hazard rating determination is subjective. Applying hazard ratings in a subjective manner has resulted in inconsistent hazard rating assessments by EPA contractors. To support this conclusion, IPL provides the following examples where EPA contractors have inconsistently applied the hazard ratings:

- Harding Street Ponds 1 and 3 both border Lick Creek but are rated differently;
- EPA's evaluation of other facilities such as Alabama Power Company; William Crawford Gorgas Electric Generating Plant; and AEP – Philip Sporn Generating Plant.

Reclassification of the ash ponds at the Harding Street Station to a rating other than a high hazard is consistent with what EPA has done in its evaluations of other facilities.

As a final point, it is important to note that the Harding Street units are ponds that are used as part of a wastewater treatment facility. The embankments have not been designated as dams per the Indiana Department of Natural Resources and thus have not been subject to Indiana Code 14-27-7.5 and 312 IAC 10.5.

2. IPL disagrees with the characterization of Ponds 1, 2, 2A, 2B, 3, 4, 4A, and 4B as being in "POOR" condition on the basis that there is a "lack of documentation relative to the design and construction of these facilities." A lack of documentation does not provide any basis to designate a pond's condition. Such a determination should be made based on the observations of the ponds and not based on the existence or lack of existence of design criteria/documentation. EPA is arbitrarily assessing a "POOR" rating without regard to the actual condition of the dikes simply because documentation was not complete. As noted, lack of documentation does not logically suggest poor dike condition. The definition of "POOR" provided by EPA is not clear in regards to what is considered an acceptable amount of documentation needed to render a rating better than "POOR" and is very subjective. EPA contractors have inconsistently determined what is considered an acceptable amount of documentation. Other utilities

inspected by EPA lacked documentation but were rated as fair even though the EPA contractor recommended studies similar to what is recommended for Harding Street (e.g., Duke Energy – Miami Fort Generating Station; Big Sandy Electric Corp. – Coleman Generating Station; AEP – Big Sandy Generating Station; and AEP – Coneville Generating Station). In order to be consistent, IPL has assessed the stability of our ponds by utilizing the IDNR dam guidelines. Per the IDNR classification system, these ponds would be rated as "Fair" (see attached).

In regards to the ponds being rating as "POOR" based on site observations, it appears that isolated areas or minor areas that were already under repair were used as a basis for this designation, without attention to the ponds as a whole. In general, IPL believes those areas characterized as slope failures" or "deep erosion rills" or "significant surface sloughs" are being addressed by IPL's routine, ongoing maintenance. IPL has employed a third party qualified professional (BT SQUARED) to perform inspections twice per year in addition to its own inspection program (see attached inspection program). Any erosion or other possible weaknesses are corrected.

3. Regarding the draft report' "recommendations," IPL has the following comments:

a. IPL performs routine internal inspections of its ponds and employs an outside qualified professional (BT SQUARED) to perform independent inspections twice a year. Some of the comments provided in the draft report conflict with the recommendations of IPL's outside consultant. For example, the draft report recommends "stumps and all roots greater than one-inch in diameter be removed." BT SQUARED has recommended that only trees with a diameter greater than 4-inches be removed to the level of the root system to minimize storm water run off and potential unnecessary damage to exterior slopes. BT SQUARED has opined that there are very few trees on the slopes of the ponds and that the root system is not a real problem to the stability of the ponds. IPL agrees to mow or cut trees on the slopes, but only remove the root systems for trees with diameters more than 4 inches located on IPL property. IPL believes that reasonable engineers can differ and intends to continue to follow BT SQUARED's recommendations on issues such as this.

b. Regarding erosion rills in the south embankment exterior slope of Ash Pond 2, IPL will use riprap to remediate those rills.

c. Repairs, excluding normal maintenance activities associated with operating the ash pond facilities, such as filling erosion rills/ruts, will be designed by a registered professional engineer experienced with earthen dam and/or ash pond design.

d. Regarding the draft report's recommendation that IPL address areas disturbed by animal activity, IPL does address such activities as part of its ongoing inspection/maintenance program.

e. Regarding the draft report's recommendation for installation of piezometers, IPL does not object to this recommendation and will install piezometers at selected locations as specified in a detailed scope of work ("SOW") to be submitted to EPA for review within 45 days of receipt of the final EPA dam assessment report. IPL will complete work as detailed in the SOW, within 12 months of receipt of final EPA approved SOW.

f. Regarding the draft report's recommendation to install staff gauges, IPL does not object to this recommendation and will install staff gauges as specified in a detailed scope of work ("SOW") to be submitted to EPA for review within 45 days of receipt of the final EPA dam assessment report. IPL will complete work as detailed in the SOW, within 12 months of receipt of final EPA approved SOW.

g. Regarding the recommendations for IPL to perform detailed stability and hydraulic analyses, including a study of the Ash Pond 2 embankment, IPL agrees to perform both analyses. The details associated with such analyses will be specified in a scope of work ("SOW") to be submitted to EPA for review within 45 days of receipt of the final EPA dam assessment report. IPL will complete work as detailed in the SOW, within 12 months of receipt of final EPA approved SOW.

h. IPL will review its current inspection procedures and revise, if necessary. IPL will submit a revised bi-weekly inspection form, if necessary, within 45 days of receipt of the final EPA dam assessment report.

i. IPL will develop and implement an emergency action plan ("EAP") for the Harding Street ponds. The details associated with the EAP will be specified in a scope of work ("SOW") to be submitted to EPA for review within 45 days of receipt of the final EPA dam assessment report. IPL will complete work as detailed in the SOW, within 12 months of receipt of final EPA approved SOW.

IPL seeks clarification regarding the EPA re-rating process. If EPA maintains the current hazard ratings for the ponds, what is the process for having our ponds re-classified to a rating other than high hazard?

Attached are IPL's administrative comments that address specific issues with the information in the draft report.

IPL recommends that it meet with EPA to discuss these comments prior to finalization of the report.[2] Please contact Nysa Hogue at 317-261-5473 at your earliest convenience to arrange such a meeting and/or if you have any questions.

Sincerely,

Gregory J. Daeger
Plant Manager

[2] IPL's intent to undertake EPA's recommendations as evidenced by this response to EPA's Assessment of Dam Safety for the Harding Street Station's ponds does not waive IPL's position that it believes that EPA does not have the legal authority to perform these pond inspections or to require any remedial actions since there has not been a release of hazardous substance from these ponds as is required under the applicable statutory program. Nothing in this letter is intended to waive IPL's position in this regard.

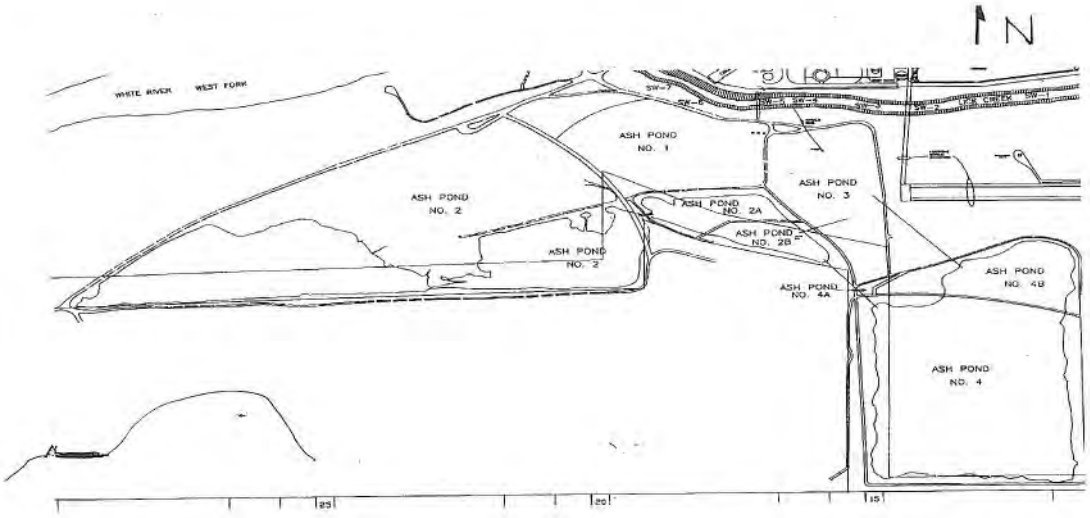
ASH POND(S) INSPECTION RECORD
HARDING STREET STATION

Date:_____ **Time:**_____

								Initials
Ash Pond Description (Name/ID)	Erosion Along Crest or Embankment Slopes (Normal/ Abnormal)	Appearance of Sinkholes or Failure (Y/N)	Tension Cracks Along Crest or Slope Faces (Y/N)	Presence of Vegetation Cover Along the Embankment Slopes (Y/N)	Changes in Dike Alignment (Y/N)	Appearance of Erosion/Deterioration Around Outlet Structures (Normal/Abnormal)	Description of Current Operational Conditions (Normal/ Abnormal)	Personnel
1								
2								
2A								
2B								
3								
4								
4A								
4B								

This record is completed following twice monthly ash pond inspections

NOTES:



Administrative Comments

June 4, 2010, Draft Report
Assessment of Dam Safety of Coal Combustion Surface Impoundments
Indianapolis Power & Light Company
Harding Street Generating Station

General:

The plant datum provided is -2.1 feet from USGS datum.

Section 1.2 IPL has the following comment to this section:

The Indiana Department of Natural Resources (IDNR) Water Division is responsible for the State's dam safety program. It is our understanding that to date IDNR has not been actively involved in the regulation of CCW impoundments because they are considered wastewater treatment facilities. IPL staff stated there are no State Inspection reports for the impoundments at the HS Generating Station.

Section 1.4 Revise as follows:

The HS Generating Station is located on the southwest side of Indianapolis, Marion County, Indiana as shown on Figure 1. The state boundary with Illinois and Michigan is approximately 70 miles west and 145 miles north of the site, respectively. The HS Generating Station is located within the city limits of Indianapolis. The area around the HS Generating Station showing critical infrastructure within approximately five miles down gradient of the impoundments is shown on Figure 2. The nearest residential area which is located approximately 1.5 miles downstream (southwest) from the site is also shown on Figure 2. An aerial view of the Ash Pond Impoundments is shown on Figure 3.

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Section 1.4.1 IPL has the following revisions and comments to this section:

* * *

Based on a survey map dated 1996 (shown on Figure 4) and previous reports, the embankment crests for the ponds ranged from El. 682 (Ash Pond 4) to El. 720 (Ash Pond 2). The ponds are not disposal facilities but are operated as wastewater treatment facilities.

Ash Pond 1 is the original CCW impoundment at HS and was commissioned in 1958. In 1995 the crest elevation of the embankment was raised to approximately El. 686. In 1998 the crest was widened to approximately 25 feet to accommodate truck hauling and other vehicle traffic. The interior and exterior slopes of the embankment were constructed at approximately 3H:1V.

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Ash Pond 2 was commissioned in 1968. Based on information contained in IPL project files, a "Wing levee" was constructed in 1980 within Ash Pond 2. In

Deleted: constructed and

1992, the "Perry K ash disposal facility" was also constructed within Ash Pond 2. Remnants of several interior embankments were observed at the time of the assessment, however neither the "Wing levee" nor the "Perry K ash disposal facility" were evident. IPL drawing titled "Pond 2 Levee Improvements Ash Pond Area Plan," dated October 27, 2004, called for the removal of several embankments within Ash Pond 2 (shown on Figure 5).

Ash Pond 2 embankments crests were raised to El. 686. [This information was not provided to EPA. EPA needs to identify its source.] .* * *

* * *

Ash Pond 3 was commissioned in approximately 1977 with modifications and vertical expansions in 1995 to El. 684 (plant datum). In 1998, the embankment crest was widened to approximately 40 feet to accommodate truck traffic. The interior and exterior slopes of the embankment were constructed at approximately 3H:1V.

Ash Pond 4 was gravel borrow pit prior to 1983. Ash Pond 4 was commissioned in approximately 1983. Modifications and vertical expansions occurred in 1995 to El. 684 (plant datum) and horizontal expansions to accommodate truck traffic in 1998 (as shown on Figure 7). Upon completion of the 1998 modifications, the embankment crest had been raised to approximately El. 686. At some time after commissioning, divider embankments were constructed within the original footprint of Ash Pond 4 to create Ash Ponds 4A and 4B.

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Section 1.4.2 The following addition should be made to the second paragraph:

Other plant wastes sluiced into the ash ponds include liquids from:

- Recirculating cooling tower blowdown;
- Demineralizer wastes;
- Flue gas desulfurization (FGD) system blowdown;
- Miscellaneous FGD wastes;
- Floor drains;
- Stormwater runoff;
- Water treatment wastes;
- Metal cleaning wastes;
- River dredging materials; and
- Condensate polisher waste.

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The last paragraph on page 1-4 should be revised as follows:

Pond 2A is charged by four (4) lines, consisting of the two sump pit lines, the cinder pit, and the FGD hydroclone line ....

Deleted: As Pond 2A is charged with influent flows through three 8-inch-diameter sump pit (pits 7-1, 7-2, and 7-3) lines and the 8-inch-diameter cinder pit (hydroclone) line

Water also flows from Ash Pond 1 into Ash Pond 2A through a 30-inch diameter CMP, with an approximate invert elevation of El. 681.5.

The following portions of Section 1.4.2 on page 1-5 should be revised as follows:

Ash Pond 3 is the final settling pond before water is discharged into Lick Creek. Flow into Ash Pond 3 comes directly from Ash Pond 4B, through 30-inch-diameter CMP. The invert from Ash Pond 4B has an invert of approximately El. 681.5. Water from Ash Pond 3 flows through three 12-inch-diameter welded steel pipes, with invert elevations of approximately El. 678.5, to a drop outlet structure, and then into Lick Creek via an 18-inch-diameter reinforced concrete pipe.

Deleted: Ash Pond 4A and

Deleted: Ash Pond 4A has an invert of approximately El. 682 and the inlet from

Ash Pond 4 is charged by a 9-inch-diameter sluice line and a 12-inch-diameter sluice line and is used as a primary settling pond. Water from Ash Pond 4 discharges into Ash Pond 4B through two (2) 30-inch-diameter CMP with an invert elevation of approximately El. 681.0.

Deleted: four (4) 8-inch-diameter

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Fly ash and bottom ash contained in Ash Pond 4A are currently being processed. Ash Pond 4B is being used for the settlement of fines. Water levels in Ash Pond 4B and Ash Pond 4A are balanced with a 30-inch-diameter CMP equalizer pipe which extends between the two ponds. Ash Pond 4A is charged by two (2) FGD sump lines.

The outlet from Ash Pond 4B to Ash Pond 3 is through a 30-inch-diameter CMP, with an invert elevation of approximately El. 681.5.

Deleted: The outlet from Ash Pond 4A to Ash Pond 3 is through a 30-inch-diameter CMP, with an invert elevation of approximately El. 682.0.

Section 2.2.1 IPL has the following comment to the first paragraph of this section:

The exterior slopes appear to be in fair condition. The exterior slope of the north embankment is, for the most part, heavily covered with trees up to 18 inches in diameter and brush (Photograph 14). Although vegetation nearly obscured observations on the north embankment, it appeared that the exterior slope of the north embankment was approximately 3H:1V. Dense vegetation precluded observation of any erosion or rodent burrows on the north embankment (Photograph 14).

BT Squared recommends that vegetation with diameters less than four inches in diameter is not an immediate concern. In addition, removal of trees with larger diameters may cause more harm to slope than maintaining tree in current location. IPL will assess existing vegetation to determine which trees can be removed without significantly impacting slope.

Section 2.4 Revise as follows:

An overview of Ash Pond 2A photograph locations is shown on Figure 9c. Ash Pond 2A had areas of standing water and ash, with approximately 3.5 feet of freeboard. The pond's north, south, east, and west embankments serve as divider embankments between Ash Pond 1, Ash Pond 2B, Ash Pond 3 and Ash Pond 2 respectively. Pond 2A is charged by four (4) lines, consisting of the two sump pit lines, the cinder pit, and the FGD hydroclone line (Photograph 46), located at the northwestern corner of the pond. Based on information provided by IPL, Ash Pond 2A was commissioned in 1992.

Deleted: The pond is charged through two sump pit lines and the cinder pit (hydroclone) line

Section 2.4.1 IPL has the following comment to the second paragraph on page 2-5:

> Erosion rills and areas of slope failure were observed on the south embankment (divider embankment with Ash Pond 2B). In the areas of slope failure, the embankment slope is approximately 1H:1V (Photographs 72 and 73).

Please define what is "slope failure" as the terms erosion and/or steep slopes do not indicate slope failure.

Section 2.4.3 IPL has the following comment to the first paragraph of this section:

> The interior slopes appear to be in fair condition. Erosion rills were observed along the north embankment. Erosion has undercut two active sluice lines in one location along the north embankment (Photographs 48 and 49). Riprap has been placed in several locations along the north embankment (Photograph 46), but in general the surface of the interior slopes defining Ash Pond 2A consists of exposed ash material, covered with light vegetation one to three feet in height (Photograph 55). Riprap on the north embankment near the waterline has been dislodged, apparently due to wave action (Photograph 54). Vegetation, consisting of brush and saplings, generally less than 30 inches in height was observed on the interior slope of the north embankment (Photographs 52 and 54). The interior slopes generally appear to range from 2.5H:1V to 3H:1V; except in the areas of slope failure. In those areas slopes appear to be approximately 1H:1V.

Please define what is "slope failure" as the terms erosion and/or steep slopes do not indicate slope failure.

Section 2.5.1 IPL has the following comment:

> The exterior slopes appeared to be in poor condition due to the presence of trees and brush. Trees up to 4 inches in diameter and light brush were observed on the exterior slope of the south embankment (Photograph 65). Sluice lines/pipes from the cinder pit, FGD hydroclone line and sump pump lines run along the north embankment (Photograph 69). Erosion was observed below pipes running along the east crest (Photograph 71). The south embankment slope was approximately 2H:1V.

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BT Squared recommends that vegetation with diameters less than four inches in diameter is not an immediate concern. In addition, removal of trees with larger diameters may cause more harm to slope than maintaining tree in current location. IPL will assess existing vegetation to determine which trees can be removed without significantly impacting slope.

Section 2.5.3 IPL has the following comment:

> The interior slopes appear to be generally in fair condition. Surface erosion was observed on the west embankment (Photograph 63) and at the eastern end of the north embankment interior slope (Photograph 73). The majority of the south embankment interior slope is armored with riprap (Photograph 62). The interior

slopes generally appear to range from 2.5H:1V to 3H:1V, except in the areas of surface erosion and slope failure. In those areas slopes appear to be approximately 1H:1V.

Please define what is "slope failure" as the terms erosion and/or steep slopes do not indicate slope failure.

Section 2.5.4 Revise as follows:

The outlet structure between Ash Ponds 2B and 4A appeared to be in good condition (Photograph 66). This structure is controlled with a manually operated vertical slide gate. The inlet to Ash Pond 3 is located along the east embankment. This inlet was below the water surface and could not be observed (Photograph 68).

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The connection between Pond 2B and Pond 3 is closed.

Section 2.6.2 IPL has the following revision and comment.

The crest appears to be in satisfactory condition [in order to be consistent with EPA's rating scale] (Photographs 84 and 90). The east, north and south embankment crests were widened in 1998 and surfaced with compacted gravel and crushed stone to accommodate truck traffic. The measured width of the east, north, and south embankment crests was approximately 40 feet. The surface of the west embankment crest appears to consist of compacted ash materials. The west embankment crest was measured to be approximately 20 feet wide.

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Section 2.6.3 IPL has the following comments:

The interior slopes appear to be in poor condition. Much of the north embankment interior slope and a segment of the east embankment slope appeared to be armored with a layer of riprap, extending slightly below the water's surface (Photographs 86, 87 and 90). In general, the balance of the interior slopes is not armored. The interior slopes generally appear to range from 2.5H:1V to 3H:1V; except in areas of slope failure. In those areas slopes appear to be approximately 1H:1V.

Please define what is "slope failure" as the terms erosion and/or steep slopes do not indicate slope failure.

* * *

Surface erosion and localized sink holes were observed near the top of the west embankment interior slope (Photographs 81 and 82). Localized slope failures were observed (up to 18 feet in length) on the west embankment (Photograph 77, 78, and 103). Vegetation, including brush and samplings with a maximum diameter of approximately <4 inches, lines the south embankment interior slope (Photograph 96 and 97).

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Please define what is "slope failure" as the terms erosion and/or steep slopes do not indicate slope failure.

> Slope failure of the east embankment was observed near the mid-point of the embankments length. The failure extended a distance of approximately 40 feet (Photos 92, 93 and 94). A sluice line (hydroclone) extends along the embankment crest, immediately adjacent to and above the area of the slope failure (Photograph 94). It was observed that further encroachment into the crest may result in undermining of the sluice line. Some vegetation remains intact in vicinity of the east embankment slope failure (Photograph 91). [These are cenospheres not due to erosion which IPL HS is currently harvesting for sale.] Ash product, likely deposited by strong winds, was observed on the northwest corner of Ash Pond 3 (Photograph 80).

Please define what is "slope failure" as the terms erosion and/or steep slopes do not indicate slope failure.

Section 2.6.4 IPL has the following revision and comment:

> The outlet structure appears to be in satisfactory condition [in order to be consistent with EPA's rating scale....

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Section 2.7 This section should be revises as follows:

> An overview of Ash Pond 4 photograph locations is shown on Figure 9f. Ash Pond 4 had standing water and ash at the time of the assessment, with approximately 4 feet of freeboard. Based on information provided by IPL personnel, Ash Pond 4 was formerly a gravel borrow pit that was commissioned as a wastewater treatment facility in 1983.

Deleted: CCW Impoundment

Section 2.7.1 IPL has the following comment:

> The exterior slopes appear to be in fair condition. The south and west embankments' exteriors slopes were covered with trees (up to 18 inches in diameter) and heavy vegetation (Photographs 114, 121, and 124). The dense vegetation prohibited visual assessment. The south, east and west embankment slopes generally appear to be 3H:1V. The slope of the east embankment was covered with vegetation consisting of established grass, some shrubs, and small samplings (Photographs 128 and 129). The north embankment serves as a divider embankment for Ash Pond 4 and Ash Ponds 4A and 4B. The slope is generally not armored, and numerous areas of slope failure and surface erosion were observed. The slope was approximately 1H:1V.

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BT Squared recommends that vegetation with diameters less than four inches in diameter is not an immediate concern. In addition, removal of trees with larger diameters may cause more harm to slope than maintaining tree in current location. IPL will assess existing vegetation to determine which trees can be removed without significantly impacting slope. Please define what is "slope failure" as the terms erosion and/or steep slopes do not indicate slope failure.

Section 2.8 Revise as follows:

An overview of Ash Pond 4A photograph locations is shown on Figure 9g. Ash Pond 4A had standing water and ash at the time of this assessment, with approximately 1.5 feet of freeboard. Based on information provided by IPL personnel, Ash Pond 4A was formerly a gravel borrow pit that was commissioned as a waste water treatment facility in 1983.

Deleted: CCW impoundment

Section 2.8.1 IPL has the following comment:

The exterior slopes of Ash Pond 4A appear to be in fair condition. The north, east and south embankments serve as divider embankments between Ash Pond 4A and Ash Pond 3, Ash Pond 4B and Ash Pond 4, respectively. These slopes are generally not armored. Slope erosion and slope failures were observed. The west embankment exterior slope was covered with trees up to 18 inches in diameter and heavy vegetation (Photograph 152). The heavy vegetation prohibited further visual assessment. The south, east and west embankment slopes generally appear to be 3H:1V.

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BT Squared recommends that vegetation with diameters less than four inches in diameter is not an immediate concern. In addition, removal of trees with larger diameters may cause more harm to slope than maintaining tree in current location. IPL will assess existing vegetation to determine which trees can be removed without significantly impacting slope. Please define what is "slope failure" as the terms erosion and/or steep slopes do not indicate slope failure.

Section 2.8.4 Revise as follows:

The outlet pipe to Ash Pond 4B consists of a 30-inch-diameter CMP and appears to be in poor condition. The pipe was apparently partly crushed in the past by construction equipment. The outlet pipe to Ash Pond 4B has been partly flattened which effectively reduces the cross-section of the pipe (Photograph 150). The outlet was partly submerged during the assessment and visibility was limited. It appears that there was flow through the outlet. However, it could not be determined if sedimentation or debris was present at the pipe outlet (Photograph 149).

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Deleted: The second outlet is a 30-inch-diameter CMP which discharges to Ash Pond 3. This pipe appears to be in good condition with no apparent obstructions.

Section 2.9.1 IPL has the following comment:

The exterior slopes of Pond 4 B appear to be in fair condition. The north, west and south embankments separate Ash Pond 4B from Ash Pond 3, Ash Pond 4A and Ash Pond 4, respectively. These slopes are generally not armored. Slope erosion and significant slope failures (on the divider embankment with Ash Pond 3) were observed. Saplings (approximately 1 to 2 inches in diameter) were observed along the exterior slope (Photograph 163). The south, east and west embankment slopes generally appear to be 3H:1V.

Please define what is "slope failure" as the terms erosion and/or steep slopes do not indicate slope failure.

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IPL DAM INSPECTION TRAINING PROGRAM
7 APRIL 2009

Presented by David M. Hendron, P.E.

1. INTRODUCTION

IPL plants handle their ash using slurry ponding sedimentation processes. In this process, the ash solids are mixed with water to form the slurry and pumped to ashponds through piping to ashponds shown on the aerial photos of each of the plants. The ashslurry is discharged into the ashponds and the ash solids sediment out. The water goes through a three phase (tertiary) process involving different ponds and then is discharged to the White River after meeting regulations for suspended solids and other physical parameters.

What results is that the IPL plants have earth dams at each of the facilities. Earth dams are widely used across the world for various purposes. They are very simply an earthen structure that acts like the rim of a bowl to retain water. Just like the rim of a bowl, everything is fine until the rim fails for some reason. When it fails, the damage that results is very often very costly in money, environmental damage and sometimes in human life.

There are some very important basic "facts of life" about earth dams that I want this class to understand and remember when you are going through this training and as you conduct the inspections.

- Earth dams have the highest frequency of failure of any geotechnical structure that is ever built.
- Earth dams fail almost always fail as a result of water pressure and water pressure acts on the smallest defect that is present in the earth dam.
- All earth dams have water flowing through them and under them at all times.
- Earth dams don't fail gradually. They fail quickly and they almost always appear fairly stable until the failure is occurring.
- The signs of potential failure of earth dams are subtle and involve signs that the flow of water is changing through the dam
- Small dams create the biggest problems because they are not taken seriously.

The elements of an earth dam are as follows:

- Shell
- Core
- Foundation
- Drains

The stability of an earth dam is determined by dividing the magnitude of the forces that resist failure by the forces causing failure in the following manner:

F = Sum of forces resisting failure/Sum of forces causing failure

Where:

F = Factor of Safety (sometimes called the margin of error)
Sum of forces resisting failure = Shear Strength of Soils
Sum of forces causing failure = Gravity and water pressure

The primary objective of the IPL staff inspection program is to make observations and measurements to look for changes in the forces causing failure and we will spend some time to identify the most important things to look for. These will include such things as:

- Evidence of seepage from the ashpond
- Increases or decreases in water level in the ashpond
- Changes in the geometry of the interior and exterior slopes of the ashpond
- Blockage to drainage pipes or other drainage features in the ashpond
- Observations of slumping of roadways, slopes or other terrain around the ashpond
- Increase in water levels in any monitor wells installed in the ashponds at the facility

2. BASICS OF IPL ASHPOND DAM CONSTRUCTION OPERATION

a. Basic Design and Construction

The ashponds at IPL facilities are generally designed as shown on Figure 1. The ashponds are constructed predominantly of ash materials obtained from the existing ashponds. Some of the facilities have also incorporated a started dike of clay materials taken from the native surface soils at the site.

The ashponds do not have a core and do not have any toe drains or other drains to collect and discharge seepage that occurs through the dam. This is a very important thing to understand about the IPL ashponds.

The foundation materials beneath the ashponds are typically a layer of thin clay soils that are underlain by a very thick layer of granular sand and gravel soils. The clay soils do not permit a lot of water flow through them; the sand and gravel soils permit a lot of flow through them. Given my observations at the site, the sandy and gravelly soils beneath the site must be serving in some fashion as the drain for seepage flow from the

b. Failure Modes

The primary failure modes that are the most likely at the IPL ashpond facilities are as follows:

- Piping failure from flow through the embankment
- Piping failure from flow through a penetration in the embankment
- Piping failure from uplift of the downstream toe of the ashpond dam
- Rapid drawdown failure of the upstream slope of the ashpond dam with large and rapid water level changes in the ashpond
- Overtopping the discharge structure for the facility when it fails or becomes blocked for some reason.
- Failure and leakage from the slurry pipeline in the vicinity of the ashpond dam materials.
- Erosion of the upstream or downstream ashpond slopes by rainfall or other climatic event

c. Critical Areas

- Steep slope sections of the ashponds – both internal and external
- Areas with penetrations of the ashponds with pipes, spillways and other such items

- Areas where the downstream toe of the ashpond is closest to an external slope or drainage feature such as creek, drainage channel or river.
- Areas where high erosion is possible or has occurred.

d. Danger Signals

- Erosion
- Seepage –
- Vertical movements
- Horizontal movements
- Change in fluid levels in the ponds
- Animal activity
- Construction activity
- Other – anything that appears different from previous inspections

3. PERIODIC DAM INSPECTIONS BY IPL STAFF

a. Purpose

- These inspections provide the means for IPL to observe conditions on the ashponds that are precursors of stability problems and to allow IPL to get the information to make early decisions about taking corrective actions before these conditions can cause instability of the ashpond facilities.

b. Scope

- Inspections are to be conducted on a bi-weekly frequency by IPL staff that meet the qualifications to make the inspections.
- Inspections are to be made by traversing the top of the ashpond facilities in plant vehicles. At least once monthly, the inspector must traverse all of the areas of the ashponds identified as critical zones and areas of the ashponds where danger signals have been observed in previous inspections.
- Inspectors are to document each inspection by completing an inspection form provided in Attachment A to this outline.
- Inspectors are to follow up with IPL management about any danger signals or areas where differences are noted in the inspections.

c. Qualifications of Inspection Staff

- Must have attended inspection training course.
- Must have been a full time employee for a minimum of 6-months and be familiar with process and operations involved with ash production and disposal at the plant.

d. Materials and Equipment

- 25-ft steel tape
- Binoculars
- Clip board with supply of inspection forms
- Safety equipment
- Camera – when danger signals are observed

4. ORGANIZATION

a. General

- Internal to IPL
- External to IPL

b. Responsibilities

- Inspector
- IPL Supervisory Staff
- External Professional Staff

c. Communication

- Importance – timeliness, clarity and consistency
- Level 1 - Inspection Forms
- Level 2 – Questions about observations
- Level 3 – Direct observations of danger signals

5. INSPECTION PROCEDURE

a. Route of Inspection and Identification of Location on the Ashpond Dam

- Aerial photographic maps for the particular facility
- Discussion of critical areas on the aerial photos

b. Inspection Forms

- Attachment A – Eagle Valley Plant
- Attachment B – Harding Street Station

c. Discussion of Critical Observations and Measurements

- Group discussion

d. Photographs, Notes and Sketches

- Group discussion

6. REPORTS

a. Level 1 - Inspection Report

b. Levels 2 and 3 - Immediate Communication of Problem or Questionable Observations

- Create a specific log and file for levels 2 and 3 observations
- Content to be established.

c. Follow-up by Inspector for Problems or Questionable Observations Identified

- Documented in the inspection report form and on the log and file for each event

7. DISCUSSION

8. ASHPOND DAM INSPECTION

ATTACHMENT A

Proposed Inspection Form
Eagle Valley Plant

Inspection Form
Eagle Valley Plant

Date: _____
Inspector: _____
Weather: _____
Time: Begin _____ **End** _____

Eagle Valley Plant – Ashpond location plan

Summary of Observations _____

_____
_____
_____
_____
_____
_____

Outline of Questions and Problems Observed: _____

Photographs taken: _____

Follow-up to questions and problems observed:

Inspector: _____ **Date:** _____

Supervisor: _____ **Date:** _____

ADDITIONAL DOCUMENTATION:_____

Inspector: _____
Date: _____

ATTACHMENT B

Proposed Inspection Form
Harding Street Station

Inspection Form
Harding Street Station

Date: _____

Inspector: _____

Weather: _____

Time: Begin _____ End _____

Harding Street Station – Ashpond location plan

Summary of Observations _____

_____

_____

_____

_____

_____

_____

Outline of Questions and Problems Observed _____

_____

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Photographs taken _____

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Follow-up to questions and problems observed _____

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Inspector: _____ **Date:** _____

Supervisor: _____ **Date:** _____

ADDITIONAL COMMENTS AND DOCUMENTATION

Inspector: _____
Date: _____

HAZARD CLASSIFICATION FOR DAMS

DAMAGE TO:	AREA AFFECTED BY DAM BREACH		
	LOW	SIGNIFICANT	HIGH
LOCATION	***Rural or Agricultural*** Damage would be minimal and would mostly occur on dam owner's property. No building, road, railroad, utility, or individual significantly affected. Damage is limited to farm buildings, agricultural land, and local roads.	***Predominantly Rural or Agricultural*** but roads, buildings, utilities or railroads may be damaged.	***Developing or Urban*** Where individuals could be seriously injured or killed. Buildings, roads, railroads or utilities seriously damaged.
POTENTIAL LOSS OF LIFE Flood depths greater than 1 foot in occupied quarters. Potential of loss of human life may occur.	***No***	***No***	***Yes***
ROADS County roads, state two-lane highways, or U.S. highways Serving as the only access to a community. Multilane divided state or US highway, including an interstate highway.	***No Damage***	***May Damage*** Interruption of service for not more than 1 day.	***Serious Damage*** Interruption of service for more than 1 day.
RAILROADS Operating Railroads	***No Damage***	***May Damage*** Interruption of service for not more than 1 day.	***Serious Damage*** Interruption of service for more than 1 day.
OCCUPIED QUARTERS Homes-Single family residences, apartments, nursing homes, motels and hospitals	***No Damage***	***May Damage*** Damage that would not render the structure unusable	***Serious Damage*** Damage where the flow velocity at the building compromises the integrity of the structure for human occupation.
UTILITIES	***No Damage***	***May Damage*** Damage may occur to important utilities where service would not be interrupted for more than 1 day but either of the following may occur: 1) buried lines can be exposed by erosion, or 2) towers, poles and above ground lines can be damaged by undermining or debris loading.	***Serious Damage*** Interruption of service to interstate and intrastate utility, power or communication lines serving towns, communities or significant military and commercial facilities in which disruption of power and communication would adversely affect the economy, safety, and general well-being of the area for more than 1 day.