



EAST ASH POND VISUAL SITE INSPECTION REPORT – 2015

**SOUTHERN INDIANA GAS AND ELECTRIC COMPANY
F.B. CULLEY GENERATING STATION
YANKEETOWN, INDIANA**

ATC PROJECT NO. 170LF00160

January 14, 2016

PREPARED FOR:

**SOUTHERN INDIANA GAS AND ELECTRIC COMPANY
dba VECTREN POWER SUPPLY
F.B. CULLEY GENERATING STATION
3711 DARLINGTON ROAD
NEWBURGH, INDIANA 47630
ATTENTION: MS. LISA MESSINGER**

January 14, 2016

ATC Group Services LLC

7988 Centerpoint Dr.
Suite 100
Indianapolis, IN 46256

Phone 317 849 4990
Fax 317 849 4278

www.atcgroupservices.com

Ms. Lisa Messinger
Southern Indiana Gas and Electric Company
F.B. Culley Generating Station
3711 Darlington Road
Yankeetown, Indiana 47630

Re: **Visual Site Inspection Report – 2015**
East Ash Pond
F.B. Culley Generating Station
Yankeetown, Indiana
ATC Group Services Project No. 170LF00160

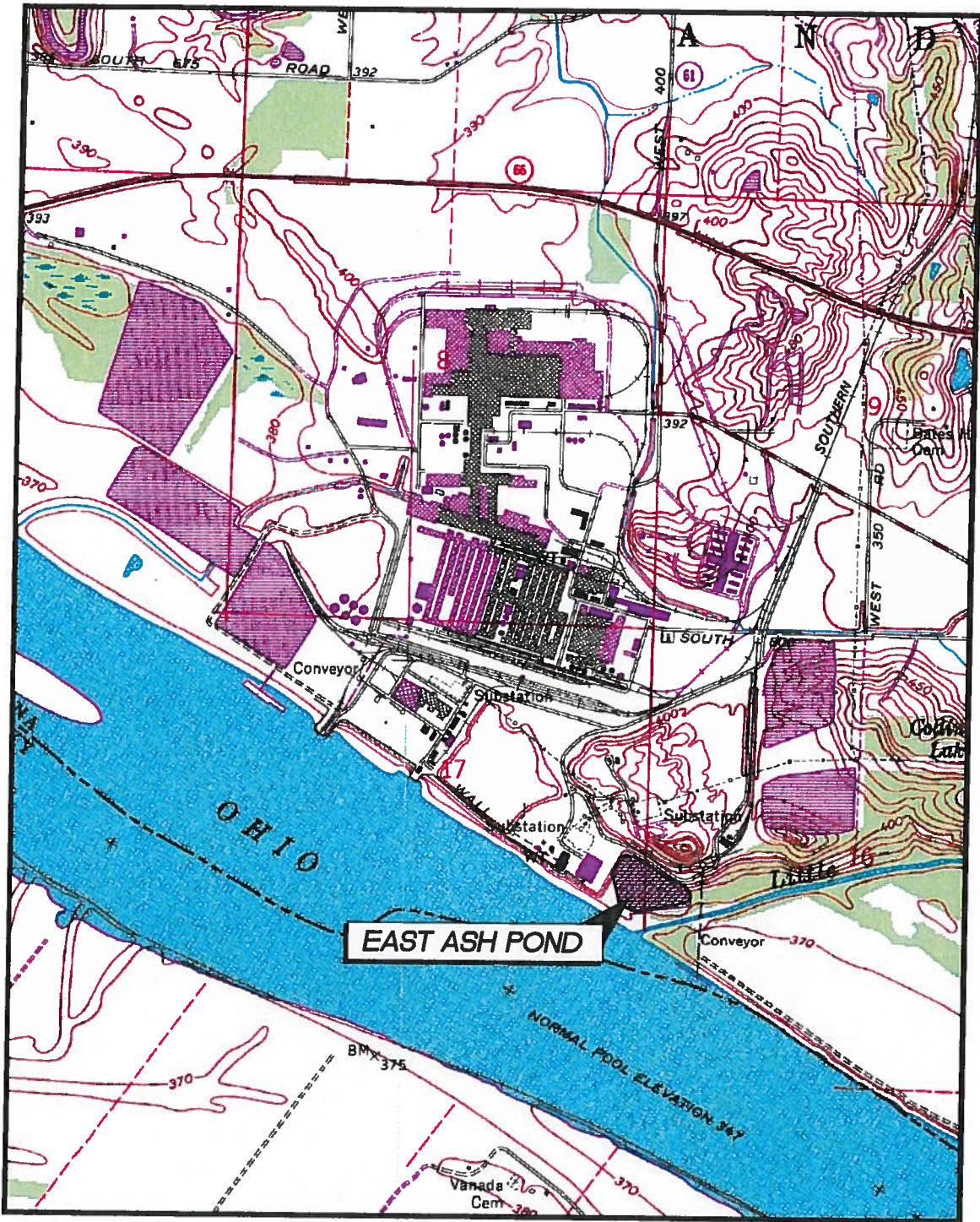
Dear Ms. Messinger:

Submitted herewith is the report of our December 3, 2015 Visual Site Inspection of the East Ash Pond Dam at the F.B. Culley Generating Station. This inspection was done in general accordance with guidelines established by the Indiana Department of Natural Resources (IDNR) and incorporates requirements included in the Environmental Protection Agency's (EPA) Coal Combustion Residuals (CCR) Rule that was released on April 17, 2015.

The scope of this inspection was limited to an examination of readily observable surficial features of the dam and a review of information that was provided by you. Please note that the inspection did not include any test drilling, testing of materials, precise physical measurements of dam features, detailed calculations to verify spillway capacities or embankment stability or other engineering analyses. Although the inspection was conducted by competent personnel in accordance with generally accepted methods for inspecting dams, it should not be considered as a warranty or guaranty of the future safety of the dam.

The inspection was of the East Ash Pond, which is located within the F.B. Culley Station property area in portions of Sections 16 and 17, Township 7 South, and Range 8 West on the north bank of the Ohio River about 1.5 miles southwest of Yankeetown in Warrick County, Indiana as highlighted on the Yankeetown, IN USGS Quad, Figure 1 attached.

H:\2015\VECTREN CORPORATION\FB CULLEY VISUAL INSPECTION 170LF00160\FBCULLEY-VIC-EAST-2015.DWG, HP5500



VICINITY MAP

ASH POND INSPECTION
 DECEMBER 3, 2015
 F.B. CULLEY STATION
 YANKEETOWN, INDIANA

Project Number: 170LF00160		Drn. By: CR
Drawing File: SEE LEFT		Ckd. By: DB
Date: 12/15	Scale: 1" = 2000'	App'd By:
ATC GROUP SERVICES LLC		Figure: 1

Based on our previous review of the files at the Indiana Department of Natural Resources – Division of Water (IDNR-DOW) and conversations with Southern Indiana Gas and Electric Company (SIGECO) personnel, the East Ash Pond does not have a permit issued by the IDNR-DOW. Therefore, the structure does not have a designated hazard rating. However, the EPA recommended a “significant” hazard rating based on their inspection on August 17, 2010. Based on observations made during both this visual inspection and previous visual inspections, we are in agreement with this hazard rating.

Don Bryenton and Kilian Sweet of ATC Group Services LLC (ATC) met with Brandie Rucker on December 3, 2015 to discuss details associated with the referenced ash pond dam and to conduct the visual inspection. In addition, Don Bryenton and Kilian Sweet met with the Culley Station personnel that conduct weekly inspections of the pond and associated features to discuss key observations to make during dam assessments.

The East Ash Pond is located on the east side of the F.B Culley Station and occupies an area of approximately ten acres. The impoundment was formed in the early 1970's by constructing an embankment along its south side (adjacent to the Ohio River) and on the east side (adjacent to Little Pigeon Creek). These two embankments were tied into the existing grades along the north and west sides of the pond. The plans indicate that the embankments were designed to have 3(H):1(V) outside slopes while the inside slopes vary from 2.5(H):1(V) in the upper half of the slope to 2(H):1(V) in the lower half of the slope. The plans also indicate that the entire downstream slopes were to be covered with riprap. The crest width was designed to be 10 ft set at EL 397, resulting in an embankment height of about 40 ft on the south side of the impoundment. Survey information obtained by others in 2013 indicated that the crest varied from ~EL 394 to ~EL 396. Since that time, it is our understanding that the crest elevation has been modified to provide a minimum elevation of 395.7. Initially the impoundment was equipped with an auxiliary spillway system consisting of a drop inlet pipe that discharged into Little Pigeon Creek. That system was abandoned in the 1990's so the pond no longer has a spillway system.

In accordance with the recommendations included in the “Hydrologic-Hydraulic Evaluation Summary Report”, prepared by ATC Associates Inc. on February 24, 2012, the facility intends to maintain a normal pool elevation of EL 391, or lower, in the East Ash Pond. Since the pond is not currently equipped with a either principal or emergency spillway, the recommended maximum normal pool elevations require top of embankment/pond perimeter elevations of EL 395.7 around the East Ash Pond to contain the runoff generated during the design storm required for “significant” hazard structures in accordance with IDNR requirements (i.e., the 6 hour 50% Probable Maximum Precipitation event) while providing about one (1) ft of freeboard.

Following the abandonment of the original spillway system, the pool level in the East Ash Pond has been controlled by pumping water from the pond through NPDES Outfall 201 to the discharge tunnel and ultimately to the Ohio River through NPDES Outfall 001. Facility operators monitor the pool elevations of the pond twice per day seven days per week and make adjustments to the pumping rate as needed to maintain the recommended maximum pool level.

The available topographic mapping indicates the presence of a small berm approximately three (3) to five (5) high along the west side of East Ash Pond that separates the East Ash Pond from the Culley

Station. The berm includes top elevations ranging from EL ~ 394 to EL ~ 396 compared to adjacent Culley Station ground elevations in the range of EL ~ 391.

As noted above, the dam inspection was completed on December 3, 2015 by Don Bryenton and Kilian Sweet of ATC. The weather condition was approximately 40° F and mostly sunny. The Dam Assessment Form with the results of the inspection is attached in Appendix A. The most recent topographic data of the pond and area within the facility watershed area is provided in Appendix B.

The following is a list of our observations in the field on December 3, 2015 followed by our recommendations in bold print.

East Ash Pond Observations/Recommendations

1) Since the 2014 visual inspection, the following work has been completed:

- > The facility pumps water from the East Ash Pond through NPDES Outfall 201 to the discharge tunnel, and ultimately to the Ohio River through NPDES Outfall 001, as needed to maintain the normal pool level at, or below, EL 395.7.
- > The facility continues to conduct weekly and quarterly inspections of the East Ash Pond and its associated features to meet CCR Rule requirements.
- > The facility continues to control growth of trees and brush along the upper 1/3 of the downstream slope (reportedly from the crest to the ordinary high water mark of the Ohio River).
- > The facility implemented a pest control program to deter rodent activity in the embankments of the dam.
- > Portions of the upper third of the downstream slope have been regraded to repair irregular embankment slopes; however, the regraded portions of the slope have not received permanent slope protection.

2) The crest is lined with crushed stone; however, some small erosions gullies were observed near the crest's edge leading into the top of the downstream slope.

Recommendation: Repair any erosion gullies, stabilize, and maintain as necessary.

3) Minor erosion is developing at a pipe discharge outlet into the East Ash Pond along the west berm.

Recommendation: Repair any erosion, stabilize the area, and maintain as necessary.

4) There continues to be some isolated evidence of rodent activity on the downstream slopes of the south embankment.

Recommendation: Properly backfill holes and continue the rodent control program.

5) Portions of the downstream slopes and the toe of slope areas associated with the south and east embankments are not properly vegetated or covered with riprap and there is evidence of

minor erosion. The downstream slopes also included tree and concrete debris, which presents difficulties in identifying potential problems such as rodent impact, seepage and erosion.

Recommendation: Tree and concrete debris should be removed from the slope and erosion should be repaired. Vegetation should be established and maintained or the entire slope covered with a designed riprap system to stabilize the downstream slope.

- 6) The downstream slopes of the south and east embankments appear to be steeper than the original design slope 3(H):1(V) in areas.

Recommendation: Slope stability analyses are currently being performed to address the “Periodic Safety Assessment” required by the CCR Rule. If slope stability deficiencies are identified by that report, they should be remediated as soon as practical, in accordance with the requirements of the CCR Rule.

- 7) Accumulated ash is exposed across approximately 40 percent of the surface area of the ash pond.

Recommendation: Since the East Ash Pond is not currently equipped with any spillway system, the accumulated ash present above EL 391 should either be removed and the ash level maintained below EL 391, or other modifications made to provide the storage capacity necessary to retain the design storm. It is our understanding that the facility plans to lower the normal pool in the East Ash Pond to EL 388 to both improve the stability of the exterior slopes and to increase the storage capacity. Although additional ash may be exposed, the increased storage volume for the design storm event will be achieved through the lowering of the normal pool elevation. The installation of the spillway and other modifications made to address any issues identified by ongoing CCR studies must be completed by October 18, 2016 to comply with the CCR Regulations.

- 8) Based on the findings noted in the February 2012 “Hydrologic-Hydraulic Evaluation Summary Report”, the water level in the East Ash Pond could rise to approximately EL 394.7 during the typical IDNR design storm event starting from a maximum normal pool level elevation of EL 391. Such a pool level will result in water ponded against the west berm adjacent to the Culley Station. Observations made during this site visit indicate that significant portions of the west berm consist of granular material. Further, the berm also supports a number of pipes, either within the fill or on top of the fill. It is noted that the granular materials that form the berm are susceptible to erosion and are more likely to allow seepage through the embankment materials than cohesive structural fill that are normally used to contain surface water. These issues related to the increased potential for erosion of, and seepage through, the granular embankment materials are further aggravated when the pool level is maintained above the recommended elevation and coal ash is allowed to accumulate above the recommended elevation.

Recommendation: In the event of a failure of the west berm, water and any associated solids will be released into the adjoining Culley Station. Given this potential liability, it

is recommended that the normal pool level be consistently maintained at or below EL 388 as outlined in Item 7, above.

In the event that this elevation cannot be assured, or if signs of seepage and/or erosion are noted along the west berm, it is recommended that the berm either be replaced or modified to provide a compacted cohesive soil core. It is recommended that the west berm be inspected following each significant rainfall event to allow for detection and repair of problem areas prior to the next storm event. In addition, the west berm should continue to be included in the facility's dam inspection program.

- 9) Some sections of the upstream slope of the west berm (i.e. adjacent to the Culley Station) are steep and susceptible to erosion. In addition, weeds and brush have become overgrown in other sections of the upstream slope along the west berm, making it difficult to visually inspect.

Recommendation: The stability of the west berm is prudent to protect the Culley Station from rising pond water levels during storm events. Therefore, it is recommended that the west berm's upstream slope be flattened where necessary, be either vegetated or lined with riprap, and that the growth of weeds and brush be controlled to facilitate future inspections.

- 10) Due to the absence of a principal or emergency spillway, the recommended maximum normal pool elevation of the East Ash Pond is EL 391 according to the "Hydrologic-Hydraulic Evaluation Summary Report". Based on information provided by Culley Station personnel, the East Ash Pond water surface elevation was EL ~ 390.47 during the December 3, 2015 inspection (i.e., 37.5 inches below benchmark EL 394.36).

Recommendation: Maintain the normal pool elevation at or below EL 391 and continue checking water surface elevations twice each day, seven (7) days per week. It is recommended that the facility install a staff gauge that includes visible surveyed elevations to assist in observing and managing the pool level.

- 11) There is a piece of conveyor equipment on the downstream slope of the north embankment. The presence of this equipment limits the ability to properly maintain the vegetative cover and to inspect the area for signs of seepage, erosion and slope instability.

Recommendation: Remove the equipment from the slope and repair the slope as needed to re-establish the design grades and the vegetated cover.

- 12) The original spillway system has been taken out of service. Although the pipe has been plugged, there remains a potential for seepage to develop along the outside of the pipe. Further, there is no controlled outlet for the pond if the pumping system fails during a storm event.

Recommendation: It is our understanding that work is currently in progress to design and install a spillway system to meet the requirements of the CCR Rule. This work is scheduled to be completed by October 18, 2016. If the abandoned spillway remains in place, the portion of the downstream slope in the vicinity of the abandoned outlet pipe should be inspected weekly for signs of seepage.

It should be noted that a dam/embankment is exempt from the state of Indiana's authority under IC Section 14-27-7.5 if it meets the following three (3) criteria: it has a drainage area that is not more than one (1) square mile, if it does not exceed twenty (20) feet in height, and if its volume does not exceed one hundred (100) acre-feet of water. Even if the dam/embankment does not fall under the state's authority and/or is not permitted, it is still categorized by the hazard classification system and required to comply with the corresponding safety requirements. Although IDNR has not previously regulated the embankment, it appears that the East Ash Pond Embankment at the Culley Station exceeds 20 feet in height, and it is therefore recommended that the Culley Station initiate communications with the IDNR about formalizing documentation associated with this structures. Although the East Ash Pond embankments are not currently permitted, this inspection has been conducted in general accordance with guidelines established by the IDNR for permitted structures.

While considering our observations and recommendations, there appeared to be no immediate threat to the safety of the impoundment embankments at the time of our inspection. However, severe weather and flood conditions, among other factors, could adversely change the conditions that were observed. It is noted that the overall condition of the pond was downgraded from "Fair" to "Conditionally Poor" in 2012 because the recommended embankment crest elevations, normal pool elevations, and ash levels had not yet been established and maintained. During the 2015 inspection, it appeared that the recommended embankment crest elevations have been established and the pool elevation is being maintained in the in the East Ash Pond. However, concerns related to the elevation of the accumulated ash have not been addressed and this condition has now existed for at least two years. Further, the presence of concrete rubble, brush, trees and sparse vegetation on portions of the downstream slope make it extremely difficult to properly inspect both the slope and the toe area. Therefore, it is our opinion that the condition of the impoundment should remain at "Conditionally Poor" until the following items are completed and/or maintained:

- > Maintain water surface elevations at or below the recommended pool elevations.
- > Permanently establish and maintain ash levels below the recommended pool elevations.
- > Repair all animal burrows and continue the rodent control program.
- > Address all slope stability concerns if identified in the slope stability evaluation being performed for the CCR Rule.
- > Remove all concrete debris from the downstream slope and the toe area.
- > Remove trees and brush from the downstream slope and toe area.
- > Design and establish a permanent vegetative cover, or alternate form of slope protection for the south and east embankments.
- > Remove the abandoned spillway system and design and install a new spillway system to meet the requirements of both the IDNR and the CCR Rule.
- > Install a compacted cohesive soil core within the East Ash Pond's west berm to reduce the potential for seepage and/or failure.

It is noted that many of the required activities listed above will require permits from IDNR and the US Army Corps of Engineers. The proposed activities should be discussed with the agencies before proceeding with the modifications.

Coal Combustion Residuals Rule Ash Pond Requirements/Observations

On April 17, 2015, the Environmental Protection Agency's (EPA) CCR Rule was released. As a result, CCR Surface Impoundments are now required to meet the requirements of 40 C.F.R. §257.74 and to be inspected in accordance with 40 C.F.R. §257.83(b). The results of the initial annual inspection of this impoundment are outlined below:

40 C.F.R. §257.83

(b) Annual inspections by a qualified professional engineer.

(1) If the existing or new CCR surface impoundment or any lateral expansion of the CCR surface impoundment is subject to the periodic structural stability assessment requirements under §257.73(d) or §257.74(d), the CCR unit must additionally be inspected on a periodic basis by a qualified professional engineer to ensure that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards. The inspection must, at a minimum include:

(i) A review of available information regarding the status and condition of the CCR unit, including, but not limited to, files contained in the operating record (e.g., CCR unit design and construction information required by §257.73(c)(1) and §257.74(d), the results of inspections by a qualified person and results of previous annual inspections);

The initial CCR Rule annual inspection of the Culley East Ash Pond was performed by the undersigned professional engineer on December 3, 2015. Prior to the inspection, files from the operating record were reviewed along with the results of previous inspections performed by qualified persons.

(ii) A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit and appurtenant structures

The visual inspection performed on December 3, 2015 did not reveal signs of slope instability. However, as noted above, the ability to thoroughly perform a visual inspection of portions of the downstream embankment and the downstream toe area was limited due to the presence of concrete rubble, trees and brush. It will be necessary to address the condition of these areas as part of an on-going maintenance program in order to comply with the requirements of the CCR Rule. It is noted that it will be necessary to obtain all necessary permits from both the US Army Corps of Engineers and the IDNR before these repairs/modification can be initiated. A separate investigation is currently being performed to address the Structural Integrity (§257.73) of this CCR unit.

(iii) A visual inspection of any hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit for structural integrity and continued safe and reliable operation.

As noted in the preceding paragraphs, the original spillway system for this CCR unit has been abandoned and there is currently no spillway system in operation at this unit. The water level in the impoundment is controlled by pumping water from the pond into the Station's discharge tunnel. The inlet of the original spillway is still visible and did not reveal any signs of seepage through or around the pipe. The outlet end of the pipe that previously penetrated the downstream slope has been covered with crushed stone. At the time of this inspection, there were no visible signs of seepage either from within the grouted pipe or along the outside of the pipe.

It will be necessary to design and install a new spillway system at this unit to meet the requirements of §257.82. This work must also be approved by the Indiana Department of Natural Resources before these repairs/modifications can be initiated.

(2) Inspection report. The qualified professional engineer must prepare a report following each inspection that addresses the following:

(i) Record any changes in geometry of the impounding structure since previous annual inspection;

Although this is the first formal annual CCR Rule Inspection, no significant changes in geometry have been noted since the last general visual inspection performed in December 2014. It appears that some minor modifications were made to establish a consistent minimum crest elevation of 395.7.

(ii) The location and type of existing instrumentation and the maximum recorded readings of each instrument since the previous annual inspection;

There is no instrumentation at this impoundment.

(iii) The approximate minimum, maximum and present depth and elevation of impounded water and CCR since the previous annual inspection;

Since this is the first formal annual CCR Rule inspection, information regarding minimums and maximums since the previous annual inspection are not available. The depth of coal ash and the elevation of the pool level on December 3, 2015 was estimated to be approximately 70 ft and EL 390.47, respectively.

(iv) The storage capacity of the impounding structure at the time of the inspection;

Based on information provided by others, the storage capacity of the impounding structure is approximately 485,000 yd³.

(v) The approximate volume of the impounded water and CCR at the time of inspection;

Based on information provided by others, the approximate volume of water and CCR are 30,000 yd³ and 285,000 yd³, respectively.

(vi) Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit and appurtenant structures; and

The visual inspection performed on December 3, 2015 did not reveal any actual or potential structural weaknesses. However, it is the opinion of the undersigned that there are conditions that exist that have the potential to disrupt the operation and safety of the CCR unit and its appurtenant structures. These conditions, which have been discussed in detail in the preceding sections of this report and are the subject of investigations being performed by others, include:

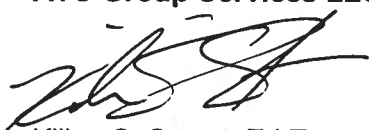
- **The lack of a spillway system.**
- **The presence of accumulated ash above the normal pool elevation.**
- **The presence of trees, brush and concrete debris on the downstream slopes which limit the ability to perform a thorough visual inspection of these areas.**
- **The condition of the west berm.**

(vii) Any other change(s) which may have affected the stability or operation of the impounding structure since the previous annual inspection.

Portions of the upper third of the downstream slope of the south embankment have been regraded since the last visual inspection in order to address some of the irregularities in the surface of the slope. However, to date the regraded areas have not been vegetated or covered with riprap and, therefore, lack proper slope protection.

We appreciate the opportunity to assist you with this project. If you have any questions concerning information contained in the report or if the condition of the dam should change significantly from that described herein, please do not hesitate to call one of the undersigned at 317.849.4990.

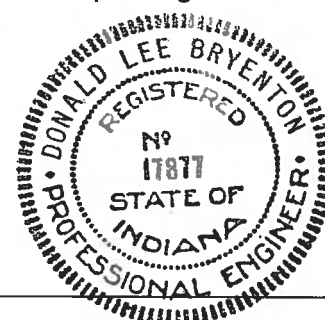
Sincerely,
ATC Group Services LLC



Kilian S. Sweet, E.I.T.
Staff Engineer



Donald L. Bryenton, P.E.
Principal Engineer



Appendices

Appendix A: East Ash Pond

Section 1: Dam Assessment Form
Section 2: Summary of Observations

Appendix B: Site Plan

Appendix A: East Ash Pond

Section 1: Dam Assessment Form
Section 2: Summary of Observations

Appendix A: East Ash Pond

Section 1: Dam Assessment Form

SUGGESTED DAM INSPECTION REPORT (Refer to pages 5 and 6 for instructions.)

Name of Professional Conducting Inspection Don Bryenton and Kilian Sweet	Professional License No. (Indiana) 17877
Business Address 7988 Centerpoint Drive, Suite 100 Indianapolis, IN 46256	Phone: (day) <u>317</u> - <u>849</u> - <u>4990</u> (evening) _____

Company Name ATC Group Services LLC

INSPECTION PREPARATION: Reviewed all pertinent technical documentation related to this dam and site in the State's and the Owner's files:
Yes No Comment _____

MULTIDISCIPLINARY: I am experienced in the technical disciplines or I am working with other professionals experienced in the technical disciplines to properly inspect this dam and appurtenant works. Technical disciplines, in addition to the general civil engineering, may include geotechnical, geological, hydrologic, structural, and mechanical. Yes No Comment _____

Dam Name F.B. Culley Station East Ash Pond	Quad. Yankeetown	Date of Inspection 12 / 03 / 15
State Dam ID None	Permit (if unapproved see pg. 6) None	County Warrick
Sec. <u>17</u>	T. <u>7</u>	R. <u>S</u>
		W. <u>8</u>
		Last Inspection 12 / 09 / 14

Owners Name Southern Indiana Gas and Electric Company (dba Vectren Power Supply)	Owner's Phone (812) 491-4895
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Address/Zip Code
3711 Darlington Road Newburgh, IN 47630

Contact's Name Brandie Rucker	Contact's Phone (day) <u>812</u> - <u>491</u> - <u>4895</u> (evening) <u>812</u> - <u>491</u> - <u>8245</u>	Spillway Width Top _____ Bot. _____	Ft. FBD.
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Hazard Significant	Drainage Area MI ²	Surface Area 10 AC	Height ~37 FT	Crest Length ~1600 FT	Crest Width ~10 FT	Inlet Below Crest FT	Slope: Up 2 to 2.5(H):1(V) Down 2 to 3(H):1(V)
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FIELD CONDITIONS OBSERVED Water Level - Below Dam Crest <u>~3</u> Ft. Ground Moisture Condition: Dry <input type="checkbox"/> Wet <input checked="" type="checkbox"/> Snowcover <input type="checkbox"/> Other _____	DRAWDOWN STRUCTURE <input type="checkbox"/> Yes <input checked="" type="checkbox"/> None Comment _____
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MONITORING Yes None [Gage Rod Piezometers Seepage Weirs Survey Monuments Other]
 Comments Visual inspection of impoundment features completed weekly by owner.

A UPSTREAM SLOPE GOOD <input type="checkbox"/> ACCEPTABLE <input type="checkbox"/> DEFICIENT <input checked="" type="checkbox"/> POOR <input type="checkbox"/>	PROBLEMS NOTED: <input type="checkbox"/> (A-1) None <input type="checkbox"/> (A-2) Riprap - Missing, Sparse, Displaced, Weathered <input checked="" type="checkbox"/> (A-3) Wave Erosion-with Scarps <input type="checkbox"/> (A-4) Cracks-with Displacement <input type="checkbox"/> (A-5) Sinkhole <input checked="" type="checkbox"/> (A-6) Appears Too Steep <input type="checkbox"/> (A-7) Depressions or Bulges <input type="checkbox"/> (A-8) Slides <input type="checkbox"/> (A-9) Animal Burrows <input type="checkbox"/> (A-10) Trees, Brush, Briars <input type="checkbox"/> (A-11) Other _____ Comments: The upstream slope on the east and south embankments have been protected with riprap and are acceptable. However, portions of the upstream slope of the west berm appear to be steeper than 2.5(H):1(V) and looked to be susceptible to erosion. Some erosion features have formed that should be repaired and maintained. Some portions of the west berm upstream slope were covered by weeds.
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B CREST GOOD <input type="checkbox"/> ACCEPTABLE <input checked="" type="checkbox"/> DEFICIENT <input type="checkbox"/> POOR <input type="checkbox"/>	PROBLEMS NOTED: <input type="checkbox"/> (B-1) None <input type="checkbox"/> (B-2) Ruts or Puddles <input checked="" type="checkbox"/> (B-3) Erosion <input type="checkbox"/> (B-4) Cracks with Displacement <input type="checkbox"/> (B-5) Sinkholes <input type="checkbox"/> (B-6) Not Wide Enough <input type="checkbox"/> (B-7) Low Area <input type="checkbox"/> (B-8) Misalignment <input type="checkbox"/> (B-9) Inadequate Surface Drainage <input type="checkbox"/> (B-10) Trees, Brush, Briars <input type="checkbox"/> (B-11) Other _____ Comments: The crest has been lined with crushed stone; however, some small erosion gullies were observed near the crest's edge leading into the top of the downstream slope.
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Spillway Width refers to the open channel (typically the emergency or auxiliary spillway) at the control section.
Ft. FBD. refers to the vertical distance from the emergency (auxiliary) spillway control section to the lowest point of the crest of the dam.
Inlet Below Crest refers to the vertical distance from the inlet of the principal spillway to the crest of the dam.

C	DOWNSTREAM SLOPE	PROBLEMS NOTED: <input type="checkbox"/> (C-1) None <input type="checkbox"/> (C-2) Livestock Damage <input checked="" type="checkbox"/> (C-3) Erosion or Gullies <input type="checkbox"/> (C-4) Cracks with Displacement <input type="checkbox"/> (C-5) Sinkholes <input checked="" type="checkbox"/> (C-6) Appears too Steep <input type="checkbox"/> (C-7) Depression or Bulges <input type="checkbox"/> (C-8) Slide <input type="checkbox"/> (C-9) Soft Areas <input checked="" type="checkbox"/> (C-10) Trees, Brush, Briars <input checked="" type="checkbox"/> (C-11) Animal Burrows <input type="checkbox"/> (C-12) Other _____
	GOOD	<input type="checkbox"/>
	ACCEPTABLE	<input type="checkbox"/>
	DEFICIENT	<input checked="" type="checkbox"/>
	POOR	<input type="checkbox"/>
<p>Comments: The slope was sparsely vegetated and uneven in many areas, and portions of the slope are covered with riprap, trees and and/or concrete debris. In addition, the slope appeared to be steeper than the original design 3(H):1(V) in areas. Some small erosion gullies are forming due to lack of ground cover and slope steepness. One potential animal burrow was observed on the east downstream slope.</p>		

D	SEEPAGE	PROBLEMS NOTED: <input checked="" type="checkbox"/> (D-1) None <input type="checkbox"/> (D-2) Saturated Embankment Area <input type="checkbox"/> (D-3) Seepage Exits on Embankment <input type="checkbox"/> (D-4) Seepage Exits at Point Source <input type="checkbox"/> (D-5) Seepage Area at Toe <input type="checkbox"/> (D-6) Flow Adjacent to Outlet <input type="checkbox"/> (D-7) Seepage Clear/Muddy
	GOOD (NONE)	<input checked="" type="checkbox"/>
	ACCEPTABLE	<input type="checkbox"/>
	DEFICIENT	<input type="checkbox"/>
	POOR	<input type="checkbox"/>
<p>[DRAIN OUTFALLS SEEN ___No___Yes <input type="checkbox"/> (D-8) Flow Clear/Muddy <input type="checkbox"/> (D-9) Dry/Obstructed] <input type="checkbox"/> (D-10) Other _____ Describe location of drains and indicate amount and quality of discharge. Comments:</p>		

E	PRINCIPAL SPILLWAY	DESCRIPTION: None
	GOOD	<input type="checkbox"/>
	ACCEPTABLE	<input type="checkbox"/>
	DEFICIENT	<input checked="" type="checkbox"/>
	POOR	<input type="checkbox"/>
<p>PROBLEMS NOTED: <input checked="" type="checkbox"/> (E-1) None <input type="checkbox"/> (E-2) Deterioration <input type="checkbox"/> (E-3) Separation <input type="checkbox"/> (E-4) Cracking <input type="checkbox"/> (E-5) Inlet, Outlet Deficiency <input type="checkbox"/> (E-6) Stilling Basin Inadequacies <input type="checkbox"/> (E-7) Trash Rack <input checked="" type="checkbox"/> (E-8) Other _____ Comments: The impoundment does not have a principal spillway. The Facility manages storm water by establishing and maintaining specified top of berm elevations, maintaining maximum water surface elevations via a pumping station and managing ash below specified level. At the time of this inspection, the pool level and the top of berm elevations appeared to be consistent with the recommended elevations. However, accumulated ash was present above recommended elevations. Plans are reportedly in progress to design and install a new principal spillway.</p>		

F	AUXILIARY SPILLWAY	DESCRIPTION: None
	GOOD	<input type="checkbox"/>
	ACCEPTABLE	<input type="checkbox"/>
	DEFICIENT	<input checked="" type="checkbox"/>
	POOR	<input type="checkbox"/>
<p>PROBLEMS NOTED: <input checked="" type="checkbox"/> (F-1) None <input type="checkbox"/> (F-2) No Auxiliary Spillway Found <input type="checkbox"/> (F-3) Erosion-with Backcutting <input type="checkbox"/> (F-4) Crack with Displacement <input type="checkbox"/> (F-5) Appears to be Structurally Inadequate <input type="checkbox"/> (F-6) Appears too Small <input type="checkbox"/> (F-7) Inadequate Freeboard <input type="checkbox"/> (F-8) Flow Obstructed <input type="checkbox"/> (F-9) Concrete Deteriorated/Undermined <input checked="" type="checkbox"/> (F-10) Other _____ Comments: The impoundment does not have an auxiliary spillway. Prior to the 1990s, the impoundment was equipped with a drop inlet pipe in the northeast corner but that inlet has been filled in with concrete. See description above regarding storm water management.</p>		

G	MAINTENANCE AND REPAIRS	PROBLEMS NOTED: <input type="checkbox"/> (G-1) None <input type="checkbox"/> (G-2) Access Road Needs Maintenance <input type="checkbox"/> (G-3) Cattle Damage <input type="checkbox"/> (G-4) Spillway Obstruction <input checked="" type="checkbox"/> (G-5) Brush, Weeds, Tall Grass, on Upstream Slope, Crest, Downstream Slope, Toe <input checked="" type="checkbox"/> (G-6) Trees on Upstream Slope, Crest, Downstream Slope <input checked="" type="checkbox"/> (G-7) Rodent Activity on Upstream Slope, Crest, Downstream Slope, Toe <input type="checkbox"/> (G-8) Deteriorated Concrete-Facing, Outlet, Spillway <input type="checkbox"/> (G-9) Gate and/or Drawdown Need Repair <input type="checkbox"/> (G-10) Other _____
	GOOD	<input type="checkbox"/>
	ACCEPTABLE	<input type="checkbox"/>
	DEFICIENT	<input type="checkbox"/>
	POOR	<input type="checkbox"/>
<p>Comments: Erosion protection should be established and maintained on the west berm upstream slope and all downstream slopes. The specified ash and water levels should be maintained. Animal burrows should be repaired and controlled.</p>		

H OVERALL CONDITIONS	
Based on this inspection and recent file review, the overall surficial condition is determined to be: <input type="checkbox"/> (H-1) Satisfactory <input type="checkbox"/> (H-2) Fair <input checked="" type="checkbox"/> (H-3) Conditionally Poor <input type="checkbox"/> (H-4) Poor <input type="checkbox"/> (H-5) Unsatisfactory	
IMPORTANT: IF THIS RATING IS DIFFERENT THAN PREVIOUS IDNR RATING, PLEASE ATTACH EXPLANATION AND REASONS FOR CHANGE ON PAGE 4.	

**RECOMMENDATIONS AND ITEMS REQUIRING ACTION BY OWNER
TO IMPROVE THE SAFETY OF THE DAM**

MAINTENANCE-MINOR REPAIR-MONITORING

- (1) Provide Additional Erosion Protection: downstream slopes and upstream slope on the west berm
- (2) Mow: _____
- (3) Clear Trees and/or Brush From: Trees and concrete debris should be removed from the downstream slopes to facilitate inspection
- (4) Initiate Rodent Control Program and Properly Backfill Existing Holes: _____
- (5) Repair: RE-evaluate slope stability or restore slopes to original design slopes
- (6) Provide Surface Drainage For: _____
- (7) Monitor: Continue to complete weekly inspections including west berm
- (8) Other: Inspect west berm following significant storm events
- (9) Other: _____

ENGINEERING-EMPLOY AN ENGINEER EXPERIENCED IN DESIGN AND CONSTRUCTION OF DAMS TO:

(Plans & Specifications must be approved by State prior to construction.)

- (10) Prepare Plans and Specifications for the Rehabilitation of the Dam: _____
- (11) Prepare As-Built Drawings of: _____
- (12) Perform a Geotechnical Investigation to Evaluate the Stability of the Dam: To consider existing slopes
- (13) Perform a Hydrologic Study to Determine Required Spillway Size: Prior to completing study, control water and ash levels
- (14) Prepare Plans and Specifications for an Adequate Spillway: Prior to completing study, control water and ash levels
- (15) Set up a Monitoring Program: _____
- (16) Refer to Unapproved Status of Dam: _____
- (17) Develop an Emergency Action Plan: _____
- (18) Other: _____
- (19) Other: _____

Recommended schedule for upgrades/comments (Please prioritize and note importance of each item.)

1. Continue to identify any animal burrows/holes. Properly backfill any burrows/holes and continue a Rodent Control Problem.
2. Downstream Slope - Remove all tree/brush/concrete debris along the downstream slopes and provide permanent slope protection - as soon as possible following receipt of all regulatory approvals.
3. Downstream Slope - Perform updated slope stability analysis and implement any necessary corrective measures - as soon as possible following receipt of all regulatory approvals.
4. Maintain pond perimeter berm elevations of EL 395.7 or higher at all locations - ongoing.
5. Continue to maintain and permanently establish a maximum normal pool elevation of EL 391 or lower - ongoing.
6. Achieve and maintain ash levels in the pond at or below EL 391 - as soon as possible.
8. West Berm - see recommendations in letter report.
9. Crest - Erosion areas at the top of the downstream slope should be repaired - as soon as possible.
10. Upstream Slope - Repair erosion developing at a pipe outlet along the west berm - as soon as possible.
11. Upstream Slope - The upstream slope of the west berm should be kept clear of brush - as soon as possible.
12. Upstream Slope - The upstream slope of the west berm should be flattened where necessary and protected by either vegetating the slope or lining the slope with riprap - as soon as possible.
13. Spillway system - Install a permanent engineered spillway system - as soon as possible following receipt of all regulatory approvals.

Photographs Attachments

ENGINEER'S INSTRUCTION Instructed owner on the safety concerns with the structure and how to monitor and inspect the dam and appurtenant works in the interim period between the regulatory two-year inspections. Yes No

Comment

Professional Engineer's Signature *Ronald L Bryant* Date 1/15/16

Reviewed By _____ Date _____

Owner/Owner's Representative

EXPLANATION FOR CHANGE IN RATINGS (Describe all repairs, upgrades or improvements made if dam conditions and rating have improved since the last inspection. Describe deteriorating conditions if ratings have worsened.)

REASONS FOR RATING CHANGE:

No Change

PREVIOUS RECOMMENDATIONS FOR MAINTENANCE, REPAIRS, AND UPGRADES:

HAVE THEY BEEN PERFORMED YES NO (If no, please explain:)

2014 Recommendations 1, 4 and 5 appear to have been completed.

All other recommendations from the 2014 report have been incorporated into the recommendations in this inspection report.

Supporting Documentation

Photographs Attachments Calculations Drawings Other

Comments:

INSTRUCTIONS FOR COMPLETING DAM VISUAL INSPECTION REPORT

1. Complete all items that are applicable; if not applicable, write in "N/A". For concrete dams, complete all applicable items and use "comments" section to cover items not included in the check boxes. Also indicate that the dam is concrete in the comments section.
2. Use page 6 to determine ratings of each dam component (items A through G) and for Overall Conditions (Item H).
3. Please write legibly and concisely.
4. Inspector must be knowledgeable with the type of dam, materials, and components being inspected. If not, qualified assistance shall be engaged.
5. The inspector shall review the dam owner's and IDNR project files prior to the inspection. Previous inspection reports shall be closely reviewed for previous problems and deficiencies.
6. If the ratings of the components (items A through G) or the Overall Conditions (item H) of the dam have changed since the last inspection, please complete page 4. If a rating has improved, dam repairs, improvements, analyses, or maintenance must have been performed and documented on page 4.
7. For a dam to have a satisfactory "Overall Conditions" rating, it must have no existing or potential dam safety deficiencies recognized. Safe performance is expected under all anticipated loading conditions, including infrequent hydrologic events (PMP for high hazard dams) and seismic events. The dam owner's project files must contain hydrologic and hydraulic analyses of the dam and its spillways to verify performance. The files must also contain slope stability analyses to verify embankment stability under full reservoir conditions and rapid-draw down conditions. The dam and all of its components must meet current IDNR and design standards. "Normal" deficiencies such as minor erosion, minor seepage, or normal concrete aging may not make a dam unsatisfactory or unacceptable. For a satisfactory "Overall Conditions" rating to be assigned, items A through G generally should all have a "good" rating; however, in some cases an "acceptable" rating may be satisfactory if the "Problems Noted" are minor, or "normal" conditions, such as minor erosion rills, small puddles on crest, or if grass needs mowed, but is in good condition.
8. An inspection report form must be submitted to IDNR along with a formal technical inspection report as described in Chapter 4.0 of Part 3 of the Indiana Dam Safety Inspection Manual.
9. Please sign and date this page in the space below to verify that you have read and understand these instructions.

Inspector's Signature:

Donald L. Bryant

Date:

1/15/16

GUIDELINES FOR DETERMINING CONDITIONS

CONDITIONS OBSERVED - APPLIES TO UPSTREAM SLOPE, CREST, DOWNSTREAM SLOPE, PRINCIPAL SPILLWAY, AUXILIARY SPILLWAY

GOOD	ACCEPTABLE	DEFICIENT	POOR
In general, this part of the structure has a good appearance, and conditions observed in this area do not appear to threaten the safety of the dam.	Although general cross-section is maintained, surfaces may be irregular, eroded, rutted, spalled, or otherwise not in new condition. Conditions in this area do not currently appear to threaten the safety of the dam.	Continued deterioration and/or unusual loading may threaten the safety of the dam.	Conditions observed in this area appear to threaten the safety of the dam. Conditions observed in this area are unacceptable.

CONDITIONS OBSERVED - APPLIES TO SEEPAGE

GOOD (NONE)	ACCEPTABLE	DEFICIENT	POOR
No evidence of uncontrolled seepage. No unexplained increase in flows from designed drains. All seepage is clear. Seepage conditions do not appear to threaten the safety of the dam.	Some seepage exists at areas other than the drain outfalls, or other designed drains. No unexplained increase in flows from designed drains. All seepage is clear. Seepage conditions observed do not currently appear to threaten the safety of the dam.	Excessive seepage exists at areas other than drain outfalls and other designed drains. Seepage needs to be evaluated. Increased flow and/or continued deterioration in seepage conditions may threaten the safety of the dam.	Excessive seepage conditions observed appear to threaten the safety of the dam and is unacceptable. Examples: 1) Designed drain or seepage flows have increased without increase in reservoir level. 2) Drain or seepage flows contain sediment. i.e., muddy water or particles in jar samples. 3) Widespread seepage, concentrated seepage or ponding appears to threaten the safety of the dam.

CONDITIONS OBSERVED - APPLIES TO MAINTENANCE AND REPAIR

GOOD	ACCEPTABLE	DEFICIENT	POOR
Dam appears to receive effective on-going maintenance and repair, and only a few minor items may need to be addressed.	Dam appears to receive maintenance, but some maintenance items need to be addressed. No major repairs are required.	Level of maintenance of the dam needs significant improvement. Major repairs may be required. Continued neglect of maintenance may threaten the safety of the dam.	Dam does not receive adequate maintenance. One or more items needing maintenance or repair has begun to threaten the safety of the dam. Level of maintenance is unacceptable.

OVERALL CONDITIONS

SATISFACTORY - No existing or potential dam safety deficiencies recognized. Safe performance is expected under all anticipated loading conditions, including such events as infrequent hydrologic and/or seismic events. Project Files contain necessary hydrologic, and other engineering calculations to verify dam safety and performance.

FAIR - No existing dam safety deficiencies are recognized for normal loading conditions. Infrequent hydrologic and/or

seismic events would probably result in a dam safety deficiency.

CONDITIONALLY POOR - A potential safety deficiency is recognized for unusual loading conditions which may realistically occur during the expected life of the structure. **CONDITIONALLY POOR** may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency; further investigations and studies are necessary.

POOR - A potential dam safety deficiency is clearly recognized for normal loading conditions. Immediate actions to resolve the deficiency are recommended; reservoir restrictions may be necessary until problem resolution.

UNSATISFACTORY - A dam safety deficiency exists for normal conditions. Immediate remedial action is required for problem resolution.

HAZARD CLASSIFICATIONS OF DAMS (STRUCTURE)

LOW HAZARD- A structure the failure of which may damage farm buildings, agricultural land, or local roads

SIGNIFICANT HAZARD- A structure the failure of which may damage isolated homes and highways, or cause the temporary interruption of public utility services.

HIGH HAZARD-A structure the failure of which may cause the loss of life and serious damage to homes, industrial and commercial buildings, public utilities, major highways, or railroads.

UNAPPROVED STATUS OF DAM

A dam that has been given an unapproved status (see entry for permit) means that plans, construction specifications, hydraulic analyses, and/or a geotechnical investigation on your dam, proving the safety of the structure, have not been received and approved by the Indiana Department of Natural Resources (IDNR). IDNR records indicate that no progress has been made to secure this approval. The fact that the dam is inspected under the Regulation of Dams Act (IC 14-27-7.5) in no way alters the illegal status of the structures.

If your dam is indicated to be unapproved, it is requested that your engineer contact the Indiana Department of Natural Resources,

Appendix A:

East Ash Pond

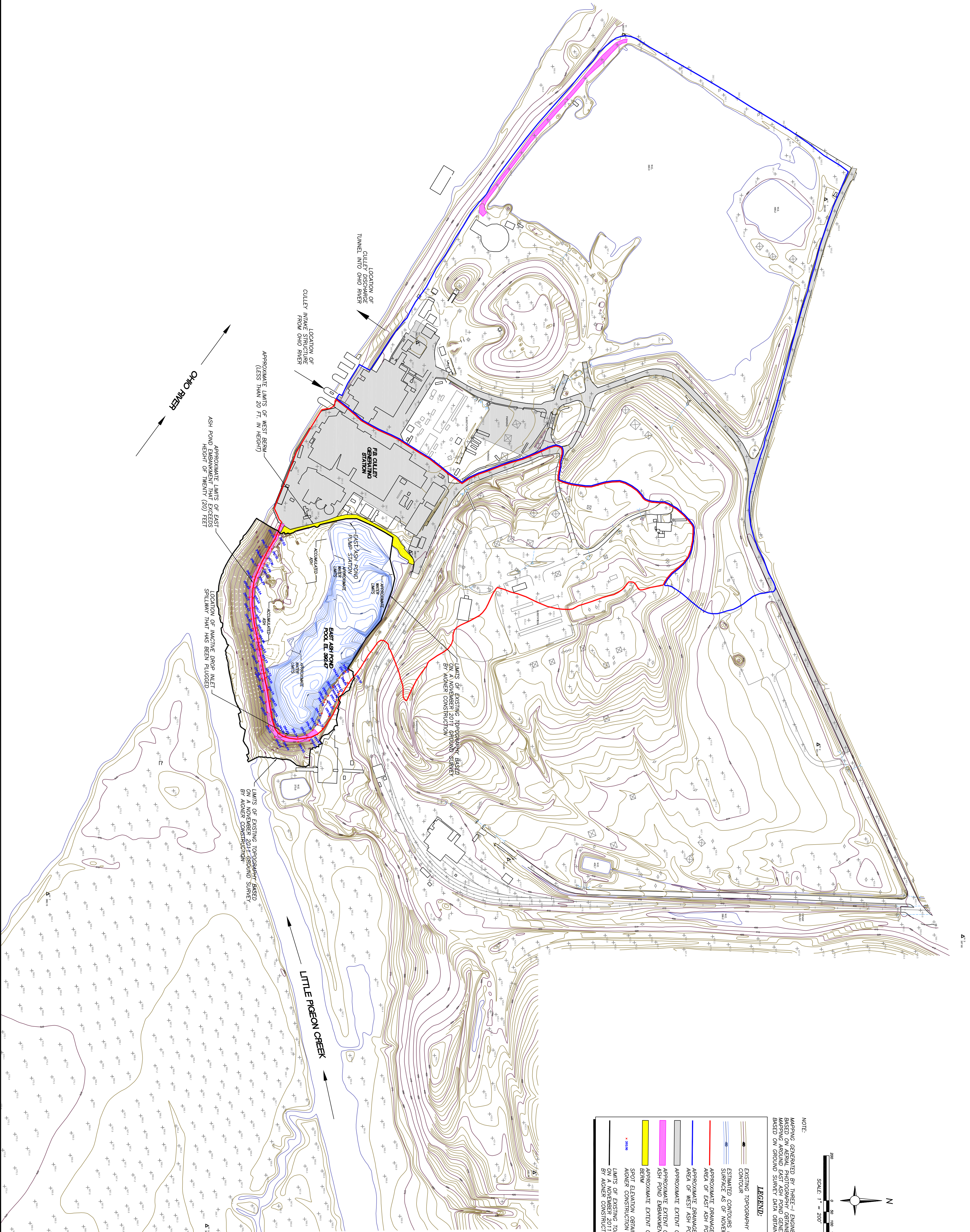
Section 2:

Summary of Observations

**VECTREN F. B. CULLEY STATION
EAST ASH POND OBSERVATIONS
12-03-15**

- > The crest is lined with crushed stone; however, some small erosions gullies were observed near the crest's edge leading into the top of the downstream slope.
- > Minor erosion is developing at a pipe discharge outlet into the East Ash Pond along the west berm (see Photograph #4 in Appendix A, Section 3)
- > There continues to be some isolate locations of rodent activity on the downstream slopes of the south and east embankments.
- > Portions of the downstream slopes and the toe of slope areas associated with the south and east embankments areas are not properly vegetated or covered with riprap and there is evidence of minor erosion. The downstream slopes also included tree and concrete debris, which presents difficulties in identifying potential problems such as rodent impact, seepage and erosion.
- > The downstream slopes of the south and east embankments appear to be steeper than the original design slope 3(H):1(V) in areas.
- > Accumulated ash is exposed across approximately 40 percent of the surface area of the ash pond.
- > Based on the findings noted in the February 2012 "Hydrologic-Hydraulic Evaluation Summary Report", the water level in the East Ash Pond could rise to approximately EL 394.7 during the typical IDNR design storm event starting from a maximum normal pool level elevation of EL 391. Such a pool level will result in water ponded against the west berm adjacent to the Culley Station. Observations made during this site visit indicate that significant portions of the west berm consist of granular material. Further, the berm also supports a number of pipes, either within the fill or on top of the fill. It is noted that the granular materials that form the berm are susceptible to erosion and are more likely to allow seepage through the embankment materials than cohesive structural fill that are normally used to contain surface water. These issues related to the increased potential for erosion of, and seepage through, the granular embankment materials are further aggravated when the pool level is maintained above the recommended elevation and coal ash is allowed to accumulate above the recommended elevation.
- > Some sections of the upstream slope of the west berm (i.e. adjacent to the Culley Station) are steep and susceptible to erosion. In addition, weeds and brush have become overgrown in other sections of the upstream slope, making it difficult to visually inspect.
- > Due to the absence of a principal or emergency spillway, the recommended minimum perimeter elevation of the East Ash Pond is EL 395.7 according to the "Hydrologic-Hydraulic Evaluation Summary Report", which provides about one (1) ft of freeboard for the design storm water surface elevation assuming a normal pool elevation of EL 391 or below. Based on the visual inspection and review of available topographic information, the perimeter elevations appear to be below the recommended elevation at some locations.

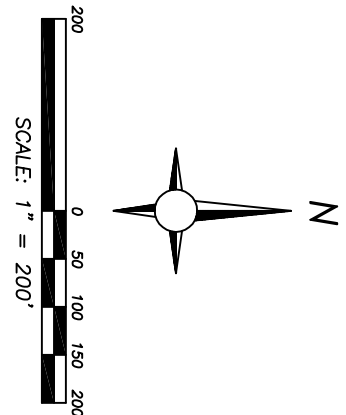
Appendix B: Site Plan



LEGEND:

- EXISTING TOPOGRAPHY
- CONTOUR
- ESTIMATED CONTOUR BELOW WATER SURFACE AS OF NOVEMBER 2011
- APPROXIMATE DRAINAGE AREA OF EAST ASH POND
- APPROXIMATE DRAINAGE AREA OF WEST ASH POND
- APPROXIMATE EXTENT OF PAVED AREAS
- APPROXIMATE EXTENT OF ASH POND EMBANKMENT
- APPROXIMATE EXTENT OF BERM
- SPOT ELEVATION OBTAINED BY ANGNR CONSTRUCTION IN JULY 2013
- LIMITS OF EXISTING TOPOGRAPHY BASED ON A NOVEMBER 2011 GROUND SURVEY BY ANGNR CONSTRUCTION

NOTE:
 MAPPING GENERATED BY THREE-I ENGINEERING, INC. BASED ON AERIAL PHOTOGRAPHY OBTAINED ON MARCH 28, 2011. PHOTOGRAPHY OF EAST ASH POND OBTAINED ON NOVEMBER 2011. PHOTOGRAPHY OF WEST ASH POND OBTAINED IN NOVEMBER 2011. MAPPING BASED ON GROUND SURVEY OBTAINED IN NOVEMBER 2011.



Drawing Title:
EAST ASH POND INSPECTION - DECEMBER 3, 2015
SOUTHERN INDIANA GAS AND ELECTRIC COMPANY
F.B. CULLEY GENERATING STATION
WARRICK COUNTY, INDIANA

ATC
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Company Name:
SOUTHERN INDIANA GAS AND ELECTRIC COMPANY
F.B. CULLEY GENERATING STATION
3700 DARLINGTON ROAD
NEWBURGH, INDIANA

Project Number	170L700001
Sheet	1 of 7
Scale	1" = 200'
Date	12/15
AS SHOWN	05/15
06/15	05/15
07/15	05/15
08/15	05/15
09/15	05/15
10/15	05/15
11/15	05/15
12/15	05/15