DRAFT REPORT

Dam Safety Assessment of CCW Impoundments

Edwardsport Plant

United States Environmental Protection Agency
Washington, DC

September 17, 2010

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REPORT

13498/46122

Dam Safety Assessment of CCW Impoundments

Edwardsport Plant

Prepared for:
US Environmental Protection Agency
Washington, DC

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1. INTRODUCTION

1.1. GENERAL

In response to the coal combustion waste (CCW) impoundment failure at the TVA/Kingston coal-fired electric generating station in December of 2008, the U. S. Environmental Protection Agency has initiated a nationwide program of structural integrity and safety assessments of coal combustion waste impoundments or "management units". A CCW management unit is defined as a surface impoundment or similar diked or bermed management unit or management units designated as landfills that receive liquid-borne material and are used for the storage or disposal of residuals or by-products from the combustion of coal, including, but not limited to, fly ash, bottom ash, boiler slag, or flue gas emission control residuals. Management units also include inactive impoundments that have not been formally closed in compliance with applicable federal or state closure/reclamation regulations. The USEPA has authorized O'Brien & Gere to provide actual site specific impoundment assessments at selected facilities. This project is being conducted in accordance with the terms of BPA# EP10W000673, Order No. EP-CALL-0002, dated July 28, 2010.

1.2 PROJECT PURPOSE AND SCOPE

The purpose of this work is to provide Dam Safety Assessment of CCW management units, including the following:

- Identify conditions that may adversely affect the structural stability and functionality of a management unit and its appurtenant structures
- Note the extent of deterioration, status of maintenance, and/or need for immediate repair
- Evaluate conformity with current design and construction practices
- Determine the hazard potential classification for units not currently classified by the management unit owner or by state or federal agencies

O'Brien & Gere's scope of services for this project includes performing a site specific dam safety assessment of all CCW management units at the subject facility. Specifically, the scope includes the following tasks:

- Perform a review of pertinent records (prior inspections, engineering reports, drawings, etc.) made available at the time of the site visit to review previously documented conditions and safety issues and gain an understanding of the original design and modifications of the facility.
- Perform a site visit and visual inspection of each CCW management unit and complete the visual inspection checklist to document conditions observed.
- Perform an evaluation of the adequacy of the outlet works, structural stability, quality and adequacy of the management unit's inspection, maintenance, and operations procedures.
- Identify critical infrastructure within 5 miles down gradient of management units.
- Evaluate the risks and effects of potential overtopping and evaluate effects of flood loading on the management units.
- Immediate notification of conditions requiring emergency or urgent corrective action.
- Identify all environmental permits issued for the management units
- Identify all leaks, spills, or releases of any kind from the management units within the last 5 years.
- Prepare a report summarizing the findings of the assessment, conclusions regarding the safety and structural integrity, recommendations for maintenance and corrective action, and other action items as appropriate.

This report addresses the above issues for the Primary and Secondary Ash Ponds at the Duke Energy Edwardsport Plant, Edwardsport, Indiana. The impoundment is owned and operated by Duke Energy-Indiana. In the course of this assessment, we obtained information from representatives of Duke Energy.

2. PROJECT/FACILITY DESCRIPTION

The Edwardsport Plant is located on Washington Street near its junction with State Route 67 in Edwardsport, Indiana. A Site Location Map is included as Figure 1. The coal and oil-fired power station consists of three coal and one oil combustion units with a total capacity of 160 MW, commercial operation began in 1918. Coal combustion waste that is produced during power generation is managed on-site with two CCW impoundments separated by a dividing earthen dike. None of the units are equipped with flue-gas desulphurization (FGD) scrubbers. A new, larger generation plant is under construction on the site which is planned to replace the existing plant in 2012.

The facility uses a double impoundment known as the Primary and Secondary Ash Ponds for CCW management. The CCW impoundment is undergoing staged abandonment which will be completed in 2011. The pond area will then be used only for stormwater runoff from the coal yard and the new plant site. The Primary Ash Pond was drained and dewatered CCW was being excavated and trucked offsite at the time of inspection for this assessment (August 2010). In addition, much of the upper 10 feet of the Primary Ash Pond containment dike had been removed to match the crest elevation of the smaller Secondary Ash Pond embankment. The remainder of the Primary dike crest will be lowered in the near future. This safety assessment report summarizes the August 2010 inspection of this management unit at the Edwardsport Plant.

2.1. MANAGEMENT UNIT IDENTIFICATION

The location of the CCW impoundments inspected during this safety assessment are identified on Figure 2 – Facility Layout Plan.

The Primary and Secondary Ash Ponds are located on the south side of the power plant. The Indiana Department of Natural Resources (IDNR) regulates the impoundments under its dam safety program, but does not inventory this site under its dam safety regulations. The Ash Ponds are operated under NPDES Permit IN 0002780.

The Ash Ponds were built in 1974 with one reported vertical expansion of the Primary Ash Pond by 10 feet in 2004. The facility was designed by Sargent & Lundy. Coal combustion waste stored in the ponds consists of fly ash, bottom ash, boiler slag, and other low-volume wastes. Bottom ash is sluiced to the Primary Ash Pond using water from the White River. Supernatant from the Primary Ash Pond passes through the dividing dike to the Secondary Ash Pond via an outlet structure and 24-inch corrugated metal pipe. Water that is routed through the ponds is discharged from the Secondary Ash Pond through an outlet structure, an 18-inch CMP and open channel back to the White River.

2.2. HAZARD POTENTIAL CLASSIFICATION

The Indiana Department of Natural Resources (IDNR) classifies dams or embankments in accordance with 312IAC 10.5. The regulations are administrated by IDNR, Dam Safety Branch. IDNR regulations define a dam as any artificial barrier, including appurtenant works, that does not meet the conditions given in 312IAC 10.5-2-3 as follows:

A. *Is built for the sole purpose of erosion control, watering livestock, recreation, or providing haven or refuge for fish or wildlife.*
B. *Has a drainage area above the dam of not more than one (1) square mile.*
C. *Does not exceed twenty (20) feet in height.*
D. *Does not impound a volume of more than one hundred (100) acre-feet of water.*

The combined maximum storage volume of the Primary and Secondary Ash Ponds marginally exceed criteria D. above.

Dam hazard classifications are established by 312IAC 10.5-3 which provides definitions for low, significant and high hazard structures.

The Edwardport Ash Ponds meet the definition for a *low* hazard classification, defined as follows:

> *"(3)If an uncontrolled release of the structure's contents due to failure of the structure does not result in any of the items given in subdivision (1)high or (2) significant hazard and damage is limited to either farm buildings, agricultural land, or local roads, the dam shall be classified as low hazard."*

The definitions for the four hazard potentials (Less than Low, Low, Significant and High) to be used in this assessment are included in the EPA CCW checklist found in Appendix A. Based on the checklist definitions and as a result of this assessment, the hazard potential rating recommended for the Edwardsport Primary and Secondary Ash Ponds is **SIGNIFICANT.** This rating is higher than that assigned by the State of Indiana primarily because of the environmental damage potential**.** A failure of embankments impounding the Edwardsport Primary or Secondary Ash Ponds could cause significant environmental damage if the CCW was released into the surrounding floodplain and the White River, thereby damaging the surrounding area, wildlife and habitats. The power station is located in a rural area; therefore, damage to critical infrastructure or lifeline facilities in the event of a dam failure would likely be limited to the power plant facilities. It is emphasized that Duke Energy is in the process of de-commissioning the ash ponds for CCW containment in 2011.

2.3. IMPOUNDING STRUCTURE DETAILS

The following sections summarize the structural components and basic operations of the Edwardsport Primary and Secondary Ash Ponds. The location of the impoundments on the plant grounds is shown on Figure 2 which is an aerial photograph taken from the USDA National Agriculture Imagery Program. An aerial close-up of the Primary and Secondary Ash Ponds is provided as Figure 3 to better represent more current conditions at the facility. It should be noted that the 2008 photo shown on Figure 3 was taken prior to excavation of the Primary Ash Pond dike crest by 10 feet. Most of the Primary Ash Pond crest has been returned to its original design elevation matching that of the Secondary Ash Pond, however, the dividing dike near the Primary Ash Pond outlet structure remains at the raised elevation. Therefore, Figure 3 does not represent the existing configuration and does not depict all current features. Additionally, photos taken during the visual inspection are incorporated in a Photographic Log provided as Appendix B.

2.3.1. Embankment Configuration

Primary Ash Pond

The Primary Ash Pond is a 2,900-foot long diked embankment that impounds an area of approximately 9 acres. Most of the crest has been reduced by 10 feet to approximately elevation (El) 464 feet above mean sea level. The remainder of the crest near the outlet structure to the Secondary Ash Pond is at El. 474. The Primary Ash Pond is contiguous with the Secondary Ash Pond and is separated there from by a dividing dike. The facility dates to 1974 and underwent a single crest raising in 2004 to El. 474. The interior and exterior slopes are 2H:1V and the interior slope is lined with 6-inch diameter riprap. The crest and exterior slope are vegetated.

Secondary Ash Pond

The Secondary Ash Pond is a 1,290-foot long diked earth embankment that impounds an area of approximately 1.7 acres. The crest is at El 464 feet above mean sea level. The Secondary Ash Pond is contiguous with the Primary Ash Pond and is separated there from by a dividing dike. The interior and exterior slopes are 2H:1V and the interior slope is lined with 6-inch diameter riprap. The crest and exterior slope are vegetated.

2.3.2. Type of Materials Impounded

Influent into the Primary Ash Pond currently includes water with solids consisting of fly ash, bottom ash, boiler slag, other low-volume wastes, and surface runoff silt. The Secondary Ash Pond influent consists of supernatant from the Primary Ash Pond.

2.3.3. Outlet Works

Primary Ash Pond

The Primary Ash Pond is a diked offstream impoundment that has been designed to receive sluice flows, plant runoff from specific areas, and direct precipitation. The ash pond outlet structure, located at the south end of pond consists of a reinforced concrete tower equipped with a stop log slot to govern the water level in the pond (See Appendix B – Photo 5). The effluent discharges into a buried 24-inch corrugated metal pipe that extends through the dividing dike into the Secondary Ash Pond.

Secondary Ash Pond

The Secondary Ash Pond is a diked offstream impoundment that has been designed to receive supernatant discharge from the Primary Ash Pond. The ash pond outlet structure, located on the east side of the pond, is a reinforced concrete tower equipped with a stoplog slot to regulate the pond water level . (See Appendix B – Photo 5). Effluent discharges from the outlet structure through the embankment via an 18-inch diameter corrugated metal pipe which, in turn, discharges into an open channel connected to the White River.

3. RECORDS REVIEW

A review of the available records related to design, construction, operation and inspection of the Primary and Secondary Ash Ponds was performed as part of this assessment. The documents provided by Duke Energy are listed below:

Table 3.1 *Summary of Edwardsport Plant Primary and SecondaryAsh Pond Documents Reviewed*

Document	Dates	By	Description
Ash Storage Basin Construction Drawings	1974	Sargent & Lundy	Plan, section & details.
Boring Location Plan	1973	Sargent & Lundy	Location of 4 design-phase exploratory borings
In-situ Density Test Results	1974		Construction-phase borrow source Proctor density curves and in-situ density test results of embankment fill.

3.1. ENGINEERING DOCUMENTS

Review of the limited available documentation revealed information on the design details of the Edwardsport Plant Primary and Secondary Ash Ponds, which are summarized below.

Edwardsport Ash Ponds

- The ash ponds were originally constructed in 1974 from two silty clay borrow sources: one from within the Primary Ash Pond footprint and the other located just east of the ponds. The entire embankment and dividing dike were built to a crest at El. 464 using controlled fill. The Secondary Ash pond dike was reportedly raised to El. 474 in 2004 (no documents available).
- The construction phase lab test reports indicate that the dikes are homogenous earthfills generally consisting of silty clay placed under density control. The dike sections were founded upon native alluvial soil following stripping of organics.
- A 20-foot wide drainage swale is located at the toe of the northern, eastern and western embankments.
- No indication or mention of ash, coal slimes, or other CCW by-products within the dikes or dike foundations was noted in our review of the engineering records listed above.
- No indication of former spills or releases of impounded materials from the Ash Pond was noted in the records reviewed or from interviews with plant personnel.

3.1.1. Stormwater Inflows

Stormwater inflows to the Edwardsport Ash Ponds are minimal. The impounding structures are comprised of diked embankments on all sides which direct storm water away from the impoundments and limits runoff to precipitation which falls directly on the water surface, interior slopes and crest of the dike. No stormwater calculations, hydrologic/hydraulic analyses or historic operating pool records were provided for review. However, given that the Primary and Secondary Ash Ponds are currently being operated about 10 feet below the dike crest during their de-commissioning, it is expected that the ponds would contain design events up to and including the Probable Maximum Precipitation (PMP) without overtopping even with no outlet discharge.

3.1.2. Stability Analyses

There are no records of stability analyses for this facility.

3.1.3 Modifications from Original Construction

The only reported historic project modification was the raising of the Primary Ash Pond dike in 2004 from El. 464 to El. 474. The dike was recently returned to the original crest elevation as part of the de-commissioning process.

3.1.4. Instrumentation

There are no records of instrumentation for this site.

3.2. PREVIOUS INSPECTIONS

Duke Power conducts quarterly inspection audits of the entire plant site. The most recent inspection did not indicate any issues with the ash ponds.

3.3. OPERATOR INTERVIEWS

Numerous plant and corporate personnel took part in the inspection proceedings. The following is a list of participants for the inspection of the Edwardsport Primary and Secondary Ash Ponds:

Table 4 *List of Participants*

Name	Affiliation	Title
Sheryl Fisher	Duke Energy	Environmental Coordinator
Owen Schwartz	Duke Energy	Environmental Specialist
Jeff Fields	Duke Energy	Senior Engineer
Bill Taylor	Duke Energy	Environmental Department
Adam Deller	Duke Energy	Engineer I
William Skipper	Duke Energy	Production
R. James Meiers	Duke Energy	Principal Environmental Scientist
Steven H. Snider, P.E.	O'Brien & Gere	Project Manager
Robert C. Ganley, P.E.	O'Brien & Gere	Vice-President

Facility personnel provided a good working knowledge of the Edwardsport Ash Ponds, provided general plant operation background and provided requested historical documentation. These personnel also accompanied O'Brien & Gere throughout the visual inspections to answer questions and to provide additional information as needed in the field. Duke Energy provided the inspection team with the above-listed background data at the time of inspection.

4. VISUAL INSPECTION

The following sections summarize the inspection of the Edwardsport Ash Ponds which occurred on August 10, 2010. O'Brien & Gere completed an EPA inspection checklist for the site at the time of the inspection which was submitted electronically to EPA on August 13, 2010. A copy of the completed inspection checklist is included as Appendix A.

4.1. GENERAL

The weather at the time of inspection was partly cloudy and approximately 85 degrees. The visual inspection consisted of a thorough site walk along the perimeter of the ponds. O'Brien & Gere team members made observations along the toe, outboard slopes, and crest of the embankments, and along exposed portions of the inboard slopes. We also observed the outlet structures and influent and effluent pipelines.

Photos of relevant features and conditions observed during the inspection were taken by O'Brien & Gere and are provided in Appendix B. A Site Plan of the Edwardsport Ash Ponds is presented as Figure 3, which provides photograph locations and directions.

4.2. SUMMARY OF FINDINGS

The following observations were made during the inspection:

Primary Ash Pond

- Sluiced CCW by-product and coal yard runoff enters the pond near the northwest corner and is routed to the south end of the pond through a shallow ditch that has been excavated into the accumulated bottom ash deposits adjacent to the western dike (Appendix B – Photo 5). The ash pond is drained except for the aforementioned ditch. The water level in the ditch was at the crown of the 24-inch outlet pipe (El. 454).
- The reinforced concrete outlet structure was in fair condition. All of its stoplogs had been removed such that the pool elevation was being controlled by the Secondary Ash Pond outlet structure.
- Dewatered CCW was being excavated and removed from the site (Appendix B – Photo 12).
- It appeared that CCW inflows were decanting in a ditch on the west side of the pond (Appendix B – Photo 5).
- The inboard slopes are very mild and buried by CCW as a result of CCW excavation operations.
- The dike crest is about 25 feet wide and consists of a crushed stone road flanked by bare fill material. Most of the crest is at El. 464 with only that near the outlet structure remaining at El. 474 (Appendix B – Photo 2).
- The outboard slope and drainage swale had been recently cleared. A narrow bench had been excavated at approximately mid-slope apparently to accommodate installation of safety fencing present at the time of inspection. Some tree stumps up to 18 inches in diameter, and cut to the slope surface, were visible near the outboard toe.
- Vegetation on the outboard slope consists of scattered vines, grass, straw mulch and remnant stalks of woody plants and was otherwise bare (Appendix B – Photo 4).
- Ponded water was noted in the drainage swale along nearly the entire toe of the western dike (Appendix B – Photo 4). There was no evidence of piping or flow, and the ponding appeared to be caused by a low area in the swale invert. The northern and eastern toe drainage swales were dry.
- No animal burrows were observed.

Secondary Ash Pond

- Supernatant from the Primary Ash Pond enters the Secondary Ash Pond below the latter's pool elevation (El. 454) (Appendix B – Photo 7).
- The interior riprap was in good condition and the inboard slope above the riprap was covered with grass about 8 inches long (Appendix B – Photo 7).
- The dike crest is about 10 feet wide and is surfaced with crushed stone.
- The western outboard slope is partially bare with the remainder consisting of scattered vines, grass, straw mulch and remnant stalks of woody plants.
- No animal burrows were observed.
- Ponded water was noted in the drainage swale along nearly the entire toe of the western dike. There was no evidence of piping or flow, and the ponding appeared to be caused by a low area in the swale invert.
- The southern and eastern toe swales were dry (Appendix B – Photo 8).
- A 15-foot wide area of crushed stone and cobble fill on the outboard slope north of the outlet structure appeared to be backfill of an erosion gully.
- The Secondary Ash Pond outlet structure was in fair condition. Most of the stoplogs had been removed such that the water level in the Secondary Ash Pond was about 6 inches above the crown of the 18-inch CMP outlet conduit at El. 454, or about 9 feet below the lowest dike crest elevation.
- The outlet conduit discharges onto a concrete apron about 5 feet above the drainage channel invert. The apron terminates in a concrete headwall which was not undermined. The apron's southern concrete training wall was cracked about two feet above its downstream terminus (Appendix B – Photo 11).

5. CONCLUSIONS

The overall condition of the Edwardsport Primary and Secondary Ash Ponds is considered to be **Fair** based on the ratings defined in the EPA Task Order Performance Work Statement (Satisfactory, Fair, Poor and Unsatisfactory), the information reviewed and the visual inspection. Acceptable performance is expected under all loading conditions based upon review of construction density test results, the dike geometry, the reported absence of seepage during historic normal operating pools, and in consideration of the lower normal pool operating conditions adopted for closure activities. Some minor deficiencies exist that require repair and/or additional studies or investigations. The deficiencies include the following:

- Absence of fully-developed turf on the outboard slopes of both dikes.
- Cracked concrete in the apron retaining wall on the Secondary Ash Pond outlet.
- Ponded water in the western drainage swale.

Other than the conditions cited above, the owner has recently implemented regular inspections and maintenance which enable the impoundment to be maintained in good working order.

Our interviews with plant engineering personnel responsible for the operation of the impoundment indicate that a regular operations plan is in use at the Edwardsport Plant. The regular operating procedures of the facility do not appear to be impacting the structural integrity of the impounding embankments.

The plant engineering staff maintains all design documents and inspection reports in a well organized manner. Based on these findings, we are of the opinion that the operations and maintenance procedures being practiced at the Edwardsport Primary and Secondary Ash Ponds are adequate, although we recommend additional maintenance/improvement actions be implemented to correct the conditions observed.

6. RECOMMENDATIONS

Based on the findings of our visual inspection and review of the available records for the Edwardsport Ash Ponds, O'Brien & Gere recommends that additional maintenance of the embankments be performed to correct the vegetative cover and other miscellaneous deficiencies cited above.

6.1. URGENT ACTION ITEMS

None of the recommendations are considered to be urgent, since the issues noted above do not appear to threaten the structural integrity of the dam in the near term.

6.2. LONG TERM IMPROVEMENT

The deficient conditions observed during the inspection do not require immediate attention, but should be implemented in the near future as part of a regular maintenance plan. The recommended maintenance/improvement actions and additional studies are as follows:

- Establish turf on the outboard slopes.
- Repair the concrete apron retaining wall.
- Re-grade the western toe swale to drain the ponded water.

6.3. MONITORING AND FUTURE INSPECTION

O'Brien & Gere recommends Duke Energy's participation in any state inspections. Consideration should be given to development of an O&M Plan that would establish a firm schedule for operations, maintenance, and inspection activities.

6.4. TIME FRAME FOR COMPLETION OF REPAIRS/IMPROVEMENTS

Recommendations for items such as turf establishment have been developed and are on-going based on our conversations with representatives of Duke Energy. We recommend that the owner continue this schedule as planned. We recommend that the other improvements recommended above be completed prior to the end of 2010.

6.5. CERTIFICATION STATEMENT

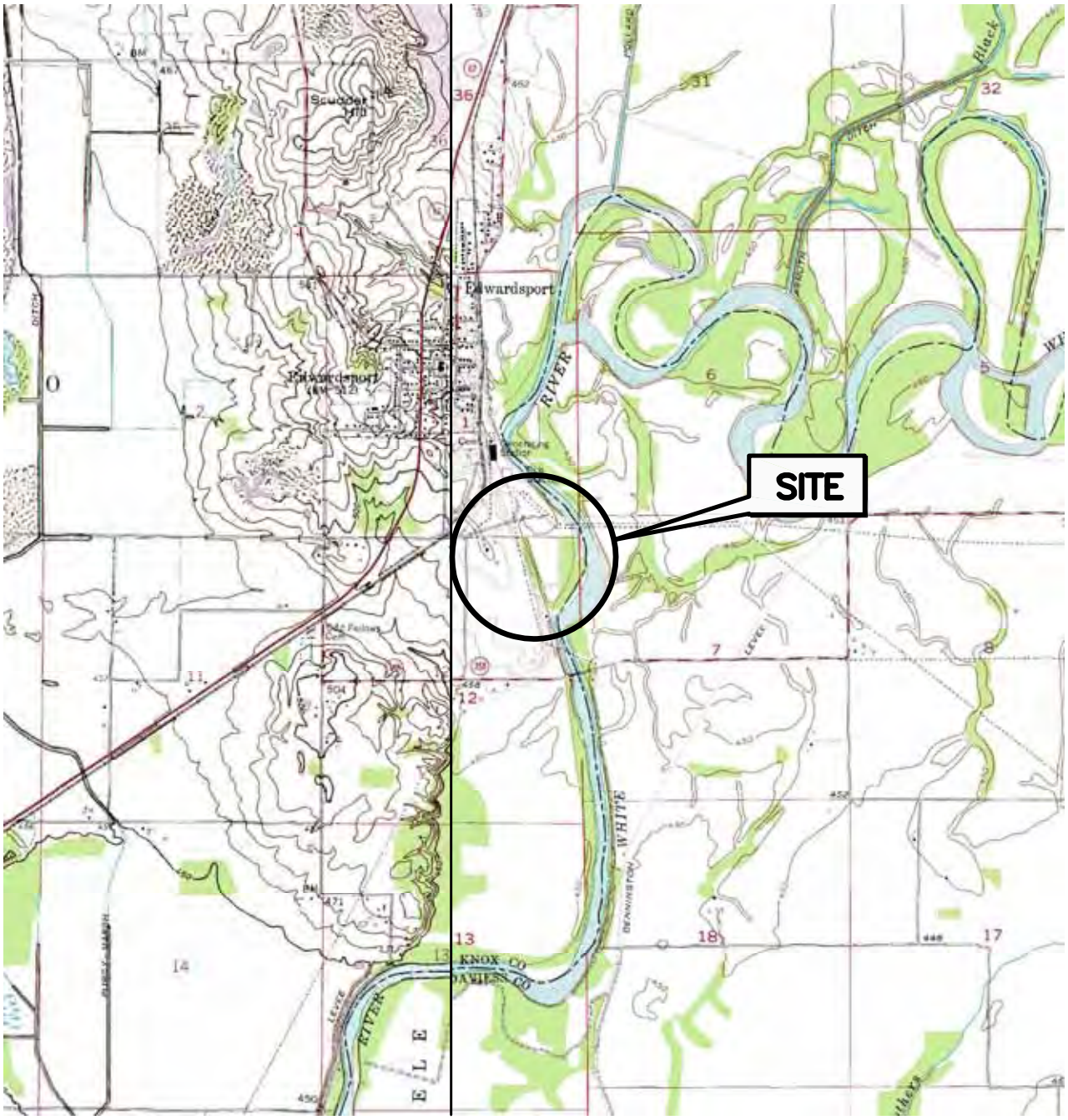
I acknowledge that the Edwardsport Primary and Secondary Ash Ponds and CCW management units referenced herein were personally inspected by me on August 10, 2010 and were found to be in the following condition:

~~SATISFACTORY~~
FAIR
~~POOR~~
~~UNSATISFACTORY~~

Signature: _____ Date: _____

Robert C. Ganley, PE
IN PE #60890283

FIGURE 1



ADAPTED FROM: BICKNELL AND PLAINVILLE QUADRANGLES, INDIANA U.S.G.S. 7.5 MIN. QUADS

QUADRANGLE LOCATION

US EPA
DAM SAFETY ASSESSMENT
OF CCW IMPOUNDMENTS

DUKE ENERGY – INDIANA
EDWARDSPORT, INDIANA

SITE LOCATION MAP

1"=3000' 3000 0 3000

46122–EDWARDSPORT–F01
SEPTEMBER 2010

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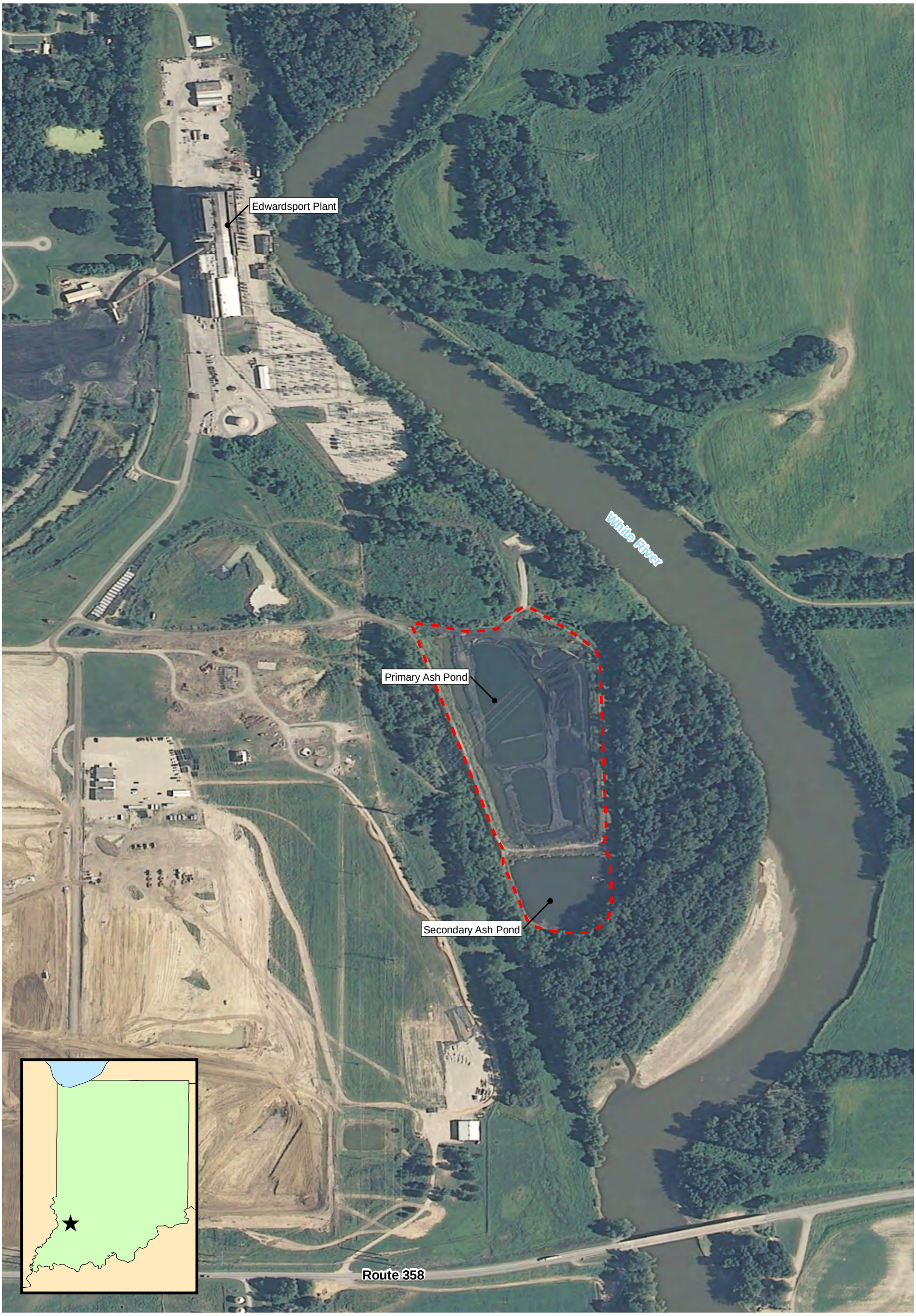

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NAME: KaufmaDR

This document was developed in color. Reproduction in B/W may not represent the data as intended.

NOTES
Aerial imagery provided by National Agriculture Imagery Program (USDA), 2008.

FACILITY LAYOUT PLAN

DUKE ENERGY
EDWARDSPORT PLANT
EDWARDSPORT, INDIANA

0 200 400 800
Feet

N

DRAFT FIGURE 2

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13498/46122

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PATH: I:\Us-Epa.13498\STDS\GIS\Coal_Impoundments\Figures\Edwardsport_FIG-3_photo.mxd

DATE: 9/8/2010 1:11:31 PM

NAME: KaufmaDR

LEGEND

1 Photograph Direction/Location

NOTES

Aerial imagery provided by National Agriculture Imagery Program (USDA), 2008.

PHOTO LOCATIONS

DUKE ENERGY
EDWARDSPORT PLANT
EDWARDSPORT, INDIANA

0 100 200 400
Feet

N

DRAFT FIGURE 3

SEPTEMBER 2010
13498/46122

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Appendix A

Visual Inspection Checklist

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name:	Edwardsport Plant	Date:	August 10, 2010
Unit Name:	Primary Ash Pond	Operator's Name:	Duke Energy-Indiana
Unit I.D.:		Hazard Potential Classification:	High Significant Low
Inspector's Name:	Robert Ganley, P.E.		

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	Annual		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	+454.0		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	+467.0		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	+452.0		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	+463.0		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?		X	Is water exiting outlet flowing clear?	X	
7. Is the embankment currently under construction?	X		21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	N/A		From underdrain?	N/A	
9. Trees growing on embankment? (If so, indicate largest diameter below)		X	At isolated points on embankment slopes?		X
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?	X		From downstream foundation area?		X
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?		X	Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?		X	22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?	X	
17. Cracks or scarps on slopes?		X	24. Were Photos taken during the dam inspection?	X	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments
3.	The decant line is above the existing crest which has been lowered by 10 feet as part of the de-commissioning process.
7.	The Primary Ash Pond is undergoing de-commisioning; the crest has been lowered by 10 feet to match the crest of the Secondary Ash Pond; de-watered CCW is being excavated and hauled to another site. CCW inflow is being channeled through the Primary Ash Pond to the outlet structure discharging to the Secondary Ash Pond.
23.	Ponded water in west exterior toe drainage swale; no evidence of piping or boils.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # ___IN0002780__ INSPECTOR__Robert Ganley, P.E.
Date _____8/10/10_____ Steven H. Snider, P.E.

Impoundment Name _____Edwardsport Primary Ash Pond_____
Impoundment Company _____Duke Energy – Indiana_____
EPA Region _____5_____
State Agency (Field Office) Address IDNR
402 West Washington Street
Indianapolis IN 46204_____

Name of Impoundment _____Primary Ash Pond_____
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New ___X___ Update _____

	Yes	No
Is impoundment currently under construction?	_____	__X__
Is water or ccw currently being pumped into the impoundment?	__X __	_____

IMPOUNDMENT FUNCTION: ___CCW Storage_____

Nearest Downstream Town : Name _ Edwardsport, IN_____
Distance from the impoundment _____0.5 mi_____
Impoundment
Location: Longitude __87_ Degrees __14_ Minutes __35.9__ Seconds
Latitude __38__ Degrees __48 Minutes __02.9 _ Seconds
State ____IN___ County _____Knox_____

Does a state agency regulate this impoundment? YES ___X___ NO _____

If So Which State Agency?__Indiana Department of Natural Resources _____

HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

_____ **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

_____ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

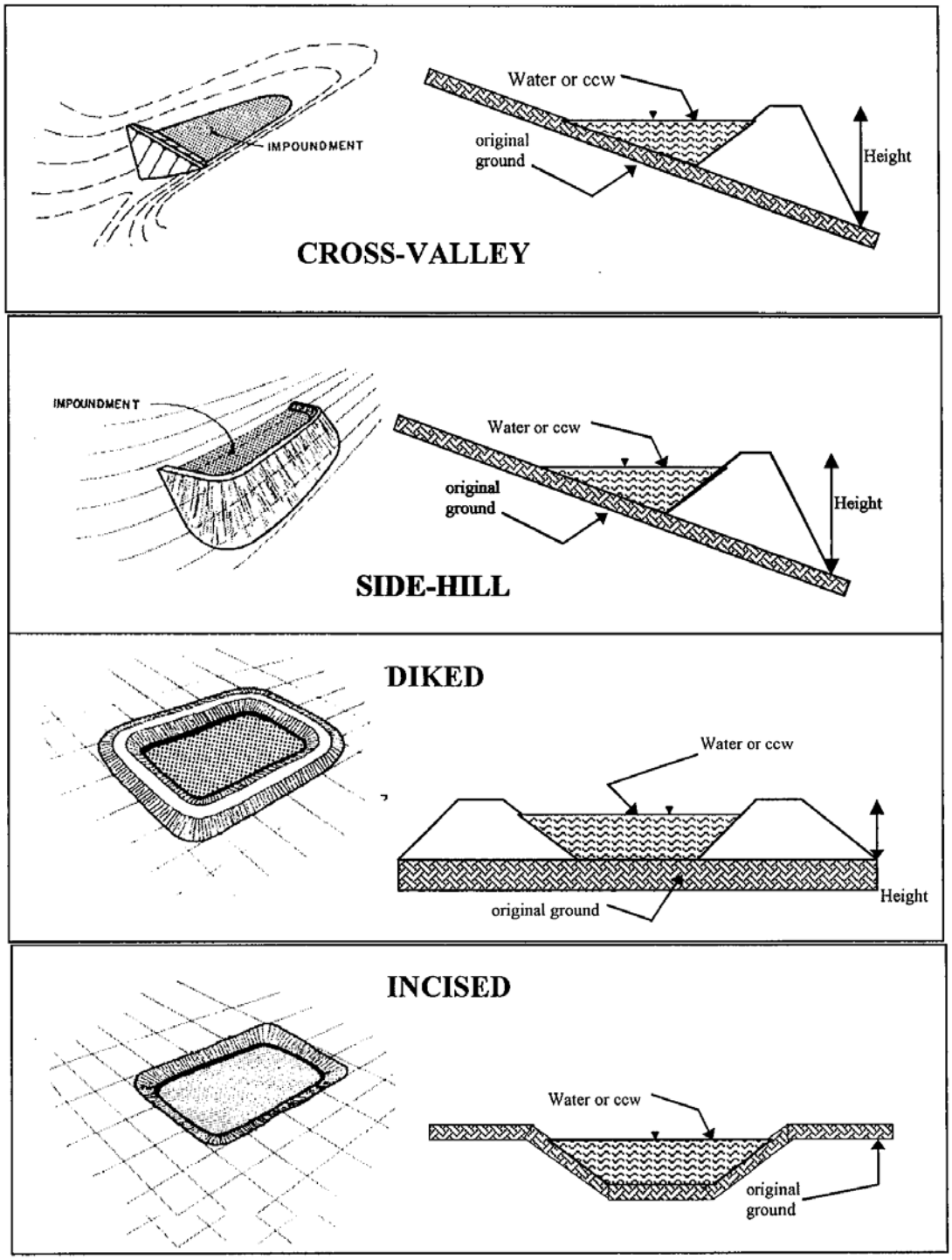
__X___ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

_____ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

An impoundment breach would discharge into the White River approximately 310 feet to the east. The impact of a breach would likely be limited to environmental damage in the White River and its unoccupied valley.

CONFIGURATION:

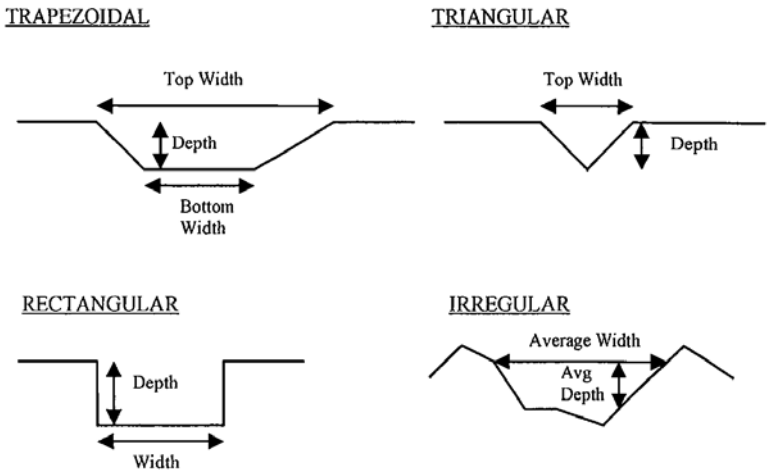


_____ Cross-Valley
_____ Side-Hill
__X__ Diked
_____ Incised (form completion optional) _____ Combination Incised/Diked
Embankment Height ____15____ feet Embankment Material_ Silty Clay

Pool Area _____8_____ acres Liner __None (slurry wall emb. core)__
Current Freeboard _____9_____ feet Liner Permeability _____N/A_____

<u>TYPE OF OUTLET</u> (Mark all that apply)

__X__ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
__X _ Rectangular
_____ Irregular

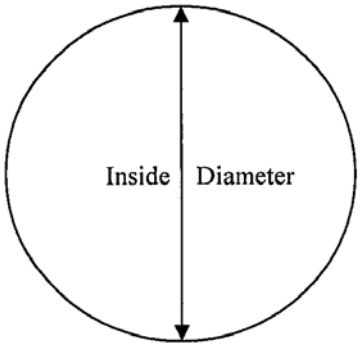


_22_ depth
__4_ bottom (or average) width
__4_ top width

__X_ **Outlet**

__24”_ inside diameter

Material
__X__ corrugated metal
_____ welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
_____ other (specify)
_____



Is water flowing through the outlet? YES ___X__ NO _____

_____ **No Outlet**

___X__ **Other Type of Outlet** (specify): 24-inch CMP discharges directly into Secondary Ash Pond through dividing dike_____

The Impoundment was Designed By _____Sargent & Lundy_____

Has there ever been a failure at this site? YES _____ NO _____X_____

If So When? _____

If So Please Describe : _____
_____
_____

Has there ever been significant seepages at this site? YES _____ NO ___X___

If So When? _____

IF So Please Describe: _____
_____
_____

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES _____NO ____X___

If so, which method (e.g., piezometers, gw pumping,...)? _____

If so Please Describe : _____
_____
_____

se

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name:	Edwardsport Plant	Date:	August 10, 2010
Unit Name:	Secondary Ash Pond	Operator's Name:	Duke Energy-Indiana
Unit I.D.:		Hazard Potential Classification:	High Significant Low
Inspector's Name:	Robert Ganley, P.E.		

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	Annual		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	+454.0		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	+452.0		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	+452.0		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	+463.0		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?		X	Is water exiting outlet flowing clear?	X	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	N/A		From underdrain?	N/A	
9. Trees growing on embankment? (If so, indicate largest diameter below)		X	At isolated points on embankment slopes?		X
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?	X		From downstream foundation area?		X
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?		X	Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?		X	22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?	X	
17. Cracks or scarps on slopes?		X	24. Were Photos taken during the dam inspection?	X	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue # Comments

23. Ponded water in west exterior toe drainage swale; no evidence of piping or boils.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # ___IN0002780__ INSPECTOR__Robert Ganley, P.E.
Date _____8/10/10_____ Steven H. Snider, P.E.

Impoundment Name _____Edwardsport Secondary Ash Pond_____
Impoundment Company _____Duke Energy – Indiana_____
EPA Region _____5_____
State Agency (Field Office) Address IDNR
402 West Washington Street
Indianapolis IN 46204

Name of Impoundment _____Secondary Ash Pond_____
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New ___X___ Update _____

	Yes	No
Is impoundment currently under construction?	_____	__X__
Is water or ccw currently being pumped into the impoundment?	__X __	_____

IMPOUNDMENT FUNCTION: ___CCW Storage_____

Nearest Downstream Town : Name _ Edwardsport, IN_____
Distance from the impoundment _____0.5 mi_____
Impoundment
Location: Longitude __87_ Degrees __14_ Minutes __34.9__ Seconds
Latitude _38 __ Degrees __48 Minutes __02.6 _ Seconds
State ____IN___ County _____Knox_____

Does a state agency regulate this impoundment? YES ___X___ NO _____

If So Which State Agency?__Indiana Department of Natural Resources _____

HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

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_____ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

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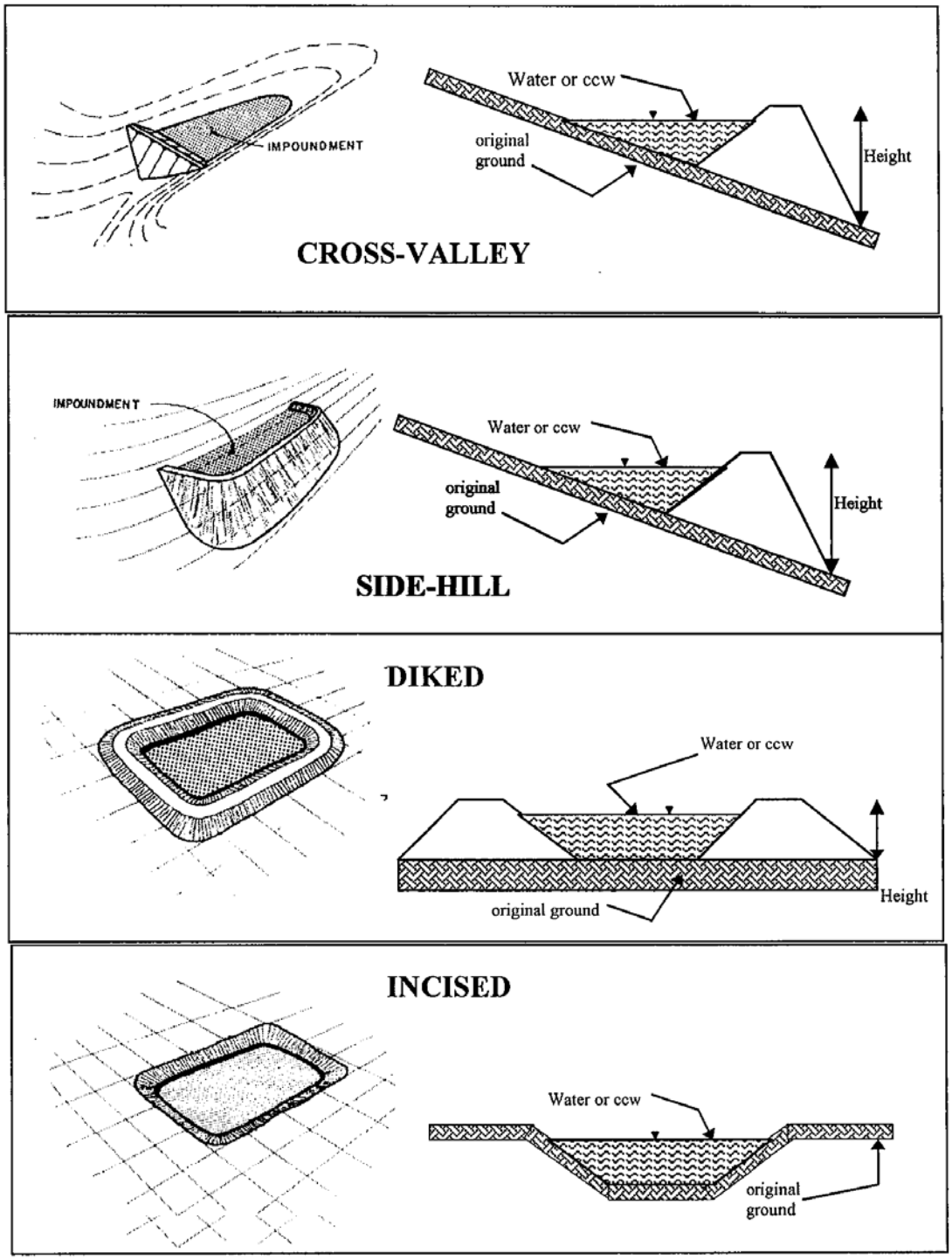
CONFIGURATION:

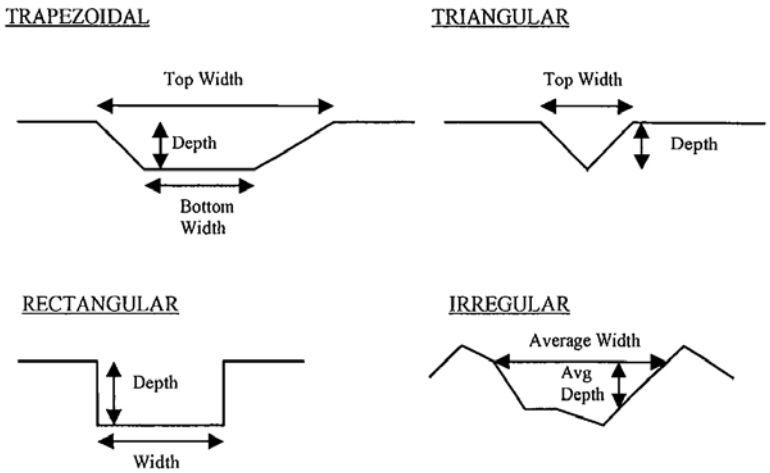


_____ Cross-Valley
_____ Side-Hill
__X__ Diked
_____ Incised (form completion optional) _____ Combination Incised/Diked
Embankment Height ____15____ feet Embankment Material: Silty Clay

Pool Area _____1_____ acres Liner __None (slurry wall emb. core)__
Current Freeboard _____9_____ feet Liner Permeability _____N/A_____

<u>TYPE OF OUTLET</u> (Mark all that apply)

__X__ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
__X _ Rectangular
_____ Irregular

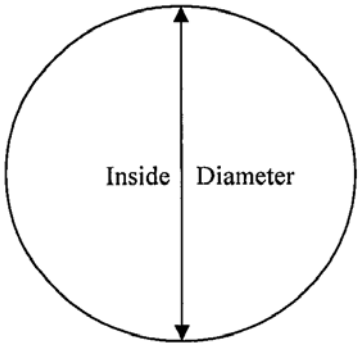


_22_ depth
__4_ bottom (or average) width
__4_ top width

__X_ **Outlet**

__18”_ inside diameter

Material
__X__ corrugated metal
_____ welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
_____ other (specify)
_____



Is water flowing through the outlet? YES ___X__ NO _____

_____ **No Outlet**

_____ **Other Type of Outlet** (specify): _____

The Impoundment was Designed By _____Sargent & Lundy_____

Has there ever been a failure at this site? YES _____ NO _____X_____

If So When? _____

If So Please Describe : _____
_____
_____

Has there ever been significant seepages at this site? YES _____ NO ___X___

If So When? _____

IF So Please Describe: _____
_____
_____

Has there ever been any measures undertaken to monitor/lowerPhreatic watertable levels based on past seepages or breaches at this site? YES _____NO ____X___

If so, which method (e.g., piezometers, gw pumping,...)? _____

If so Please Describe : _____
_____
_____

Appendix B

Photographs— Ash Ponds

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client: US EPA	Project Number: 46122.130
Site Name: Edwardsport Plant	Location: Edwardsport IN

Orientation: South

Description:

Overview of Primary Ash Pond from northwest corner showing typical condition of crest & inboard slope. Note excavator removing dewatered ash.

Date: 8/10/10

Photo Number: 1

Photographer: SH Snider

Orientation: South

Description:

Typical condition of Primary Ash Pond crest. Note safety fencing on outboard slope.

Date: 8/10/10

Photo Number: 2

Photographer: SH Snider

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client: US EPA	Project Number: 46122.130
Site Name: Edwardsport Plant	Location: Edwardsport IN

Orientation: South

Description:

Typical condition of Primary and Secondary Ash Pond exterior dike slopes.

Date: 8/10/10

Photo Number: 3

Photographer: SH Snider

Orientation: North

Description:

Ponded water in drainage swale at Primary Ash Pond dike's western exterior toe.

Date: 8/10/10

Photo Number: 4

Photographer: SH Snider

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client: US EPA	Project Number: 46122.130
Site Name: Edwardsport Plant	Location: Edwardsport IN

Orientation: North from outlet structure.

Description:

Drainage ditch from CCW and drainage inlets in Primary Ash Pond. Note excavator maintaining flow from decant inlet to ditch.

Date: 8/10/10

Photo Number: 5

Photographer: SH Snider

Orientation: Southwest

Description:

Inlet to Primary Ash Pond outlet structure. All stoplogs have been removed to facilitate dewatering and removal of CCW.

Date: 6/6/10

Photo Number: 6

Photographer: SH Snider

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client: US EPA	Project Number: 46122.130
Site Name: Edwardsport Plant	Location: Edwardsport IN

Orientation: North

Description:

Typical condition of dividing dike slope. Mild turbulence in Secondary Ash Pond water surface from Primary Ash Pond outlet conduit. Note excavator stockpiling dewatered Primary Pond ash.

Date: 8/10/10

Photo Number: 7

Photographer: SH Snider

Orientation: South

Description:

Typical condition of southern toe of Secondary Ash Pond.

Date: 8/10/10

Photo Number: 8

Photographer: SH Snider

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client: US EPA	Project Number: 46122.130
Site Name: Edwardsport Plant	Location: Edwardsport IN

Orientation: North

Description:

Secondary Ash Pond outlet structure, inboard slope and dike crest. Note lowered pond level about 4 feet below historic norm.

Date: 8/10/10

Photo Number: 9

Photographer: SH Snider

Orientation: East

Description:

18-inch outlet from Secondary Ash Pond.

Date: 8/10/10

Photo Number: 10

Photographer: SH Snider

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client: US EPA	Project Number: 46122.130
Site Name: Edwardsport Plant	Location: Edwardsport IN

Orientation: Southeast

Description:

Cracked southern retaining wall of Secondary Ash Pond outlet apron.

Date: 8/10/10

Photo Number: 11

Photographer: SH Snider

Orientation: North from dividing dike.

Description:

Ash removal from Primary Ash Pond.

Date: 8/10/10

Photo Number: 12

Photographer: SH Snider

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client: US EPA	Project Number: 46122.130
Site Name: Edwardsport Plant	Location: Edwardsport IN

Orientation: Southwest

Description:

CCW inlet to Primary Ash Pond. Outlet structure at dividing dike in background.

Date: 8/10/10

Photo Number: 13

Photographer: SH Snider

Orientation:

Description:

Date:

Photo Number:

Photographer: