DRAFT REPORT

Dam Safety Assessment of CCR Impoundments

HATFIELD'S FERRY POWER STATION

United States Environmental Protection Agency
Washington, DC

March 4, 2013

O'BRIEN & GERE
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13498/46122

Dam Safety Assessment of CCR Impoundments

Hatfield's Ferry Power Station

Prepared for:
US Environmental Protection Agency
Washington, DC

ROBERT R. BOWERS, P.E. – VICE PRESIDENT
O'BRIEN & GERE ENGINEERS, INC.

TABLE OF CONTENTS

1. Introduction 1
1.1. General 1
1.2. Project Purpose and Scope 1
2. Project/Facility Description 3
2.1. Management Unit Identification 3
2.1.1. Waste Water Treatment (WWT) Lagoons 3
2.2. Hazard Potential Classification 4
2.2.1. Waste Water Treatment (WWT) Lagoons 5
2.3. Impounding Structure Details 5
2.3.1. Embankment Configuration 5
2.3.2. Type of Materials Impounded 6
2.3.3. Outlet Works 6
3. Records Review 7
3.1. Engineering Documents 7
3.1.1. Stormwater Inflows 7
3.1.2. Stability Analyses 7
3.1.3. Modifications from Original Construction 8
3.1.4. Instrumentation 8
3.2. Previous Inspections 8
3.3. Operator Interviews 8
4. Visual Inspection 9
4.1. General 9
4.2. Summary of Findings 9
5. Conclusions 11
6. Recommendations 12
6.1. Urgent Action Items 12
6.2. Long Term Improvement 12
6.3. Monitoring and Future Inspection 12
6.4. Time Frame for Completion of Repairs/Improvements 12
6.5. Certification Statement 13

Figures

Figure 1 – Site Location Map
Figure 2 – Facility Layout Plan
Figure 3 – Photo Location Map—Waste Water Treatment (WWT) Lagoons
Figure 4 – Typical Lagoon Cross-Section

Appendices

Appendix A – Visual Inspection Checklist
Appendix B – Photographs

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 (USEPA) has initiated a nationwide program of structural integrity and safety assessments of coal combustion residuals 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 U.S. EPA has authorized O'Brien & Gere to provide site specific impoundment assessments at selected facilities. This project is being conducted in accordance with the terms of BPA# EP10W000673, Order EP-B12S-00065, dated July 18, 2012.

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 (or shortly thereafter) 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 Waste Water Treatment (WWT) Lagoons at the Hatfield's Ferry Power Station in Masontown, Greene County, Pennsylvania. The above impoundments are owned and operated by First Energy. In the course of this assessment, we obtained information from representatives of First Energy and the Pennsylvania Department of Environmental Protection (PADEP).

2. PROJECT/FACILITY DESCRIPTION

The Hatfield's Ferry Power Station is located along the west side of the Monongahela River along East Roy Furman Highway in Masontown, Pennsylvania. The center of the Hatfield's Ferry Power Station is situated at approximate latitude 39.8556 degrees, and longitude -79.9288 degrees. A Site Location Map is included as Figure 1. The coal-fired power plant began commercial operation in 1969 and has three 576-megawatt units producing a total of 1,728 megawatts of electricity. Coal combustion residual waste that is produced during power generation consists of fly ash, bottom ash, and flue-gas scrubber sludge. Flue-gas scrubber sludge is dry handled and trucked to a landfill about 25 miles away in West Virginia. Fly ash is dry handled in silos and trucked for beneficial reuse or to the on-site landfill south of East Roy Furman Highway. Coal combustion residual bottom ash waste that is produced during power generation is managed in hydrobins which decant to ash settling basins, then pumped to the following CCW impoundments:

- Waste Water Treatment (WWT) Lagoons—Bottom ash impoundment composed of two cells: the Hillside Lagoon and the Riverside Lagoon.

This dam safety assessment report summarizes the September 25, 2012 inspection of the above management units at the Hatfield's Ferry Power Station.

2.1. MANAGEMENT UNIT IDENTIFICATION

The locations of impoundments visited during this safety assessment are identified on Figure 2 – Facility Layout Plan. Three separate pond facilities are located at the on-site landfill and are identified on Figure 2. Closed Landfill Pond 007 handles surface runoff from landfill phases 1 and 2 which are closed. It is regulated by the Pennsylvania Department of Environmental Protection (PADEP) Division of Dam Safety. Wetland Treatment Ponds handle water from landfill underdrains. A Leachate Storage Impoundment (LSI) constructed in 2009 handles surface runoff from phase 3 of the landfill still in operation. It is regulated by the PADEP Bureau of Waste Management. These impoundments are closely regulated by the PADEP and were not assessed for this safety assessment report. The only CCW managed in impoundments at the Hatfield's Ferry Power Station is bottom ash from decant of hydrobins.

Bottom Ash is handled in hydrobins which decant to ash setting basins. The ash settling basins also receive all of the plant's "low volume wastewater" (except for Flue Gas Desulfurization (FGD) wastewater).The ash settling basins are located within the main plant area and are below ground reinforced concrete tank structures, which were not assessed. Decant water from the ash settling basins is pumped to one of two Waste Water Treatment (WWT) Lagoons, which are separated by a divider dike. Both lagoon impoundments were assessed. The majority of bottom ash is distributed for beneficial use, or used as landfill or pond liner. Remaining bottom ash enters the ash settling basins, then the WWT Lagoons. Twice per week, a bottom ash decant of the hydrobins is conducted, which produces more inflow.

2.1.1. Waste Water Treatment (WWT) Lagoons

The WWT Lagoons are located within the north corner of the Hatfield's Ferry Plant, as shown on Figure 2. Each lagoon consists of an approximately 1.6 acre impoundment. The Hillside Lagoon (southwest or plant south lagoon) is bordered on the north, west, and south by constructed embankments; and, on the east by a divider dike separating the two lagoons. Little Whitely Creek runs about 100 feet from the south corner of the Hillside Lagoon, approximately 40 below the embankment crest. The Riverside Lagoon (northeast or plant north lagoon) is bordered on the west by the divider dike; and, on the north, east and south by constructed embankments. The eastern embankment was constructed near the top of the Monongahela River's natural slope. The access road to the lagoons runs alongside and over Little Whitely Creek. Both lagoons were assessed.

One lagoon remains out of operation for dredging and relining at all times. In September 2012, the Hillside Lagoon was in service and the Riverside Lagoon was drained. Interior features of the two lagoons are identical. Both lagoons are about 13 feet deep. Inflow is through three (3) 12-inch pipes at the south end (Photo 11).

Decant water flows over a long metal weir trough (Photos 5 and 10). In the middle of the weir trough, each lagoon is drained for ash removal through a concrete outlet tower with an adjustable stop plate. From the weir trough and concrete outlet tower, decant water flows into a buried 24-inch outlet pipe, then into a concrete weir box open channel which transitions into a riprap-lined channel before entering the Monongahela River (Photo 20). Prior to discharge, decant water is automatically sampled with sampling equipment in the Monitoring Building on the north side of the Hillside Lagoon (Photo 16). The discharge is authorized by Pennsylvania National Pollutant Discharge Elimination System (PA NPDES) Permit No. PA0002941.

2.2. HAZARD POTENTIAL CLASSIFICATION

The Commonwealth of Pennsylvania classifies dams or embankments in accordance with the Pennsylvania Dam Safety and Encroachments Act and Title 25 of the Pennsylvania Code, Chapter 105. The regulations are administrated by the Pennsylvania Department for Environmental Protection (PADEP), Bureau of Waterways Engineering, Division of Dam Safety. Structures and activities regulated by the PADEP are as follows (25 PA Code § 105.3.a):

1) *Dams on a natural or artificial watercourse, other than those licensed under the Federal Power Act (16 U.S.C.A. § § 791a—825s), where one or more of the following occur:*

   (i) The contributory drainage area exceeds 100 acres.
   (ii) The greatest depth of water measured by upstream toe of the dam at maximum storage elevation exceeds 15 feet.
   (iii) The impounding capacity at maximum storage elevation exceeds 50 acre-feet.

2) *Dams used for the storage of water not located on a watercourse and which have no contributory drainage where the greatest depth of water measured at upstream toe of the dam at maximum storage elevation exceeds 15 feet and the impounding capacity at maximum storage elevation exceeds 50 acre-feet.*

3) *Dams used for the storage of fluids or semifluids other than water, the escape of which may result in air, water or land pollution or in danger to persons or property.*

4) *Water obstructions and encroachments other than dams located in, along or across, or projecting into a watercourse, floodway or body of water, whether temporary or permanent.*

5) *Flood control projects constructed, owned or maintained by a governmental unit.*

Dam and embankment hazard classifications are established by Title 25 PA Code Chapter 105.91 and provide standards regarding impoundment facility structure classification:

A dam or reservoir shall be classified in accordance with Size Category and the Hazard Potential Category which might occur in the event of an operational or structural failure. In approving a classification, the Department will consider, without limitation:

(1) The height of the dam and storage capacity of the reservoir.
(2) The physical characteristics and extent of actual and projected development of the dam site and downstream areas.
(3) The relationship of the site to existing or projected industrial, commercial and residential areas and other land uses downstream which may be affected by a dam failure.

The PADEP Division of Dam Safety currently does not regulate the WWT Lagoons; therefore, no PADEP hazard classification has been assigned. In the absence of a State Hazard Potential Classification, the FEMA guidelines, *Hazard Potential Classification System for Dams* (2004) have been applied in this assessment to recommend a

hazard potential classification for the impoundments.

2.2.1. Waste Water Treatment (WWT) Lagoons

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 WWT Lagoons is **SIGNIFICANT**. A failure of the embankments impounding the WWT Lagoons would result in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.

The **SIGNIFICANT** hazard potential is recommended primarily due to the potential for release of CCW into Little Whitely Creek or the Monongahela River and the environmental impacts associated with such a potential release. Loss of human life and/or damage to critical infrastructure or lifeline facilities in the event of a dike breach is unlikely. However, environmental impacts to waters of the U.S. are likely due to the proximity of the impoundments to Little Whitely Creek and the Monongahela River which is a public drinking water supply.

2.3. IMPOUNDING STRUCTURE DETAILS

The following sections summarize the structural components and basic operations of the subject impoundments. The location of the impoundments on the plant grounds is shown on Figure 2. A typical cross section of the WWT Lagoons in shown on Figure 4.

2.3.1. Embankment Configuration

Each lagoon impounds a surface area of approximately 1.6 acre. The Riverside Lagoon is diked on all sides; however, the Hillside Lagoon is partially incised on the west side. Based on the drawings provided by First Energy, maximum constructed embankment heights and slopes are shown in the table below.

Lagoon	Embankment	Maximum constructed height	Inboard Slope	Outboard Slope
Hillside Lagoon	Southern	Up to 20 ft	3H:1V	2H:1V
	Northern	Up to 15 ft	2.5H:1V	2.5H:1V
	Eastern (divider dike)	Up to 25 ft	3H:1V	2.5H:1V
	Western (hillside)	Up to 25 ft (and partially incised)	3H:1V	2.5H:1V
Riverside Lagoon	Southern	Up to 20 ft	3H:1V	2H:1V
	Northern	Up to15 ft	2.5H:1V	2.5H:1V
	Eastern (riverside)	Up to 25 ft	3H:1V	2.5H:1V
	Western (divider dike)	Up to 25 ft	3H:1V	2.5H:1V

The western embankment of the Hillside Lagoon ties into relatively flat ground for 50-100 feet which is then bordered by a natural hillside. The south corner of the Hillside Lagoon ties into ground sloping down for about 100 feet at about 4H:1V toward Little Whitely Creek. The eastern embankment of the Riverside Lagoon ties into a relatively flat segment for about 10-25 feet before sloping down at about 3H:1V to the Monongahela River.

The crest is at approximately elevation (EL) 806 feet above mean sea level. The lagoon bottom (as indicated by plant record drawings) is at approximately EL 793. The typical water surface elevation maintained in the operating lagoon is approximately EL 803. As described in the table above, the northern inboard embankment slope has in inclination of approximately 2.5H:1V. Remaining inboard embankment slopes, including the divider dike slopes, have an inclination of approximately 3H:1V. The southern outboard embankment slope has an inclination of approximately 2H:1V. Remaining outboard embankment slopes have an inclination of approximately 2.5H:1V.

Hand placed riprap embankment protection was constructed on the southern embankment inboard slope and bottom of the Hillside Lagoon's western embankment outboard slope where not incised.

2.3.2. Type of Materials Impounded

Suspended particulate bottom ash that is not removed in the hydrobins or ash settling basins is stored in the WWT Lagoons. Ash is dewatered in hydrobins so that it may be distributed for beneficial use, or used as landfill or pond liner. Remaining ash settles out in the ash settling basins or WWT Lagoons.

2.3.3. Outlet Works

The WWT Lagoons have identical outlet works. A temporary boom is placed near the center of the operating WWT Lagoon to trap floating debris and encourage ash settling in the upstream half of the lagoon. Water is decanted through a 72-ft long, 2.5-ft wide metal weir trough which drains toward the center. A concrete outlet tower contains an adjustable stop plate which is used to drain the lagoon through orifices located on the side of the outlet tower. At the bottom of the outlet tower, a 24-inch diameter pipe directs outflow to the Monitoring Building. Outflow exits the Monitoring Building over a flume in a concrete weir box, then discharges into a rip rap-lined channel and outfalls at the Monongahela River. The discharge is authorized by Pennsylvania National Pollutant Discharge Elimination System (PA NPDES) Permit No. PA0002941.

3. RECORDS REVIEW

A review of the available records related to design, construction, operation and inspection of the WWT Lagoons was performed as part of this assessment. The documents provided by First Energy are listed below:

Table 3.1 Summary of Documents Reviewed

Document	Dates	By	Description
West Penn Power Company Hatfield Power Station Wastewater Treatment Facilities Construction Drawings	1976-1977	First Energy	Sheet C-2411: Lagoons Plan C-2412: Lagoons Section and Details Sheet 1 C-2418: Lagoons Section and Details Sheet 3 C-2419: Lagoons Section and Details Sheet 4 C-2424: Lagoons Section and Details Sheet 5 C-4426: Lagoon & Settling Camber Piping

3.1. ENGINEERING DOCUMENTS

Review of the above documents revealed information on the design details and construction of the Hatfield's Ferry CCW impoundments, which are summarized below.

- Waste Water Treatment (WWT) Lagoons were constructed and put into operation in 1977.
- All embankment sides were constructed between 15 to 25 feet high except for a section of the Hillside Lagoon that was incised.
- A one-foot (1-ft) thick layer of bottom ash lines the lagoon bottoms.
- Foundation subsurface drains surround the embankment perimeter and a subsurface drainage system was constructed within the lagoon bottoms. Outflow from the subsurface system is directed to a manhole on the riverside slope which outlets to a 12-inch diameter RCP (reinforced concrete pipe) that connects to the lagoon outfall to the Monongahela River.
- No geotechnical information or slope stability analyses were available for review.
- No embankment failures or releases of impounded materials have occurred.

3.1.1. Stormwater Inflows

No hydrologic & hydraulic analyses have been conducted to evaluate stormwater inflow into the WWT Lagoons. The impounding structures are surrounded by 15 to 25-ft high diked embankments on nearly all sides except for a portion of the western embankment. This portion of the western embankment was constructed with an approximately 5-ft high outboard slope draining to a 3H:1V V-shaped perimeter surface drain. Therefore, stormwater inflows to the WWT Lagoons are limited to direct precipitation with negligible runoff based on observations of the topography around the lagoons. Available volume provided by the lagoon freeboard of three (3) feet is sufficient to contain the precipitation of a 24-hour 100-year storm (5 inches) or a PMP (Probable Maximum Precipitation) event (approximately 34 inches) without overtopping the lagoon.

3.1.2. Stability Analyses

As mentioned above, no geotechnical records of design or as-built slope stability analyses were provided in the records made available by First Energy. Based on our discussions with plant personnel, geotechnical design and slope stability records are either non-existent or could not be located in preparation for our visit. No indications of slope distress were observed during the visual inspection of both lagoons.

3.1.3. Modifications from Original Construction

Based on records review and discussions with plant personnel, no modifications from original lagoon construction have occurred.

3.1.4. Instrumentation

No geotechnical or dam safety related instrumentation has been installed. The Monitoring Building and groundwater monitoring pits were part of original lagoon construction.

3.2. PREVIOUS INSPECTIONS

Informal operational inspections are conducted. No inspections are performed to check for seepage, cracks, holes, and freeboard.

3.3. OPERATOR INTERVIEWS

Plant personnel took part in the inspection proceedings. The following table lists participants for the September 2012 inspection of the WWT Lagoons:

Name	Affiliation	Title
Joe Lapcevic	First Energy	Senior Environmental Scientist
Randy Jones	First Energy	Senior Environmental Scientist
Dreher Whetstone, PE	O'Brien & Gere	Technical Associate - Geotechnical Engineer
Carrie Lohrmann, PE	O'Brien & Gere	Design Engineer

Dave Hoone of First Energy was unable to attend the September 2012 inspection; however, he provided construction drawings and additional information following the inspection. PADEP desired to attend the inspection, but also was not present. Facility personnel provided a good working knowledge of the CCW impoundments, provided general plant operation background and provided requested historical documentation. The personnel listed in the table above accompanied O'Brien & Gere throughout the visual inspection to answer questions and to provide additional information as needed in the field.

4. VISUAL INSPECTION

The following sections summarize the inspection of the Waste Water Treatment (WWT) Lagoons which occurred on September 25, 2012. At the time of the inspection, O'Brien & Gere filled out EPA inspection checklists for the facilities. Additional information on the checklists was identified from drawings provided by First Energy following the inspection. Checklists were submitted electronically to EPA on November 12, 2012. Copies of the completed inspection checklists are included as Appendix A.

4.1. GENERAL

The weather on the date of the inspection was approximately 55 degrees and mostly clear. The visual inspection consisted of a thorough site walk along the perimeter of the impoundment dikes and other portions of the impoundments to observe outlet structures and general facility operations. O'Brien & Gere team members made observations along the toe, outboard slope, and crest of the dikes, and along exposed portions of the inboard slopes. We also observed the inlet/outlet structures and current operation.

Photos of relevant features and conditions observed during the inspection were taken by O'Brien & Gere and are provided in Appendix B. An aerial photograph depicting the layout and locations and orientation of the photographs is included as Figure 3.

4.2. SUMMARY OF FINDINGS

The following observations were made during the inspection:

- The Hillside Lagoon was operating at the time of inspection. The Riverside Lagoon was drained at the time of inspection. Otherwise, lagoon features and condition are nearly identical so they are documented as one complete unit.
- Lagoon access was restricted with a security fence topped with barbed wire.
- Sluiced bottom ash enters the south end of the lagoons through three (3) 12-inch inflow pipes. Inflow control valves for both lagoons are located near the top of the southern outboard slope.
- No depressions or ponding along the crest were noted.
- The access road to the lagoons and lagoon crest roadway surfaces were mainly bare earth with some gravel. The access road down to the river was mainly gravel and grass. Access roads were maintained adequately for vehicular traffic.
- The freeboard portion of the Hillside Lagoon and Riverside Lagoon inboard slopes and inboard slopes were mainly vegetated with tall grasses and wildflowers.
- The bottom of the Riverside Lagoon had been relined with bottom ash except for at the north end where water ponded in the bottom. Lower inboard slopes were a combination of bottom ash and earth. No significantly eroded areas were observed.
- The divider dike crest and slopes were identical in material and condition to other portions of the crest roads and inboard slopes.
- The boom in the Hillside Lagoon as well as inflow and outflow structures appeared to be in good condition and functioning normally.
- Plant personnel stated that the adjustable stop plates for draining the lagoons are operational.
- Metal outflow weir troughs and other metal components were rusted, but the outlet works showed no other significant signs of wear.

- The southern embankment outboard slope was heavily vegetated with tall grasses, wildflowers, brush, saplings, and small trees. Remaining outboard slopes were vegetated with tall grasses, wildflowers, and a few small trees.
- The eastern embankment, natural slope down to the Monongahela River, and streamside of the access road to the lagoons are a protected mitigation area that was intentionally planted as mitigation for another on-site project.
- No seepage was evident.
- A Monitoring Building is positioned northwest of the Riverside Lagoon, below the toe of the outboard slope.
- The WWT Lagoons' outfall to the Monongahela River was observed and operating.

5. CONCLUSIONS

Based on the ratings defined in the USEPA Task Order Performance Work Statement (Satisfactory, Fair, Poor and Unsatisfactory), the information reviewed and the visual inspection, the overall condition of the Waste Water Treatment (WWT) Lagoons is considered to be **POOR**. Acceptable performance is expected; however, some deficiencies exist that require additional studies or investigations and/or repair.

While the visual condition of this management unit is good, this rating must be given since no stability analyses are on file. Stability analysis requirements should be verified prior to conducting investigations.

Minor deficiencies include the following:

- Heavy vegetation on southern outboard slope, tall grass and some trees on remaining outboard slopes.
- Tall grass vegetation on inboard slopes.

Though no hydrologic & hydraulic analyses have been conducted to evaluate stormwater inflow into the WWT Lagoons, the impounding structures are diked on all sides. Based on a visual review of the topography surrounding the WWT Lagoons, stormwater inflow would be limited to direct precipitation. Available volume provided by the lagoon freeboard of three (3) feet is sufficient to contain the precipitation of a 24-hour 100-year storm (5 inches) or a PMP (Probable Maximum Precipitation) event (approximately 34 inches) without overtopping the lagoon. Maintenance and improvement measures that should be addressed include the following:

- Cutting tall grass on the inboard slopes and maintaining a mowed condition so the slopes can be inspected.
- Clearing trees and shrubs on the outboard slopes, cutting tall grass and maintaining a mowed condition.

Limits of embankment outboard slopes can be identified from the lagoon construction drawings and should be noted with field markers. Slopes around the lagoon access road and natural slopes beyond the lagoon embankment slopes do not need to be cleared or mowed. First Energy should implement regular visual inspections for perimeter embankment seeps, cracks, holes, and freeboard with the goal of identifying, documenting, and repairing any deficiencies early so that they do not develop into more serious problems. Plant staff should maintain design and construction documents and inspection reports in a well organized manner for future reference.

6. RECOMMENDATIONS

Based on the findings of our visual inspection and review of the available records for the Waste Water Treatment (WWT) Lagoons, O'Brien & Gere recommends that additional maintenance of the embankments be performed to correct the vegetation issues 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 dikes 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 are provided below:

- Cutting tall grass on the inboard slopes and maintaining a mowed condition so the slopes can be inspected.
- Clearing trees and shrubs on the southern embankment outboard slope, cutting tall grass and maintaining a mowed condition.
- Clearing any trees and shrubs on the remaining constructed portions of the outboard slopes, cutting tall grass and maintaining a mowed condition. Limits of constructed outboard slopes can be identified from the lagoon construction drawings and should be noted with field markers. Slopes around the lagoon access road, outside the lagoon outboard slopes, do not need to be cleared or mowed.
- A geotechnical investigation and slope stability analysis should be performed to assess embankment stability in accordance with applicable dam safety criteria.

Mowing equipment that may cause ruts or rills on the embankments should not be used. String trimmers or specialized arm-mounted slope mowers are a preferred option for cutting embankment vegetation.

6.3. MONITORING AND FUTURE INSPECTION

O'Brien & Gere recommends periodic inspections by independent licensed dam safety engineers on at least a biennial basis. First Energy should implement regular visual inspections for perimeter embankment seeps, cracks, holes, and freeboard with the goal of identifying, documenting, and repairing any deficiencies early so that they do not develop into more serious problems. Plant staff should maintain design and construction documents and inspection reports in a well organized manner for future reference.

6.4. TIME FRAME FOR COMPLETION OF REPAIRS/IMPROVEMENTS

Based on the findings of this assessment, O'Brien & Gere recommends that First Energy begin clearing and mowing in the next growing season and implement regular visual inspections at that time. Clearing should be completed by the end of the next growing season prior to mowing. A geotechnical investigation and slope stability analysis should be performed within the next year to ensure that the embankment meets standard dam safety stability criteria.

6.5. CERTIFICATION STATEMENT

I acknowledge that the Waste Water Treatment (WWT) Lagoons, CCW management units, referenced herein were personally inspected by me on September 25, 2012 and were found to be in the following condition:

SATISFACTORY

FAIR

(POOR)

UNSATISFACTORY

Signature: _____ Date: _____

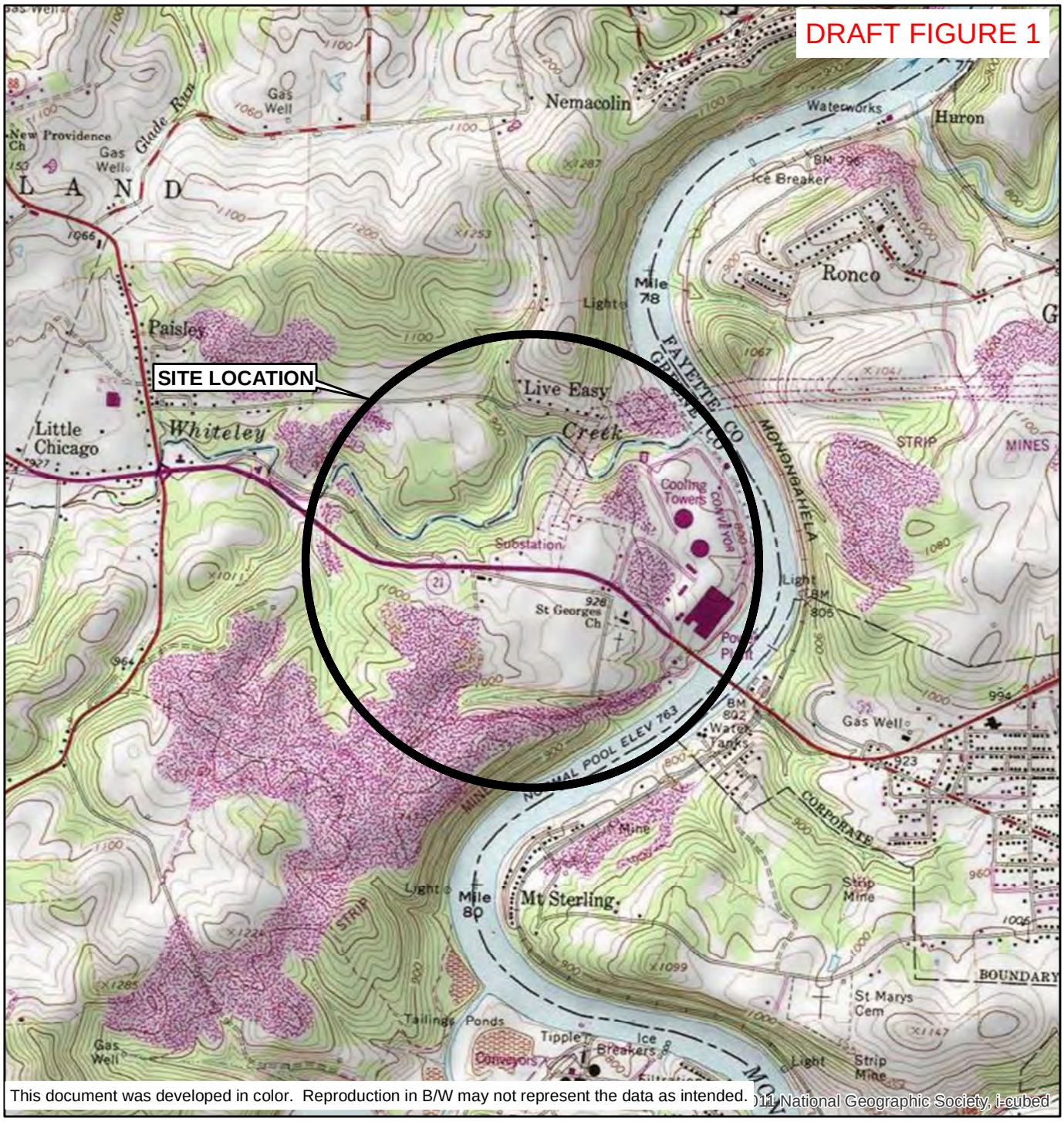
D. Dreher Whetstone, PE
PA PE License PE060840

US EPA ARCHIVE DOCUMENT

I:\US-EPA.13498\STDS\GIS\Coal_Impoundments\Figures\HatfieldsFerry\HatfieldsFerry_Figure1_SiteLocation.mxd

PLOTDATE: 2/20/2013 DRK

DRAFT FIGURE 1



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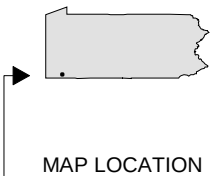
ADAPTED FROM: CARMICHEALS AND MASONTOWN, PENNSYLVANIA USGS QUADRANGLES

US EPA - DAM SAFETY ASSESSMENT OF CCW IMPOUNDMENTS
HATFIELD'S FERRY POWER STATION
MASONTOWN, PENNSYLVANIA



MAP LOCATION

N

SITE LOCATION

0 1,000 2,000 4,000 6,000 8,000

Feet

FEBRUARY 2013
13498/46122

1:24,000

O'BRIEN & GERE

DRAFT FIGURE 2

N

LEGEND

- OUTFALL
- LAGOON
- OTHER IMPOUNDMENT
- LITTLE WHITELEY CREEK

DAM SAFETY ASSESSMENT OF
CCW IMPOUNDMENTS
HATFIELD'S FERRY
POWER STATION
MASONTOWN, PENNSYLVANIA

FACILITY LAYOUT PLAN

0 300 600 1,200
Feet

FEBRUARY 2013
13498/46122

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I:\US-EPA_13498\STDS\GIS\Coal_Impoundments\Figures\HatfieldsFerry\HatfieldsFerry_Figure3_WWT_Lagoons.mxd

DRAFT FIGURE 3

N

LEGEND

- OUTFALL
- LAGOON
- 1 PHOTO LOCATION/ DIRECTION

DAM SAFETY ASSESSMENT OF
CCW IMPOUNDMENTS
HATFIELD'S FERRY
POWER STATION
MASONTOWN, PENNSYLVANIA

WWT LAGOONS PHOTO LOCATION MAP

0 50 100 200
Feet

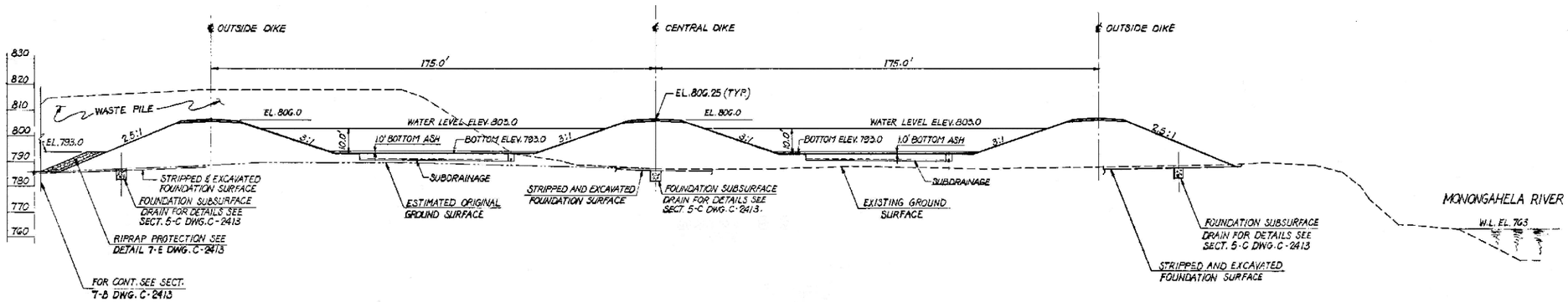
FEBRUARY 2013
13498/46122

O'BRIEN & GERE

PLOTDATE: 2/20/2013 DRK

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

FIGURE 4



WASTEWATER TREATMENT (WWT) LAGOONS

(SECTION 5-C)

SCALE: 1" = 50'-0"

REFERENCE:
DRAWING TAKEN FROM DRAWING NO. 4918-C-2412, REVISION A, TILTLED "LAGOONS SECTIONS AND DETAILS, SH.1", DATED 8/10/76 BY SANDERSON & PORTER, INC., NEW YORK

US EPA
DAM SAFETY ASSESSMENT
OF CCW IMPOUNDMENTS

FIRST ENERGY
HATFIELD'S FERRY
MASONTOWN, PENNSYLVANIA

WASTEWATER TREATMENT LAGOONS

1"=50' 50 0 50

46122-HATFIELDS-F04
FEBRUARY 2013

O'BRIEN & GERE

APPENDIX A

Visual Inspection Checklist

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name:	Hatfields Ferry Power Station	Date:	September 25, 2012
Unit Name:	~~Ash Settling Basins - 2~~	Operator's Name:	First Energy
Unit I.D.:	~~Waste Water Treatment (WWT) Lagoons~~	Hazard Potential Classification:	High **Significant** Low
Inspector's Name:	D. Whetstone, PE & C. Lohrmann, PE		

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?	never		18. Sloughing or bulging on slopes?		✓
2. Pool elevation (operator records)?	803.0		19. Major erosion or slope deterioration?		✓
3. Decant inlet elevation (operator records)?			20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	803.0		Is water entering inlet, but not exiting outlet?		✓
5. Lowest dam crest elevation (operator records)?	806.0		Is water exiting outlet, but not entering inlet?		✓
6. If instrumentation is present, are readings recorded (operator records)? N/A			Is water exiting outlet flowing clear?	✓	
7. Is the embankment currently under construction?		✓	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)?			From underdrain?		✓
9. Trees growing on embankment? (If so, indicate largest diameter below)	✓		At isolated points on embankment slopes?		✓
10. Cracks or scarps on crest?		✓	At natural hillside in the embankment area?		✓
11. Is there significant settlement along the crest?		✓	Over widespread areas?		✓
12. Are decant trashracks clear and in place?			From downstream foundation area?		✓
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		✓	"Boils" beneath stream or ponded water?		✓
14. Clogged spillways, groin or diversion ditches?		✓	Around the outside of the decant pipe?		✓
15. Are spillway or ditch linings deteriorated?		✓	22. Surface movements in valley bottom or on hillside?		✓
16. Are outlets of decant or underdrains blocked?		✓	23. Water against downstream toe?		✓
17. Cracks or scarps on slopes?		✓	24. Were Photos taken during the dam inspection?	✓	

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. Adjustable stop plate
6. No instrumentation present.
8. Unknown
9. 6" - small brush, young trees

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # PA 0002941 INSPECTOR D. Whetstone/C. Lohrmann

Date September 25, 2012
Impoundment Name ~~Ash Settling Basins~~ Waste Water Treatment (WWT) Lagoons
Impoundment Company First Energy
EPA Region 3
State Agency (Field Office) Address PA Dept. of Environmental Protection
Pittsburgh, PA

Name of Impoundment ~~Ash Settling Basins~~ Waste Water Treatment (WWT) Lagoons

(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: **Settling suspended fly ash solids not removed with dry handling.**

Nearest Downstream Town Name: Masontown
Distance from the impoundment: 0.75 mile / 4000 feet

Impoundment Location:
Latitude 39 Degrees 51 Minutes 46 Seconds North
Longitude 79 Degrees 55 Minutes 50 Seconds West

State PA County Fayette

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

If So Which State Agency? PA Department of Environmental Protection
For effluent water quality only.

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.

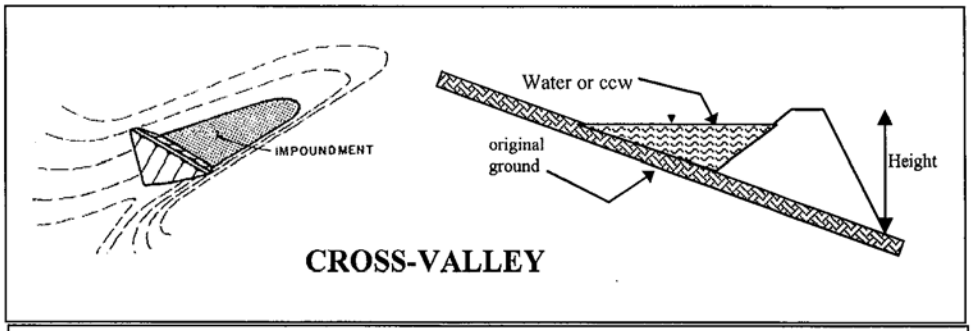
__X__ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. 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.

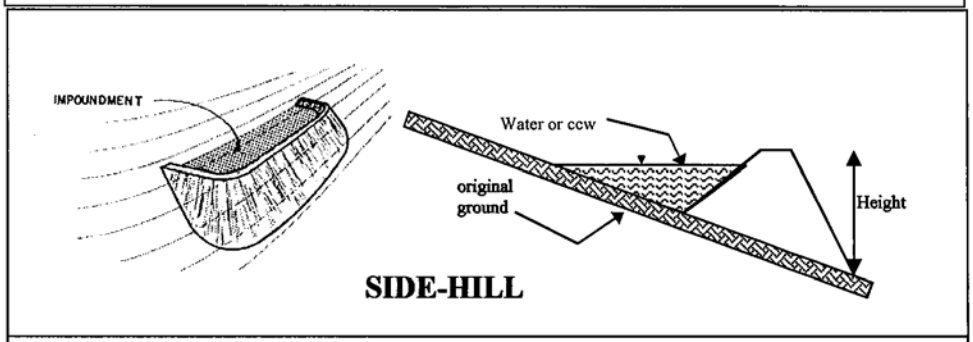
_____ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

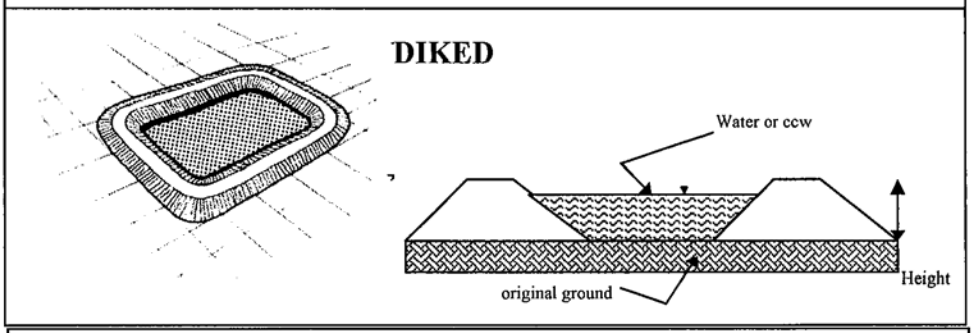
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

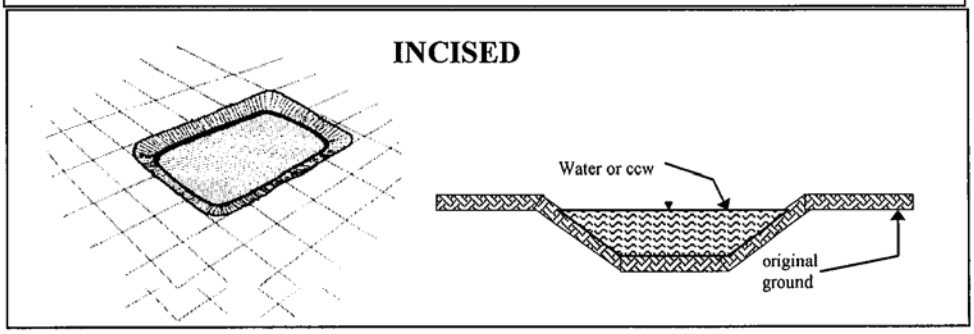
A breach in the embankment would flow into the Monongahela River which is adjacent to the ~~ponds~~ lagoons, potentially causing environmental damage.

CONFIGURATION:







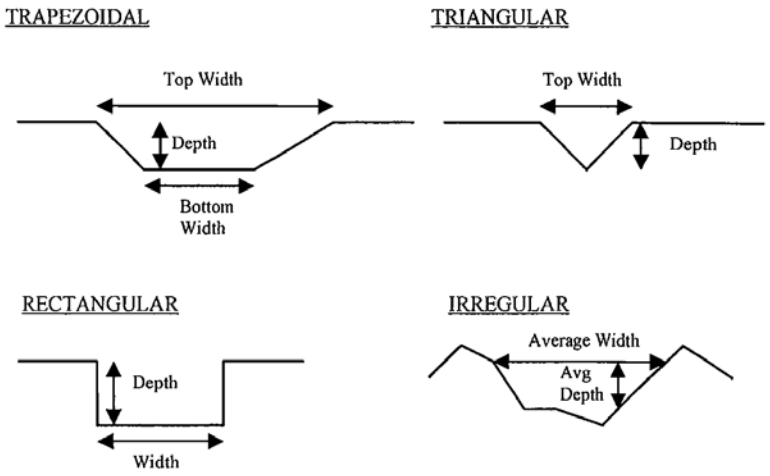


_____ Cross-Valley _____ Side-Hill _____ Diked

_____ Incised (form completion optional) __X__ Combination Incised/Diked

Embankment Height	36	Feet	Embankment Material	Earth
Pool Area	(1 lagoon) 1.6	Acres	Liner	Clay
Current Freeboard	3	feet	Linear Permeability	unknown

TYPE OF OUTLET (Mark all that apply)



_____ **Open Channel Spillway**

_____ Trapezoidal

_____ Triangular

X Rectangular

_____ Irregular

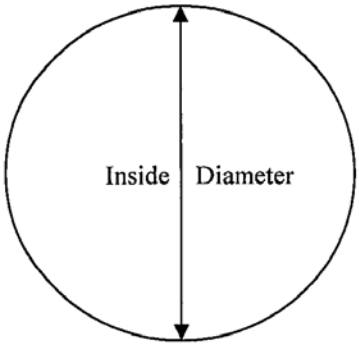
2.5 depth (ft)

72 bottom (or average) width (ft)

72 top width (ft)

_____ **Outlet**

_____ Inside diameter



Material

_____ corrugated metal

_____ welded steel

_____ concrete

_____ plastic (hdpe, pvc, etc.)

X other (specify):

Outflow flows over the top of a 72-ft long, 2.5-ft wide metal weir trough, alternately through a concrete outlet tower with an adjustable stop plate / to outlet pipe to concrete weir box open channel to rip rap open channel to river

Is water flowing through the outlet? YES X NO _____

_____ **No Outlet**

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

The Impoundment was Designed By Sanderson & Porter, Inc. of New York for West Penn Power Company: Hatfield Power Station Wastewater Treatment Facilities

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

If So When? _____

If So Please Describe: _____

Have there ever been significant seepages at this site? YES _____ NO___X_____

If So When? _____

IF So Please Describe: _____

Have 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: _____

Additional Inspection Questions

Concerning the embankment foundation, was the embankment construction built over wet ash, slag, or other unsuitable materials? If there is no information just note that.

No information.

Did the dam assessor meet with, or have documentation from, the design Engineer-of-Record concerning the foundation preparation?

No.

From the site visit or from photographic documentation, was there evidence of prior releases, failure, or patchwork on the dikes?

No.

APPENDIX B

Photographs

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PHOTOGRAPHIC LOG

Client:	US EPA	Project Number:	46122.210.100
Site Name:	First Energy – Hatfield's Ferry	Location:	Masontown, PA

Orientation: SE Description: Ash Settling Basin 1 in operation, view from outlet tower. Date: 9/25/12 Photo Number: 1 Photographer: DDW	
Orientation: SE Description: Divider dike between 2 Ash Settling Basins. Basin 1 in operation on right. Drained Basin 2 on left. Date: 9/25/12 Photo Number: 2 Photographer: DDW	

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client:	US EPA	Project Number:	46122.210.100
Site Name:	First Energy – Hatfield's Ferry	Location:	Masontown, PA

Orientation: NW

Description: Ash Settling Basin 1, view from basin south corner. Note boom across center of basin in background.

Date: 9/25/12

Photo Number: 3

Photographer: DDW

Orientation: NW

Description: Ash Settling Basin 2, view from basin south corner.

Date: 9/25/12

Photo Number: 4

Photographer: DDW

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client:	US EPA	Project Number:	46122.210.100
Site Name:	First Energy – Hatfield's Ferry	Location:	Masontown, PA

Orientation: NE Description: Weir trough in operation in Ash Settling Basin 1. Date: 9/25/12 Photo Number: 5 Photographer: DDW	
Orientation: SE Description: Concrete outlet tower with adjustable stop plate in Ash Settling Basin 1. Date: 9/25/12 Photo Number: 6 Photographer: DDW	

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client:	US EPA	Project Number:	46122.210.100
Site Name:	First Energy – Hatfield's Ferry	Location:	Masontown, PA

Orientation: W Description: Ash Settling Basin 2 bottom, inboard slopes, concrete outlet tower, and weir trough. Date: 9/25/12 Photo Number: 7 Photographer: DDW	
Orientation: W Description: Exposed concrete outlet tower with adjustable stop plate in Ash Settling Basin 2. Date: 9/25/12 Photo Number: 8 Photographer: DDW	

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client:	US EPA	Project Number:	46122.210.100
Site Name:	First Energy – Hatfield's Ferry	Location:	Masontown, PA

Orientation: SW

Description: Ash Settling Basin 2 inboard slopes near concrete outlet tower and weir trough.

Date: 9/25/12

Photo Number: 9

Photographer: DDW

Orientation: SW

Description: Weir trough out of operation in Ash Settling Basin 2.

Date: 9/25/12

Photo Number: 10

Photographer: DDW

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client:	US EPA	Project Number:	46122.210.100
Site Name:	First Energy – Hatfield's Ferry	Location:	Masontown, PA

Orientation: NE Description: Inflow pipes on inboard slope of drained Ash Settling Basin 2. Date: 9/25/12 Photo Number: 11 Photographer: DDW	
Orientation: SW Description: Ash Setting Basin inflow pipes and valves near top of southern embankment outboard slope. Date: 9/25/12 Photo Number: 12 Photographer: DDW	

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client:	US EPA	Project Number:	46122.210.100
Site Name:	First Energy – Hatfield's Ferry	Location:	Masontown, PA

Orientation: SW Description: Access road and southern embankment of Ash Settling Basins. Date: 9/25/12 Photo Number: 13 Photographer: DDW	
Orientation: NW Description: Inflow pipes along southern embankment of Ash Setting Basins. Date: 9/25/12 Photo Number: 14 Photographer: DDW	

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client:	US EPA	Project Number:	46122.210.100
Site Name:	First Energy – Hatfield's Ferry	Location:	Masontown, PA

Orientation: W

Description: Flat area west of Ash Settling Basins, limestone conveyor and hillside in background.

Date: 9/25/12

Photo Number: 15

Photographer: DDW

Orientation: N

Description: Sampling building for Ash Settling Basin outflow prior to outfall at the Monongahela River.

Date: 9/25/12

Photo Number: 16

Photographer: DDW

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client:	US EPA	Project Number:	46122.210.100
Site Name:	First Energy – Hatfield's Ferry	Location:	Masontown, PA

Orientation: NW Description: Access road to Monongahela River on Ash Setting Basin 2 eastern embankment. Date: 9/25/12 Photo Number: 17 Photographer: DDW	
Orientation: SE Description: Natural riverside slope along Monongahela River and toe of constructed eastern embankment of Ash Settling Basin 2. Planted as mitigation area. Date: 9/25/12 Photo Number: 18 Photographer: DDW	

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client:	US EPA	Project Number:	46122.210.100
Site Name:	First Energy – Hatfield's Ferry	Location:	Masontown, PA

Orientation: SE Description: Mooring cells along Monongahela River adjacent to Ash Settling Basins. Date: 9/25/12 Photo Number: 19 Photographer: DDW	
Orientation: NW Description: Ash Setting Basins outfall to Monongehela River. Date: 9/25/12 Photo Number: 20 Photographer: DDW	

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client:	US EPA	Project Number:	46122.210.100
Site Name:	First Energy – Hatfield's Ferry	Location:	Masontown, PA

Orientation: NE Description: Access road to Ash Settling Basins. Mitigation area along access road and riverside embankment. Date: 9/25/12 Photo Number: 21 Photographer: DDW	
Orientation: N/A Description: Ash storage silos and hydrobins. Date: 9/25/12 Photo Number: 22 Photographer: DDW	

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client:	US EPA	Project Number:	46122.210.100
Site Name:	First Energy – Hatfield's Ferry	Location:	Masontown, PA

Orientation: S

Description: Closed Landfill Pond 007, view from right of outlet structure. Closed landfill in background.

Date: 9/25/12

Photo Number: 23

Photographer: DDW

Orientation: S

Description: Closed Landfill Pond 007 outfall.

Date: 9/25/12

Photo Number: 24

Photographer: DDW

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client:	US EPA	Project Number:	46122.210.100
Site Name:	First Energy – Hatfield's Ferry	Location:	Masontown, PA

Orientation: W Description: Leachate Storage Impoundment (LSI). Date: 9/25/12 Photo Number: 25 Photographer: DDW	
Orientation: NW Description: Leachate Storage Impoundment (LSI). Date: 9/25/12 Photo Number: 26 Photographer: DDW	

O'BRIEN & GERE

PHOTOGRAPHIC LOG

Client:	US EPA	Project Number:	46122.210.100
Site Name:	First Energy – Hatfield's Ferry	Location:	Masontown, PA

Orientation: SE Description: Leachate Storage Impoundment (LSI) outflow channel. Date: 9/25/12 Photo Number: 27 Photographer: DDW	
Orientation: N/A Description: On-site landfill in operation. Date: 9/25/12 Photo Number: 28 Photographer: DDW