ASSESSMENT OF DAM SAFETY OF COAL COMBUSTION SURFACE IMPOUNDMENTS

FirstEnergy Corp
Albright Power Station
Albright, West Virginia

Prepared for
U.S. Environmental Protection Agency
Washington, D.C.

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CDM Smith Project No.:
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CDM Smith

Table of Contents

Appendices

Tables

Figures

Section 1
Introduction, Summary Conclusions and Recommendations

1.1 Introduction

Following the December 22, 2008 dike failure at the Tennessee Valley Authority's Kingston, Tennessee coal combustion waste (CCW) ash pond dredging cell that resulted in a spill of over 1 billion gallons of coal ash slurry, covered more than 300 acres and impacted residences and infrastructure, the United States Environmental Protection Agency (USEPA) is embarking on a initiative to prevent the catastrophic failure from occurring at other facilities located at electrical utilities in an effort to protect lives and property from the consequences of a dam failure or the improper release of impounded slurry.

This assessment of the stability and functionality of the FirstEnergy Corp's Albright Power Station ash management units is based on a review of available documents, site assessments conducted by CDM Smith on September 18, 2012, and technical information provided subsequent to the site visit. In summary, the North and South Process Wastewater Lagoon's embankments are classified as **POOR** for continued safe and reliable operation, static and seismic engineering studies following the best professional engineering practice to support acceptable safety factors have not been presented for the embankments.

It is critical to note that the condition of the embankment(s) depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the embankment(s) will continue to represent the condition of the embankment(s) at some point in the future. Only through continued care and inspection can there be likely detection of unsafe conditions.

1.2 Purpose and Scope

CDM Smith was contracted by the USEPA to perform site assessments of selected surface impoundments. As part of this contract, CDM Smith conducted site assessments of the North Process Wastewater Lagoon (North Lagoon) and South Process Wastewater Lagoon (South Lagoon) at the Albright Power Station site owned by FirstEnergy Corp. These ponds are located on the north and south sides of the site. The purpose of this report is to provide the results of the assessments and evaluations of the conditions and potential for waste release from the management units.

A site visit was conducted by CDM Smith representatives on September 18, 2012, to collect relevant information, inventory the impoundments, and perform visual assessments of the impoundments.

1.3 Conclusions and Recommendations

1.3.1 Conclusions

Conclusions are based on visual observations during site assessment on September 18, 2012 and review of technical documentation provided by FirstEnergy Corp.

1.3.1.1 Conclusions Regarding Structural Soundness of the Management Units

Lateral movement of an existing retaining wall at the interior slope of the North Lagoon near the southwest corner may be indicative of structural stability issues. Areas of erosion near the inlet pipes at the South Lagoon may cause localized structural stability issues in the future, but there was no instability of the embankment based on the observations by CDM Smith during the site assessment.

Very limited and preliminary static slope stability analysis information was provided to assess the structural stability and soundness of the embankments of the North and South Lagoons.

1.3.1.2 Conclusions Regarding the Hydrologic/Hydraulic Safety of Management Units

Hydrologic and hydraulic information provided by the FirstEnergy Corp representative indicate management units have adequate capacity to withstand a 25-year, 24-hour storm event without overtopping at normal pool level. It should be noted that the water level in the North Lagoon was approximately 3.5 feet above normal pool elevation during the site assessment. Normal pool elevation is based on the weir elevation at the outlet structure.

However, the only documentation regarding the hydraulic capacity of the lagoons was in the form of an e-mail from the FirstEnergy Corp representative. No probable maximum precipitation (PMP) analysis was provided, as required under Federal Emergency Management Agency (FEMA) standards.

1.3.1.3 Conclusions Regarding Adequacy of Supporting Technical Documentation

Supporting data and documentation for the North and South Lagoons have not been provided. Slope stability analyses and liquefaction potential analyses for embankment foundations have not been performed.

1.3.1.4 Conclusions Regarding Description of the Management Units

The record drawings and descriptions of the management units provided by FirstEnergy Corp representatives appear to be consistent with the visual observations by CDM Smith during site assessment, with the exception of the retaining wall located at the North Lagoon's west embankment. The 2008 modifications to the North and South Lagoon weir structures and modifications to the outfall piping at the North Lagoon were not included on the provided record drawings.

1.3.1.5 Conclusions Regarding Field Observations

During visual observations and site assessments, CDM Smith observed lateral movement of the existing retaining wall at the interior slope of the North Lagoon's west embankment, and areas of erosion near the inlet pipes at the interior north and west embankment slopes of the South Lagoon. Dense vegetation was observed on the exterior slopes of the North and South Lagoons adjacent to the Cheat River.

1.3.1.6 Conclusions Regarding Adequacy of Maintenance and Methods of Operation

Current maintenance and operation procedures appear to be inadequate. The inspections performed twice a month have no formal procedure and are not documented. Operating procedures resulted in water levels well above the normal pool elevation at the North Lagoon at the time of the site assessment.

There was no existing evidence of previous seepage, spills, or release of impounded liquids outside the plant property.

1.3.1.7 Conclusions Regarding Adequacy of Surveillance and Monitoring Program

The surveillance, recording, and monitoring program for the West Virginia Department of Environmental Protection (WVDEP) under the National Pollutant Discharge Elimination System (NPDES) Permit appears to be adequate and comply with WVDEP requirements.

1.3.1.8 Conclusions Regarding Suitability for Continued Safe and Reliable Operation

Main embankments do not show evidence of unsafe conditions requiring immediate remedial efforts, although maintenance to correct deficiencies noted above is required.

FirstEnergy Corp's Emergency Action Plans (EAPs) for the North and South Lagoons includes methods of controlling the water levels in the lagoons, but no formal documentation was provided to CDM Smith.

1.3.2 Recommendations

Based on CDM Smith's visual assessment of North and South Lagoons and review of documentation provided by FirstEnergy Corp, CDM Smith offers the following recommendations for consideration.

1.3.2.1 Recommendations Regarding the Hydrologic/Hydraulic Safety

It is recommended that a qualified professional engineer determine the required flood frequency and evaluate the hydrologic and hydraulic capacity of the lagoons to withstand design storm events, without overtopping.

1.3.2.2 Recommendations Regarding the Technical Documentation for Structural Stability

It is recommended that a qualified professional engineer evaluate the static and seismic stability on representative embankment cross sections and perform liquefaction analyses for both the North and South Lagoons to enable a fair or satisfactory rating for structural stability.

1.3.2.3 Recommendations Regarding Field Observations

CDM Smith observed lateral movement of the retaining wall at the interior slope of the North Lagoon's south embankment. Lateral movment was not measured, but it appeared that the wall has moved several inches out of plumb. CDM Smith recommends that a qualified professional engineer evaluate the stability of the retaining wall and provide recommendations for remediation as appropriate. It is further recommended that FirstEnergy Corp monitor wall movement prior to completion of the stability analyses.

Areas of erosion were observed on the interior slopes of the north and west embankments of the South Lagoon near inlet pipes. To restore areas of erosion, it is recommended to place riprap to adjacent existing grade contours or place and compact structural fill, grade to adjacent existing contours, and apply grass seed.

Trees and dense vegetation along the exterior slopes of the North and South Lagoon, adjacent to the Cheat River, should be removed and embankments slopes be restored to the original contours by placing select structural fill and compacting, as recommended by a qualified professional engineer. After slope restoration, it is recommended to stabilize the exposed surface of the embankment with sod, hydro seeding, or riprap consisting of a heterogeneous mixture of irregular-shaped rocks placed over the compacted fill and a geotextile fabric. Regular maintenance activities should be performed at least twice a year or as conditions warrant from the spring to fall to control and limit growth of vegetation on the embankments.

1.3.2.4 Recommendations Regarding Surveillance and Monitoring Program

Monitoring for potential seepage at the exterior embankment slopes is recommended for both the North and South Lagoons. Potential areas of seepage may be more readily assessed after clearing of trees and dense vegetation on embankment slopes.

1.3.2.5 Recommendations Regarding Continued Safe and Reliable Operation

Inspections should be made following periods of heavy and/or prolonged rainfall and/or high water events on the Cheat River, and the occurrence of these events should be documented. Inspection procedures should be documented and inspection records should be retained at the facility for a minimum of three years.

Major repairs and slope restoration should be designed by a registered professional engineer experienced with earthen dam design.

None of the conditions observed require immediate attention or remediation, however, the above recommendations should be implemented to maintain continued safe and reliable operation of the management units.

1.4 Participants and Acknowledgment

1.4.1 List of Participants

CDM Smith representatives, James Vinson, P.E. and Bevin Barringer, P.E, were accompanied at all times during visual assessment by a representative from FirstEnergy Corp, William Cannon.

1.4.2 Acknowledgement and Signature

CDM Smith acknowledges that the management units referenced herein were assessed by James Vinson, P.E. and Bevin Barringer, P.E. Based on the limited documentation provided and the inadequate stability analyses, the North and South Process Wastewater Lagoons are rated **POOR**. The facility lacks static and seismic engineering studies following best professional engineering practice to support safety factors under normal loading conditions (static, hydrologic, seismic) in accordance with the applicable safety regulatory criteria. Minor deficiencies may exist that require remedial measures.

We certify that the management units referenced herein have been assessed on September 18, 2012.

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James Vinson, P.E.
Geotechnical Engineer
West Virginia Registration No. 018380

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Bevin Barringer, P.E.
Geotechnical Engineer

Section 2
Description of the Coal Combustion Waste Management Unit(s)

2.1 Location and General Description

The Albright Power Station (Station), owned by FirstEnergy Corp., is located in Preston County just off of County Route 7/12 in Albright, West Virginia, along the west bank of the Cheat River as shown in **Figure 2-1**. Critical infrastructure within approximately five miles down gradient of the Station is shown in **Figure 2-2**. The Cheat River serves as the northern and eastern property boundary of the Station. Open grassy areas with patches of trees are located to the west and south of the Station, as shown in **Figure 2-3**. The Cheat River runs south to north near the Station, and the City of Albright is on the opposite side of the Cheat River just downstream of the Station. The surrounding area consists mostly of wooded mountains and hills.

The Station has two Coal Combustion Waste (CCW) management units: the North Process Wastewater Lagoon (North Lagoon) near the north end of Station property and the South Process Wastewater Lagoon (South Lagoon) near the south end of Station property as shown in Figure 2-3. The lagoons were created by excavation and the majority of the embankments are within three feet of original grade. The Station stopped producing electricity in August 2012 and FirstEnergy Corp has plans to demolish the Station in the future.

The total perimeter of the North Lagoon is approximately 900 feet, covering an approximate surface area of 0.85 acres. The total perimeter of the South Lagoon is approximately 1,030 feet, covering an approximate surface area of 1 acre. **Table 2-1** shows a summary of the approximate size and dimensions of the impoundments.

Table 2-1 – Summary of Impoundments Approximate Dimension and Size

	Impoundment	
	North Lagoon	South Lagoon
Dam Height (ft)	13	13
Average Crest Width (ft)	25	25
Length[1] (ft)	900	1030
Interior Slopes,[2] H:V	3:1 (west 2:1)	3:1
Exterior Slopes,[3] H:V	1:1 to 3:1	1:1 to 2:1

1. Length was measured along the perimeter crest of each impoundment/unit.
2. Interior slopes taken from construction drawings.
3. Exterior slopes estimated from topography shown on construction drawings.

2.1.1 Horizontal and Vertical Datum

Project drawings from 1977 and from 2008, provided by FirstEngergy Corp. to CDM Smith, reference various horizontal and vertical datum. Horizontal survey data on the original construction drawings from 1977 are referenced to baselines shown on earlier drawings that were not provided. Elevations

shown on the 1977 drawings are reference to the National Geodetic Vertical Datum of 1929 (NGVD 1929). The 2008 project drawings are referenced the North Zone of the West Virginia State Plane Coordinate System based on North American Datum of 1983 (NAD 83) and the North American Vertical Datum (NAVD 88). Elevations noted herein are in feet and are referenced to NAVD 88, unless otherwise noted.

2.1.2 Site Geology

The Albright Power Station is located along the western bank of the Cheat River in northern West Virginia. Based on review of the USGS Topographic Map, natural ground surface elevations in the area of the Station range from approximately El. 1200 to El. 1240. According to the Geologic Map of West Virginia published by the West Virginia Geological and Economic Survey, the Station is located on deposits from the Paleozoic Era. These deposits consist of cyclic sequences of sandstone, red beds, shale, limestone, and coal. According to the United Station Geologic Survey, surface soils in the area mainly derive from red and gray shale, siltstone, and sandstone, with thin limestones and coals.

Soil borings provided by FirstEngergy Corp indicate that existing soils present within and below the North and South Lagoons consist of very loose to medium dense silty sand underlain by a layer of medium dense to very dense clayey silt, silty sand and gravel, with top of bedrock ranging from 25 to 30 feet below ground surface. Soil boring information provided and boring locations are included in **Appendix A**.

2.2 Coal Combustion Residue Handling

When the plant was in operation, both the North and South Lagoons received liquids from bottom ash dewatering hydrobins. At the time of CDM Smith's on-site assessment, the power plant was closed and not producing CCW. Ash material from the North Lagoon had recently been dredged and disposed of off-site, and dredging operations were underway at the South Lagoon. Since the Station's closure the only liquids received by the North Lagoon have reportedly been from stormwater runoff and other plant generated liquids received after treatment at the onsite wastewater treatment facility. Due to the dredging operations, the South Lagoon was not receiving liquids and was nearly dry. Both lagoons have outlets that discharge into the Cheat River.

2.3 Size and Hazard Classification

According to the United States Army Corps of Engineers (USACE) Guidelines for Safety Inspection of Dams (1979) (ER 1110-2-106), impoundments are categorized per **Table 2-2.**

Table 2-2 – USACE ER 1110-2-106 Size Classification

Category	Impoundment	
	Storage (Ac-ft)	Height (Ft)
Small	50 to < 1000	25 to < 40
Intermediate	1000 to < 50,000	40 to < 100
Large	> 50,000	> 100

According to Dam Safety Rules (47CSR34) established by the West Virginia Department of Environmental Quality for coal related dams, dams are defined as artificial barrier or obstruction which is twenty-five (25) feet or more in height from the downstream stream bed and impounds fifteen (15) Ac-ft or more of water, or is six (6) feet or more in height from the downstream stream bed and impounds fifty (50) Ac-ft or more of water.

The total storage capacity of the North and South Lagoons are approximately 11 and 13 Ac-ft, respectively. Both lagoons have a maximum embankment height of 13 feet. Therefore, neither lagoon is considered a dam as defined in ER 1110-2-106 and 47CSR34. The lagoon capacities were estimated by CDM Smith based on the lagoon geometry shown on the 1977 construction project drawings provided by FirstEnergy Corp.

It is not known if the Station impoundments currently have an assigned Hazard Potential Classification. Based on the USEPA classification system as presented on Page 2 of the USEPA checklist (**Appendix B**) and CDM Smith's review of the site and downstream areas, recommended hazard ratings have been assigned to the impoundments as summarized in **Table 2-3**:

Table 2-3 – Recommended Impoundment Hazard Classification Ratings

Ash Pond Unit	Recommended Hazard Rating	Basis
North Process Wastewater Lagoon	Low Hazard	§ Low economic and environmental loss. § Loss of human life is not anticipated.
South Process Wastewater Lagoon	Low Hazard	§ Low economic and environmental loss. § Loss of human life is not anticipated.

2.4 Amount and Type of Residuals Currently Contained in the Unit(s) and Maximum Capacity

CDM Smith was not provided information on the amounts of residuals currently stored in the units. Ash in the North Lagoon was dredged in August 2012, and the South Lagoon was being dredged on September 18, 2012 during CDM Smith's site assessment. Based on information provided by FirstEnergy Corp the lagoons stored bottom ash residuals from dewatering hydrobin liquids. The pool area of the North Lagoon and South Lagoon is approximately 0.85 and 1 acre, respectively. Decant water from the North and South Lagoons exits through a monitored National Pollutant Discharge Elimination System (NPDES) discharge point into the Cheat River.

2.5 Principal Project Structures

Principal structures of the North Lagoon include the following:

- Three 8-inch diameter carbon steel inlet pipes at the south embankment interior slope which discharges process wastewater from the Station,
- One 18-inch diameter plastic pipe at the south embankment interior slope which discharges stormwater runoff,
- One 36-inch diameter concrete pipe that receives flow from the discharge v-notch weir structure near the north embankment,
- Earthen perimeter embankments composed of silty sand fill,

- A concrete crib retaining wall, approximately 120 feet long, near the southwest corner of the lagoon along the hillside just west of the lagoon access road, and
- A concrete crib retaining wall, approximately 75-ft-long, at the interior slope of the west embankment near the southwest corner of the lagoon.

Principal structures of the South Lagoon include the following:

- Three 8-inch diameter carbon steel inlet pipes at the north embankment interior slope discharges process wastewater from the Station,
- One 8-inch diameter ductile iron pipe at the west embankment interior slope discharges coal pile runoff,
- One 36-inch diameter concrete pipe that receives flow from the discharge v-notch weir structure near the south embankment, and
- Earthen perimeter embankments composed of silty sand fill, clayey silt, silty sand, and gravel.

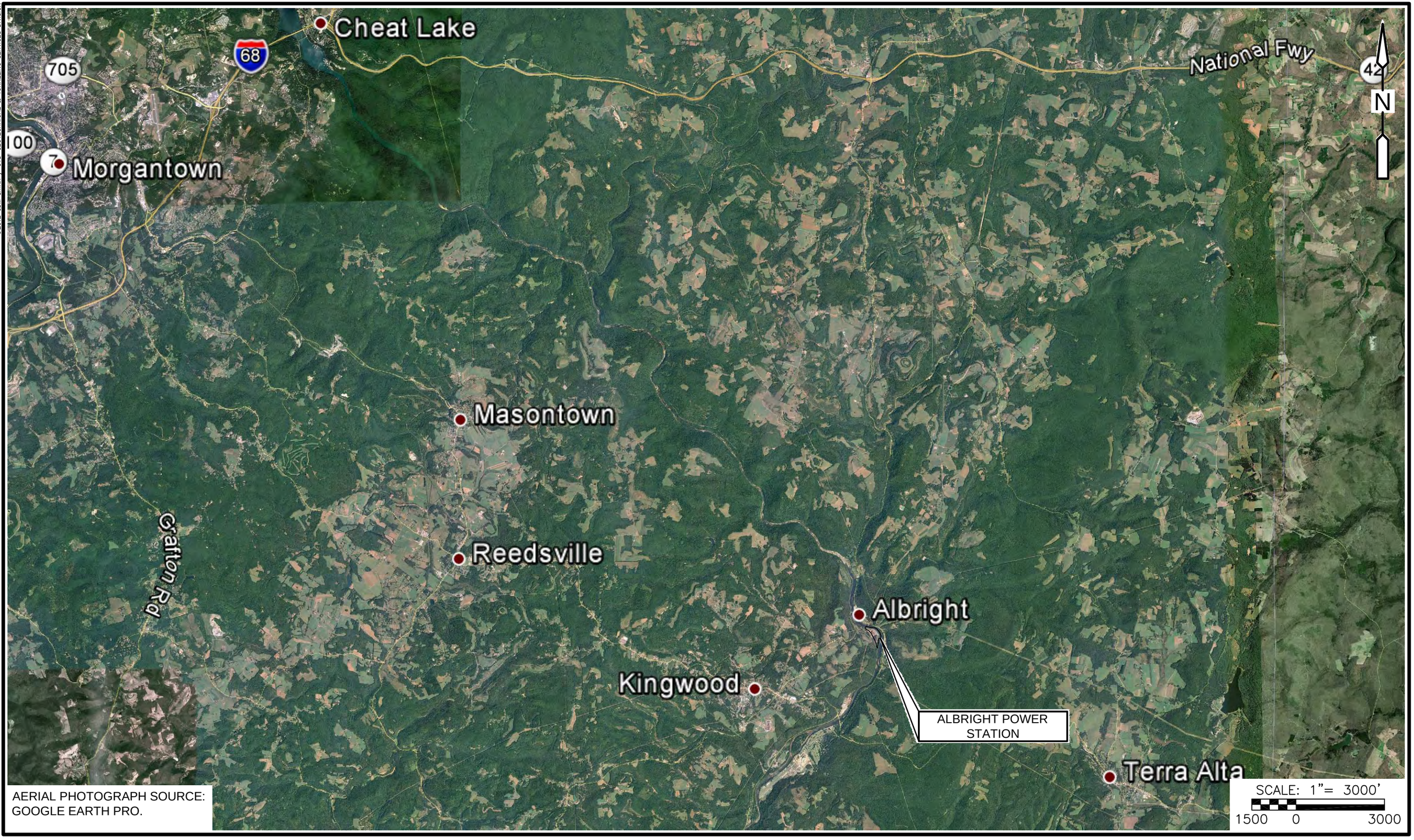
2.6 Critical Infrastructure within Five Miles Down Gradient

Based on available topographic maps, surface drainage in the vicinity of the Albright Power Station appears to be to the north and west towards the Cheat River which flows south to north in this area. Critical infrastructure, including schools, hospitals, waterways, roadways and bridges, and other major facilities, identified within five miles down gradient of the Station includes the following:

- Albright Power Station's electric substation
- Bridge and underlying dam on the Albright Power Station entrance road over the Cheat River
- Bridge on Albright Road over the Cheat River
- Albright Baptist Church

Discharge from both lagoons will flow directly into the Cheat River. There is no critical infrastructure between the impoundments and this waterway.

Liquids discharged from a breach of the impoundment embankments would most likely be absorbed by the Cheat River and is not expected to result in loss of human life.



AERIAL PHOTOGRAPH SOURCE:
GOOGLE EARTH PRO.

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ALBRIGHT POWER STATION
ALBRIGHT , WEST VIRGINIA
VICINITY MAP
FIGURE 2-1

AERIAL PHOTOGRAPH SOURCE:
GOOGLE EARTH PRO.

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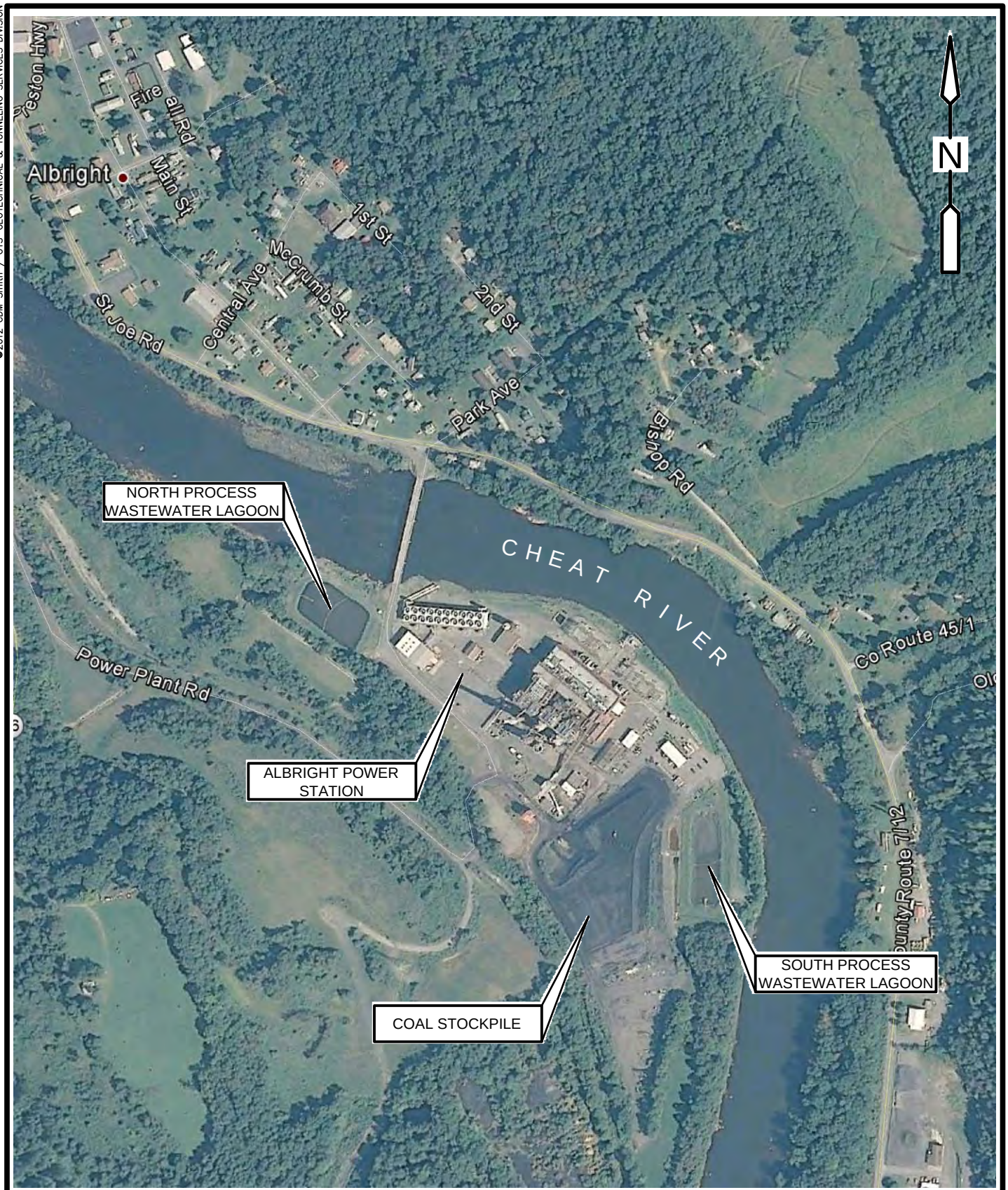
ALBRIGHT POWER STATION
ALBRIGHT , WEST VIRGINIA
CRITICAL INFRASTRUCTURE PLAN
FIGURE 2-2



AERIAL PHOTOGRAPH SOURCE:
GOOGLE EARTH PRO.

SCALE: 1"= 500'

250 0 500

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ALBRIGHT POWER STATION
ALBRIGHT , WEST VIRGINIA
SITE PLAN
FIGURE 2-3

Section 3
Summary of Relevant Reports, Permits and Incidents

3.1 Summary of Reports on the Safety of the Management Units

Safety reports for the CCW impoundments were not available for CDM Smith's review during the course of this investigation. This information was requested in an email prior to CDM Smith's on-site assessment and again during the visit. The FirstEnergy Corp representative indicated to his knowledge there have been no known structural or operational problems associated with the CCW impoundments.

3.2 Summary of Local, State, and Federal Environment Permits

Currently, the CCW impoundments are regulated by the West Virginia Department of Environmental Protection.

The Albright Power Station was issued a permit under the National Pollutant Discharge Elimination System (NPDES) authorizing discharge to the Cheat River in accordance with effluent limitations, monitoring requirements, and other conditions set forth in the permit. The Plant's permit was issued on July 11, 2011. The permit number is WV0004723.

3.3 Summary of Spill/Release Incidents

According to FirstEnergy Corp representatives, the only releases from the lagoons would have been during a flood that occurred in November 1985 when flood water was measured at El. 1228 at the Station. No further information was provided on the duration of the flooding, condition of the lagoons during or after the event, or similar.

Section 4
Summary of History of Construction and Operation

4.1 Summary of Construction History

4.1.1 Impoundment Construction and Historical Information

The Albright Power Station began operation in 1952. Prior to its recent shutdown, the CCW was currently generated by three coal fired steam electric generating units (Units 1, 2, and 3), which have a total capacity of 292 megawatts of power.

Historical information on the North and South Process Wastewater Lagoons available for review included construction drawings from 1977 when the current lagoons were constructed, and from 1995 and 2007 when piping modifications were designed. Construction drawings and other documentation provided by FirstEnergy Corp are included in **Appendix C**. The 1977 drawings show existing smaller lagoons were expanded to create the current North and South Lagoons. The 1977 construction drawings addressed regrading in the area of the previously constructed lagoons and construction of the current lagoons and inlet/outlet structures. Features that were observed during the site assessment, but not included on the construction drawings, included the concrete crib retaining walls and stormwater inlet pipe at the North Lagoon and the coal pile runoff inlet pipe at the South Lagoon. Soil boring locations and subsurface soil profiles, shown in Appendix A, were included in the 1977 drawings. A total of twelve soil borings, six borings at each lagoon site, were performed. Based on the 1977 construction drawings, the present configurations of the North and South Lagoons were achieved by regrading and excavating into silty sand fill, clayey silt and gravel material. Embankment construction only required up to 3 feet of fill in limited areas.

The North Lagoon was constructed as a side-hill configuration using the natural terrain that slopes downwards towards the Cheat River. The west embankment was constructed by excavating into the existing hillside and the north, south, and east embankments were constructed with silty sand fill. According to the 1977 drawings, the north, south, and east embankment interior slopes were constructed at 3H:1V, and the west embankment interior slope at 2H:1V. Exterior slopes at the north and east embankments were kept at the natural grade and range from 1H:1V to 3H:1V according to topography shown on the construction drawings. The south and west embankments do not include an exterior slope, as they are incised. Based on information provided by FirstEnergy Corp and visual observations, the North Lagoon embankment crest is at El. 1214 around the perimeter and crest width varies from about 20 to 25 feet.

The South Lagoon was constructed by regrading and excavating into clayey silt, silty sand and gravel. Construction of the embankments included placement of up to 3 feet of fill. According to the 1977 drawings, the interior slopes were constructed at 3H:1V. The north and west embankments do not include an exterior slope, as they are incised. Coal pile runoff drainage ditches are located adjacent to the west embankment. The south and east embankment exterior slope is natural terrain that slopes downward towards the Cheat River. The embankment slope varies from 1H:1V to 2H:1V according to topography shown on the construction drawings. Based on information provided by FirstEnergy Corp and visual observations, the South Lagoon embankment crest is at El. 1223 around the perimeter and crest width varies from about 20 to 25 feet.

4.1.2 Significant Changes/Modifications in Design since Original Construction

Changes/modifications to the design include construction of two concrete crib retaining walls at the North Lagoon. The retaining walls are located near the southwest corner of the lagoon, along the base of the hillside west of the lagoon access road, and along the interior slope of the west embankment. The wall at the base of the hillside is approximately 3 feet high and 120 feet long, and the wall on the interior slope of the west embankment is approximately 75 feet long. The wall on the interior slope extended below the water level, therefore the wall height is unknown. The FirstEnergy Corp representative did not have any information on the design or construction of these walls. CDM Smith was unable to observe other changes/modifications to the interior of the South Lagoon due to the water level in the impoundment during the site assessment.

Construction drawings dated 1995 show modifications to the South Lagoon piping at the Cheat River outfall structure. Modifications included regrading the river bank to 2H:1V in the vincinty of the outfall piping, increasing the depth of riprap armoring along the riverbank from 1 foot to 4 feet, and installing a 36-inch-diameter corrugated galvanized steel pipe extension to the end of the existing 24-inch-diameter concrete pipe. Though not included in the information provided to CDM Smith, it appears that a similar modification was made at the North Lagoon. During our site assessment, the outfall at the North Lagoon appeared to be a corrugated metal pipe and not concrete as shown on the 1977 drawings.

Construction drawings dated 2007 show the installation of new piping in the east embankment of the North Lagoon. Based on information provided by FirstEnergy Corp the pipe was installed in an open-cut trench approximately 10 feet below the crest elevation.

Washington Group International (WGI) conducted hydraulic analyses and recommended lowering the normal pool elevation in both the North and South Lagoons by one foot, to El. 1210 and 1219, respectively. The lower pool elevations were recommended to achieve adequate storage capacity for a 25-year, 24-hour storm event in both lagoons, assuming the other lagoon was out of service. According to the FirstEnergy Corp representative, modifications to the outlet weirs were made in 2008 based on recommendations provided by WGI. Modifications consisted of cutting oval holes into the metal weirs 1 foot below the v-notch to lower the normal pool elevations in both the North and South Lagoons.

4.1.3 Significant Repairs/Rehabilitation since Original Construction

Information regarding major repairs or rehabilitation to the embankments of the lagoons was not provided. Evidence of repair/rehabilitation included the concrete crib retaining walls near the southwest corner of the North Lagoon that may have been installed as part of remedial measures, but no information on the purpose or date of construction was provided. No evidence of prior releases or failures was observed on the embankments during CDM Smith's visual assessment. There was no documentation provided that indicates otherwise.

4.2 Summary of Operational Procedures

4.2.1 Original Operating Procedures

The North and South Lagoons at the Albright Power Station have historically been used as settling ponds for liquids received from bottom ash dewatering hydrobins and other plant wastes. Waste water streams discharged into the North and South Lagoons and whose decant water is ultimately released into the Cheat River have included:

- Liquid from bottom ash dewatering hydrobins
- Boiler blowdown
- Filter backwash
- Ion exchange waste
- Floor drain waste
- Yard drain waste
- Coal pile runoff
- Stormwater

4.2.2 Significant Changes in Operational Procedures and Original Startup

Prior to the recent Station shut down, no significant changes in operational procedures had been made to the North and South Lagoons. There was no documentation provided that indicates different.

4.2.3 Current CCW Impoundment Configuration

Because the Station is currently shut down and not generating electricity the North and South Lagoons only receive liquids from plant drain waste, coal pile runoff, and stormwater.

The North and South Lagoons are currently configured as previously described and as shown on Figure 2-3. The approximate crest elevations of the embankments and pond areas are shown on **Table 4-1** below.

Table 4-1 – Approximate Crest Elevations and Surface Areas

Ash Pond	Approximate Crest Elevation (Feet)	Approximate Pond Surface Area (Acres)
North Process Wastewater Lagoon	1214	0.85
South Process Wastewater Lagoon	1223	1.0

As previously discussed, ash from the North Lagoon was dredged in August 2012 and the South Lagoon was being dredged during CDM Smith's site assessment in September 2012. Over the service life of the impoundments ash has been periodically dredged prior to reaching approximately 60% of the lagoon storage capacity.

Under normal operating conditions, liquids are transported into the North Lagoons through three 8-inch-diameter steel pipes located at the south embankment interior slope. Liquids flow over a metal v-notch weir structure near the north embankment into a 36-inch concrete outlet pipe to a sump structure. Liquids are discharged from the sump to the Cheat River through a 36-inch-diameter concrete pipe with a 36-inch-diameter corrugated metal pipe extension at the outfall.

Under normal operating conditions liquids are discharged to the South Lagoon through three 8-inch-diameter steel pipes located at the north embankment interior slope. Liquids flow over a metal v-notch weir structure near the south embankment into a 24-inch concrete outlet pipe to a sump structure. Liquids are discharged from the sump to the Cheat River through a 24-inch-diameter concrete pipe with a 36-inch-diameter corrugated metal pipe extension at the outfall.

4.2.4 Other Notable Events since Original Startup

Information provided to CDM Smith regarding other notable events that impacted operations and/or regular maintenance and inspection of the lagoons included the date and flood water elevation of the November 1985 flood, as discussed in Section 3.

Section 5
Field Observations

5.1 Project Overview and Significant Findings (Visual Observations)

CDM Smith performed visual assessments of the lagoons at the FirstEnergy Corp Albright Power Station site. Impoundments assessed included the North Process Wastewater Lagoon and South Process Wastewater Lagoon. These lagoons, referred to as the North and South Lagoons are located on the north and south ends of the site, respectively. The perimeter embankments of the North Lagoon are approximately 900 feet in length and approximately 13 feet in height. The perimeter embankments of the South Lagoon are approximately 1,030 feet in length and approximately 13 feet in height. The assessments were completed following the general procedures and considerations contained in Federal Emergency Management Agency's (FEMA's) Federal Guidelines for Dam Safety (April 2004) to make observations concerning settlement, movement, erosion, seepage, leakage, cracking, and deterioration. A Coal Combustion Dam Inspection Checklist and Coal Combustion Waste (CCW) Impoundment Inspection Form, developed by USEPA, was completed for each of the aforementioned impoundments. Copies of these forms are included in Appendix B. Photograph locations are shown on **Figures 5-1** and **5-2**, and photographs are included in **Appendix D**. Photograph locations were logged using a handheld GPS device. The photograph coordinates are listed in Appendix D.

CDM Smith visited the plant on September 18, 2012, to conduct visual assessments of the impoundments. The weather was generally cloudy with intermittent light rain with daytime high temperatures up to 68 degrees Fahrenheit. The daily total precipitation prior to the site visit is shown in **Table 5-1**. The data was recorded approximately 6.5 miles south of the Station at the National Interagency Fire Center (NIFC) operated Remote Automated Weather Station (RAWS) in Kingwood, West Virginia.

Table 5-1 – Approximate Precipitation Prior to Site Visit

Date of Site Visit – September 18, 2012		
Day	**Date**	**Precipitation (inches)**
Monday	September 17	0.10
Sunday	September 16	0.01
Saturday	September 15	0.01
Friday	September 14	0.01
Thursday	September 13	0.01
Wednesday	September 12	0
Tuesday	September 11	0
Monday	September 10	0
Total	**(September 10 - 17, 2012)**	**0.14**
Total	**Month Prior to Site Visit (August 17 – September 17, 2012)**	**3.24**

Note: Precipitation data from NIFC RAWS. Station Location: Kingwood, WV. Lat. 39.407; Lon. -79.701; EL. 1869 (ft-NGVD29).

5.2 North Process Wastewater Lagoon

At the time of the assessment, the North Lagoon contained liquids with approximately 0.5 feet of freeboard. It was indicated by a FirstEnergy Corp representative that the lagoon was dredged between August 13 and 24, 2012 to remove accumulated ash. Based on information provided by the FirstEnergy Corp representative, since dredging, the Station has been out of service and the lagoon has not received any CCW.

5.2.1 Crest

The crest of the North Lagoon appeared to be in satisfactory condition (Photographs 1, 9, 18 and 24). The 20- to 25-ft-wide crest of the embankment consists of compacted granular soils and gravel and is exposed to minimal vehicle traffic. No depressions or evidence of settlement were observed on the crest.

5.2.2 Interior Slopes

Due to the lagoon water level during the assessment, only the upper 0.5 to 1 ft of the interior slopes were visible (Photographs 2, 11, 17, and 25). Reportedly, the interior slopes are 3H:1V at all embankments except the west embankment which is at 2H:1V. A concrete crib retaining wall was located at the interior slope of the west embankment, near the southwest corner. The wall was approximately 75 feet long. A section of the wall, approximately 10 feet long, appeared to be displaced laterally towards the lagoon (Photographs 22 and 23). Due to the water level and lack of documentation, the wall height is unknown. Vegetation covered the portion of the interior slopes that were visible. Inlet pipes are located at the interior slope of the south embankment (Photograph 25).

5.2.3 Exterior Slopes

The lagoon includes exterior slopes on the north and east embankments. The west embankment includes a hillside west of the crest, and the south embankment is incised. Due to the terrain and perimeter fencing around the North Lagoon, the north and east exterior slopes were only visible from the embankment crests. Based on limited observations from the crest, the exterior slopes appear to be in satisfactory condition. The exterior slopes of the north and east embankments are between 1H:1V and 3H:1V and covered in large stone riprap and vegetation (Photographs 5, 8, 10, 15, and 27). The Cheat River is at the east embankment's exterior toe (Photograph 3, 4, and 27).

5.2.4 Outlet Structures

The outlet structure consists of a metal v-notched weir near the north embankment discharging to a 36-inch concrete pipe. The outlet structure also includes an opening with stoplogs at the end of a catwalk that also discharges to the 36-inch concrete pipe (Photograph 13). The stoplogs were removed during the site assessment. The weir and pipe were submerged at the time of visual assessment. The 36-inch concrete pipe discharges into a sump structure (Photograph 6) that directs liquids to the on-site wastewater treatment plant or discharges to the outfall at the Cheat River (Photograph 7).

5.3 South Process Wastewater Lagoon

At the time of the site assessment, the majority of liquids in South Lagoon had been drained and accumulated ash material was being removed by dredging. The South Lagoon had more than

approximately 11 feet of freeboard. The lagoon was not receiving liquids during the site assessment. Based on information provided by the FirstEnergy Corp representative, the Station has been out of service since August 2012 and the lagoon has not received any CCW since that time.

5.3.1 Crest

The crest of the South Lagoon appeared to be in satisfactory condition (Photographs 28, 32, 37 and 43). The crest ranged from 20 to 25 feet wide. The crest of the embankment consists of compacted gravel and grass and is exposed to minimal vehicle traffic. No depressions or evidence of settlement were observed on the crest.

5.3.2 Interior Slopes

Interior slopes appeared to be in fair condition (Photographs 29, 33, 36, and 45). Areas of erosion were located just downstream at each of the three inlets pipes at the north embankment (Photograph 31) and at the inlet pipe at the west embankment (Photograph 34). Based on construction drawings, the interior slopes are 3H:1V at all embankments. Grassy vegetation covered the upper portion of the interior slopes.

Three 8-inch-diameter inlet pipes are located at the interior slope of the north embankment (Photograph 30). One 18-inch-diameter inlet pipe is located at the interior slope of the west embankment (Photograph 34).

5.3.3 Exterior Slopes

The lagoon includes exterior slopes on the west, east, and south embankments. The north embankment is incised (Photograph 47). Due to the terrain and vegetation on the exterior slopes of the east and south embankments of the South Lagoon, the slopes were only visible from the embankment crests. The west embankment exterior slope is a coal pile runoff drainage and storage ditch which was nearly full during the site assessment (Photographs 49, 51, and 52). Based on observations during the site assessment, the exterior slopes appear to be in satisfactory condition. The exterior slopes of the south and east embankments are between 1H:1V and 3H:1V based on topographic drawings. The exterior slopes of the south and east embankments are generally covered in dense vegetation (Photographs 55, 56, 59, and 62). The Cheat River is at the east embankment's exterior toe (Photographs 56 and 62).

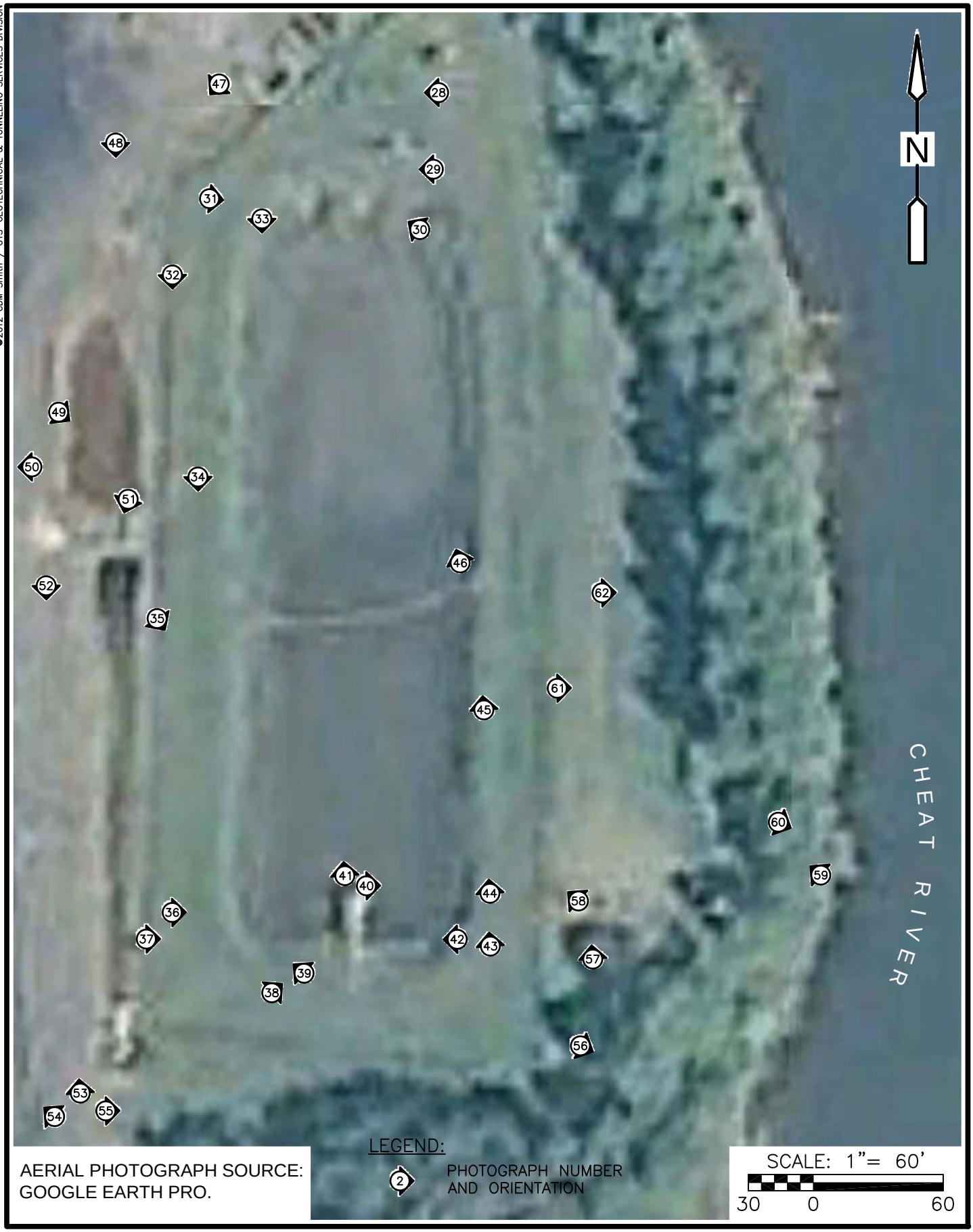
5.3.4 Outlet Structures

The outlet structure consists of a metal v-notched weir near the north embankment discharging to a 24-inch concrete pipe (Photographs 36, 39, and 42). The outlet structure also includes an opening with stoplogs at the end of a catwalk (Photograph 41) which also discharges to the 36-inch concrete pipe (Photograph 40). The stoplogs were removed during the site assessment. The 36-inch concrete pipe discharges into a sump structure (Photograph 58) that directs liquids to the on-site wastewater treatment plant or discharges to the outfall at the Cheat River (Photograph 60).

AERIAL PHOTOGRAPH SOURCE: GOOGLE EARTH PRO.

CDM Smith

ALBRIGHT POWER STATION
ALBRIGHT , WEST VIRGINIA
NORTH LAGOON PHOTOGRAPH LOCATION PLAN
FIGURE 5-1



AERIAL PHOTOGRAPH SOURCE: GOOGLE EARTH PRO.

CDM Smith

ALBRIGHT POWER STATION
ALBRIGHT , WEST VIRGINIA
SOUTH LAGOON PHOTOGRAPH LOCATION PLAN
FIGURE 5-2

Section 6
Hydrologic/Hydraulic Safety

6.1 Impoundment Hydraulic Analysis

The West Virginia Department of Environmental Protection requirements related to the hydrologic or hydraulic design of coal ash impoundments are included in Dam Safety Rule (47CSR34). According to 47CSR34, it appears that the North and South Lagoons are not subject to these requirements due to their size, as discussed in Section 2.3.

FEMA standards, as specified in "Federal Guidelines for Dam Safety" dated April 2004, require low hazard impoundments be designed for a flood frequency that takes into account loss of benefit risks, operation and maintenance costs, public confidence in dam safety, and local and state regulations. FEMA recommends that dams with a low-hazard potential are designed for a flood having an average return frequency of no less than once in 100 years.

As mentioned in Section 4.1.2, based on information provided by FirstEnergy Corp, hydrologic and hydraulic analyses were conducted by WGI for the North and South Lagoons at 25-year, 24-hour storm events. Based on the analyses the normal pool elevation was lowered to El. 1210 at the North Lagoon and El. 1219 at the South Lagoon. This pool elevation provides storage for a 25-year, 24-hour storm event in both lagoons, assuming one of the two lagoons is out of service.

6.2 Adequacy of Supporting Technical Documentation

Results of the hydrologic and hydraulic analyses for the 25-year, 24-hour storm event was provided by a FirstEngery Corp representative as a brief written summary, but did not include any documentation. Using the normal pool elevations provided by FirstEnergy Corp, the freeboard at normal pool is 4 feet for the North and South Lagoon. Although during CDM Smith's site assessment the freeboard in the North Lagoon was approximately 0.5 feet. No documentation or analyses for the PMP were provided.

6.3 Assessment of Hydrologic/Hydraulic Safety

Hydrologic and hydraulic safety of the management units appears to be inadequate based on the following:

- A brief summary of WGI's hydrologic/hydraulic analyses was provided with no supporting documentation.
- During visual observations and site assessments, the freeboard in the North Lagoon was 3.5 feet above reported normal pool elevation.

Due to inadequate information and because the PMP was not provided, the North and South Lagoons are rated as poor for hydrologic/hydraulic safety.

Section 7
Structural Stability

7.1 Supporting Technical Documentation

The available information regarding slope stability of the North and South Lagoons consists of a telephone memo prepared by GAI Consultants, Inc. (GAI), dated November 8, 1976. According to the memo, the telephone call was between Ralph Curtiss of GAI and M.P. Fedorov of Sanderson & Porter, Inc (S&P). S&P was the design engineer for the 1977 design, and GAI was the geotechnical consultant. No information is provided regarding the soil properties used in the analyses. The memo states that the factors of safety provided by GAI are based on calculations not fully checked. A copy of the memo is provided in Appendix C.

The memo states that the slope stability of the North Lagoon was analyzed with the crest elevation at El. 1214, bottom of lagoon elevation at El. 1201, water level at El. 1211, and a 20-ft-wide crest, as shown on the 1977 drawings. The analyses were performed for interior slopes at 3H:1V with cleaning equipment, and with and without a rock berm at the toe. No further information was provided regarding the definition of "with and without cleaning equipment" conditions. Analyses were performed with interior slope of 2.5H:1V without cleaning equipment. Recommendations for the exterior slopes along the river bank including leaving existing slopes undisturbed, but any new slopes should be no steeper than 2.5H:1V. It was recommended riprap be added on the slope to the flood elevation. The memo also includes recommendations regarding the distance between the top of the lagoon and an undefined road.

The memo states that the slope stability of the South Lagoon was analyzed with the crest elevation at El. 1223, bottom of lagoon elevation at El. 1210, water level at El. 1220, and a 20-ft-wide crest, as shown on the 1977 drawings. The analyses were performed for interior slopes at 3H:1V with cleaning equipment, and at 2H:1V without cleaning equipment. The analyses assumed that the toe of the coal pile would be 30 feet from the top of the interior slope.

According to the telephone memo, slope stability factors of safety were developed under the assumption that partial drainage of slope occurs concurrently with lowering of the pool. And GAI stated that is not practical to design slopes in these soils to be stable with full pool drawdown at a rapid rate, no slope drainage, and no support from fly ash.

7.1.1 Stability Analyses and Load Cases Analyzed

The West Virginia Department of Environmental Protection requirements related to embankment stability of coal ash impoundments are included in Dam Safety Rule (47CSR34), though as mentioned earlier, the North and South Lagoons are not classified as dams based on 47CSR34. The minimum factors of safety established by WVDEP are included in **Table 7-1**. Procedures established by the United States Army Corps of Engineers (USACE), the United States Bureau of Reclamation, the Federal Energy Regulatory Commission, and the Natural Resources Conservation Service are generally accepted engineering practice. Minimum required factors of safety outlined by the USACE in EM 1110-2-1902, Table 3-1 and seismic factors of safety by FEMA Federal Guidelines for Dam Safety,

Earthquake Analyses and Design of Dams (pgs. 31, 32 and 38, May 2005) are also provided in Table 7-1.

Table 7-1 - Recommended Minimum Safety Factors

Load Case	Minimum Required Factor of Safety	
	WVDEP[1]	USACE[2]
Steady-State Condition at Normal Pool or Maximum Storage Pool Elevation	1.5	1.5
Rapid Drawdown Condition from Normal Pool Elevation	1.2	1.3
Maximum Surcharge Pool (Flood) Condition	--	1.4
Seismic Condition from at Normal Pool Elevation	1.2	1.1
Liquefaction	--	1.3

Note: 1 - Based on required factors of safety published by WVDEP in 47CSR34.
2 – Based on required factors of safety published by USACE in EM 1110-2-1902.

7.1.2 Design Parameters and Dam Materials

No information was provided regarding the design parameters or material properties used in the slope stability analyses discussed in the 1976 telephone memo.

7.1.3 Uplift and/or Phreatic Surface Assumptions

The only information provided on the seepage conditions used in the geotechnical analyses were that slope stability factors of safety were developed under the assumption that partial drainage of slope occurs concurrently with lowering of the pool. No further information on assumptions was provided.

7.1.4 Factors of Safety and Base Stresses

A summary of safety factors computed for the different cases of the North and South Lagoons is included in **Table 7-2.**

Table 7-2 - Safety Factors Computed for Various Stability Conditions

Slope Geometry and Load Case	Factor of Safety
North Lagoon Interior Slope 3:1 – with cleaning equipment	1.25
North Lagoon Interior Slope 3:1 – with cleaning equipment and rock berm at toe	1.46
North Lagoon Interior Slope 2.5H:1V – without cleaning equipment	1.46
South Lagoon Interior Slope 3:1 – with cleaning equipment	1.45
South Lagoon Interior Slope 2H:1V – without cleaning equipment	1.42

Source: Telephone Memo, prepared by Ralph Curtiss, GAI, November 8, 1976.

Based on information provided in GAI's telephone memo of November 8, 1976, the calculated factors of safety were not fully checked and each of the load cases required by the USACE were not analyzed.

7.1.5 Liquefaction Potential

Documentation provided in the 1976 telephone memo did not include evaluation of liquefaction potential.

7.1.6 Critical Geological Conditions

According to the Geologic Map of West Virginia published by the West Virginia Geological and Economic Survey, geology in the area of the Station consists of sandstone, red beds, shale, limestone, and coal. According to the United Station Geologic Survey, surface soils in the area mainly derive from red and gray shale, siltstone, and sandstone, with thin limestones and coals.

Based on geographic location and the 2008 USGS National Seismic Hazard Map, Peak Ground Acceleration (PGA) for 2% probability of exceedance in 50 years is approximately 0.15g.

7.2 Adequacy of Supporting Technical Documentation

Structural stability documentation that has been provided was preliminary according to the documentation and is incomplete. Seismic and liquefaction potential analyses were not performed.

7.3 Assessment of Structural Stability

Existing conditions and visual observations yield a poor rating for structural stability of both the North and South Lagoons based on the following:

- Stability analyses of the North and South Lagoon embankments are incomplete and not well documented.
- Stability analyses for different surcharge loading, seepage, and seismic conditions, as well as liquefaction analyses are required to assess a satisfactory rating for structural stability. These types of analyses were not provided.
- During visual observations and site assessments of the North Lagoon, the high water level in the lagoon prevented observation of the interior slopes.
- Bulging of the retaining wall at the interior slope near the southwest corner of the North Lagoon was observed during the site assessment.
- Areas of erosion at the inlet pipes were observed at the South Lagoon's north and west interior slopes.
- Due to vegetation and riprap located on the exterior slopes of the North and South Lagoons near the Cheat River, assessment of potential stability and seepage issues could not be made.

Due to the lack of documentation and analyses for required loading conditions and cross sections on the identified embankments, the assessed rating is POOR. As such, a dam safety rating of "POOR" is assigned when a dam safety deficiency is recognized for loading conditions that may realistically occur. Remedial action is recommended. POOR may also be used when uncertainties exist as to critical analysis parameters that identify a potential dam safety deficiency. Further investigations and studies are necessary.

Section 8
Adequacy of Maintenance and Methods of Operation

8.1 Operating Procedures

As described in Section 2, when the plant was in operation, both the North and South Lagoons received liquids from bottom ash dewatering hydrobins. At the time of CDM Smith's on-site assessment, the power plant was closed and not producing CCW. Ash material from the North Lagoon had recently been dredged and disposed of off-site, and dredging operations were underway at the South Lagoon. Since the Station's closure the only liquids received by the North Lagoon have been from stormwater runoff and other plant generated liquids received after treatment at the onsite wastewater treatment facility. Due to the dredging operations, the South Lagoon was not receiving liquids and was nearly dry. Both lagoons have sump structures that can direct liquids to the onsite wastewater treatment plant or to outfalls at the Cheat River.

8.2 Maintenance of the Dam and Project Facilities

The FirstEnergy Corp representative indicated during the site assessment by CDM Smith on September 18, 2012, visual inspections are performed for both the North and South Lagoons twice a month. The results of these inspections are not generally documented and no documentation of inspections was provided to CDM Smith.

The only regular maintenance operations include mowing adjacent to North and South Lagoons.

8.3 Assessment of Maintenance and Methods of Operations

8.3.1 Adequacy of Operating Procedures

Based on CDM Smith's visual observations and review of documents provided by FirstEnergy Corp, operating procedures appear to be generally adequate for the Station. Although it should be noted that the water levels in the North Lagoon at the time of CDM Smith's visual assessment was 3.5 feet above the normal pool elevation. Considering the North and South Lagoons are no longer accepting CCW, there is no readily available indication that suggests that the North and South Lagoon's primary purpose is not being accomplished.

8.3.2 Adequacy of Maintenance

Maintenance issues included high vegetation and trees on the exterior slopes of the North and South Lagoons near the Cheat River, areas of erosion near the inlet pipes at the South Lagoon, water levels well above normal pool elevation in the North Lagoon, and lateral displacement at the North Lagoon retaining wall. A maintenance schedule and maintenance procedures should be developed to address these issues.

Section 9
Adequacy of Surveillance and Monitoring Program

9.1 Surveillance Procedures

FirstEnergy Corp is required by West Virginia Department of Environmental Protection (WVDEP) under National Pollutant Discharge Elimination System (NPDES) Permit No. WV0004723 to monitor discharge of wastewater into the Cheat River. Surveillance procedures should be in accordance with WVDEP – NPEDS Permit.

Reportedly, FirstEnergy Corp inspects the embankments for structural stability twice a month, but no documentation is maintained.

9.2 Instrumentation Monitoring

Based on the information provided by the FirstEnergy Corp representative the North and South Lagoon water levels are monitored remotely with instrumentation in the sump structure. The water levels recorded by the sump are in inches measured from the floor slab elevation of the sump structure. Water levels measured between May 29, 2012 and June 30, 2012 in both the North and South Lagoons are provided in Appendix C.

The North and South Lagoon embankments do not have an instrumentation monitoring system to monitor structural stability, seepage or ground displacement.

9.3 Assessment of Surveillance and Monitoring Program

9.3.1 Adequacy of Inspection Programs

Based on the documents reviewed by CDM Smith and visual observations during the site assessment, the inspection program appears to be adequate, but should be documented in the future. No conditions that needed immediate remedial actions were observed.

9.3.2 Adequacy of Instrumentation Monitoring Program

As mentioned before, instrumentation is not present within the embankments. Detrimental conditions or indications for potential failure of embankments included lateral displacement of a retaining wall at the North Lagoon.

The water level instrumentation appears to be adequate as data is recorded nearly continuously and documented by the Station.

Section 10
Reports and References

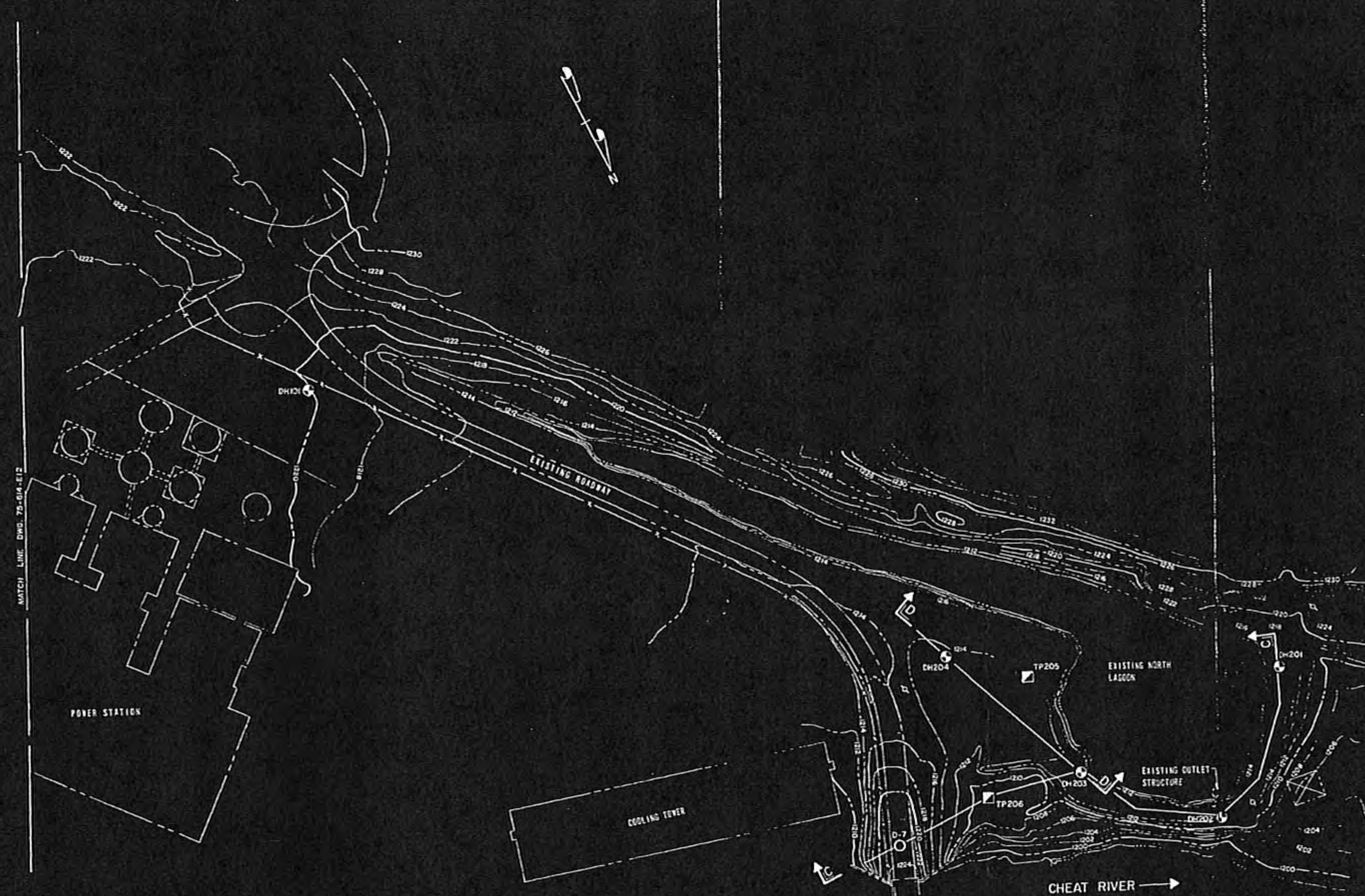
The following is a list of reports and drawings that were provided by FirstEnergy Corp and were used during the preparation of this report and the development of the conclusions and recommendations presented herein.

1. EPA Effluent Guidelines Questionnaire, prepared by Monongahela Power (now FirstEnergy Corp) to EPA, October 15, 2010.
2. Albright Power Station Power Plant Facility 2009 Topographic Mapping dated 2009.
3. Albright Power Station New Water Flow Line Diagram dated 2009.
4. Albright Power Station Wastewater Treatment System North Lagoon & South Lagoon Conn. Pipe Drainage Pipe Layout Plan & Profile Construction Drawing dated 2008.
5. Albright Power Station North and South Lagoon Diversion Chamber Drawings dated 2008.
6. Cooling Tower Retrofit – S&EC Plan dated 2007.
7. Albright Power Station South Lagoon Outlet River Bank Repair Detail dated 1986.
8. Albright Power Station Wastewater Treatment Facilities Construction Drawings dated 1977.
9. Off-Site Fill Material Investigation, Proposed Wastewater Treatment Lagoons, Albright Power Station letter, prepared by GAI Consultants, Inc. to Allegheny Power Service Corporation, July 25, 1977.
10. Earthwork Estimation, Proposed Wastewater Treatment Lagoons, Albright Power Station letter, prepared by GAI Consultants, Inc. to Allegheny Power Service Corporation, May 27, 1977.
11. Albright Power Station Wastewater Treatment Facilities Construction Drawings dated 1976.
12. Preliminary Report of Albright Investigation telephone memo, prepared by GAI Consultants, Inc., call between Ralph Curtis (GAI) and M.P. Fedorov (Sanderson & Porter, Inc.), November 8, 1976.

Appendix A

Soil Boring Information

75-614-E11



SCHEDULE OF BORINGS		
BORING NUMBER	GROUND SURFACE ELEVATION	DEPTH (FEET)
DH 1	1221.6	35.0
DH 2	1221.4	35.0
DH 3	1224.6	38.2
DH 4	1218.6	38.5
DH 5	1221.4	25.5
DH 6	1223.7	25.5
DH 101	1220.2	36.2
DH 201	1217.0	32.5
DH 202	1214.7	28.5
DH 203	1214.7	33.7
DH 204	1213.4	25.5
	TOTAL	347.1

LEGEND

DH101 ● BORING LOCATION

D-7 ○ PREVIOUS TEST BORING BY OTHERS SEE REFERENCE DRAWING-SANDERSON & PORTER CO. DWG. 2242-A253-A

TP204 ◩ TEST PIT LOCATION

—1200— — EXISTING GROUND SURFACE CONTOUR

— — — EXISTING FEATURES

—···— SHORE LINE

—x— FENCE LINE

UTILITY POLE

NOTE

1. FOR SECTIONS C-C, D-D AND GENERAL NOTES SEE DRAWING 75-614-E13.

SCALE: 1" = 50'

50' 0 50' 100'

REFERENCE DRAWINGS:

ALLEGHENY POWER SERVICE CORP. DWG NOT NUMBERED TITLED ALBRIGHT POWER STATION, COAL PILE PERIMETER PHOTOG. 6-17-76, SCALE: 1" = 50'

SANDERSON & PORTER DWG. NO 2242-A253-A BRIDGE & DAM GENERAL LAYOUT DATED 7-21-51.

DESCRIPTION	NO.	DATE
REVISIONS		

10002

PLAN AND LOCATION OF BORINGS AND TEST PITS
NORTH LAGOON
ALBRIGHT POWER STATION
ALBRIGHT, WEST VIRGINIA

GAI CONSULTANTS, INC.
Engineers • Geologists • Planners
Environmental Specialists
570 Beatty Rd. • Pittsburgh, Monroeville, Pa 15146
412-242-6530

ALLEGHENY POWER SERVICE CORP.
GREENSBURG, PENNSYLVANIA

DRAWN: GY
CHECKED: CRP
APPROVED: REC
DATE: 12/6/76
SCALE: 1" = 50'
DRAWING NUMBER: 75-614-E11
REV

75-614-E12

MATCH LINE DWG. 75-614-E11

POWER STATION

EXISTING COAL STORAGE PILE

EXISTING SOUTH LAGOON

EXISTING OUTLET STRUCTURE

RAILROAD TRACK

FENCE

SUBSTATION

CHEAT RIVER

CHEAT RIVER

DH1 DH2 DH3 DH4 DH5 DH6

TP7 TP8 TP9

NOTES:

1. FOR LEGEND SEE DRAWING 75-614-E11.
2. FOR SECTIONS A-A, B-B AND GENERAL NOTES SEE DRAWING 75-614-E13.

SCALE 1" = 50'

50' 0 50' 100'

REFERENCE DRAWING:

ALLEGHENY POWER SERVICE CORP. DWG. NOT NUMBERED TITLED ALBRIGHT POWER STATION, COAL PILE PERIMETER PHOTOG. 6-17-76, SCALE: 1" = 50'

PLAN AND LOCATION OF BORINGS AND TEST PITS
SOUTH LAGOON
ALBRIGHT POWER STATION
ALBRIGHT, WEST VIRGINIA

ALLEGHENY POWER SERVICE CORP.
GREENSBURG, PENNSYLVANIA

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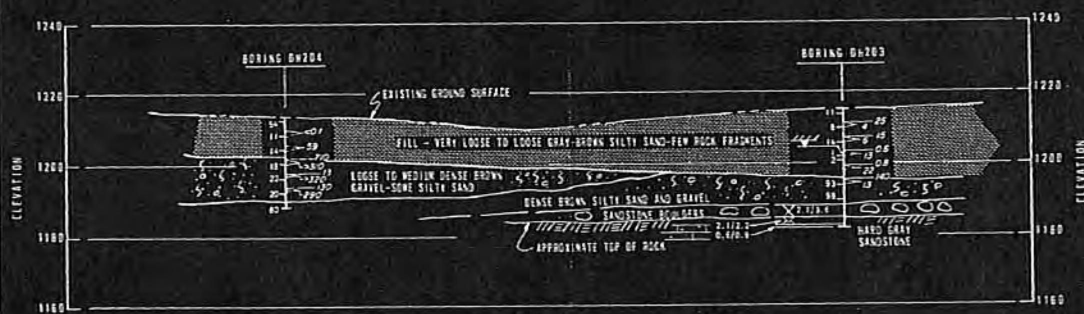
Monroeville, Pa. 15146
412-242-8520

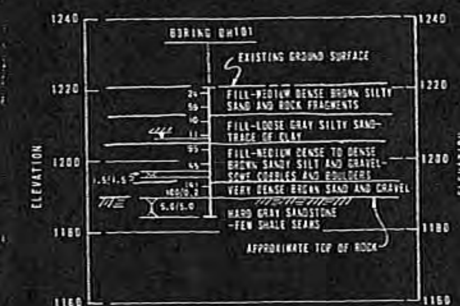
DRAWN: EY
CHECKED: CRR
APPROVED: REC
DATE: 12/6/76
SCALE: 1" = 50'
DRAWING NUMBER: 75-614-E12
REV

DESCRIPTION | NO. | DATE
REVISIONS

75-614-E13



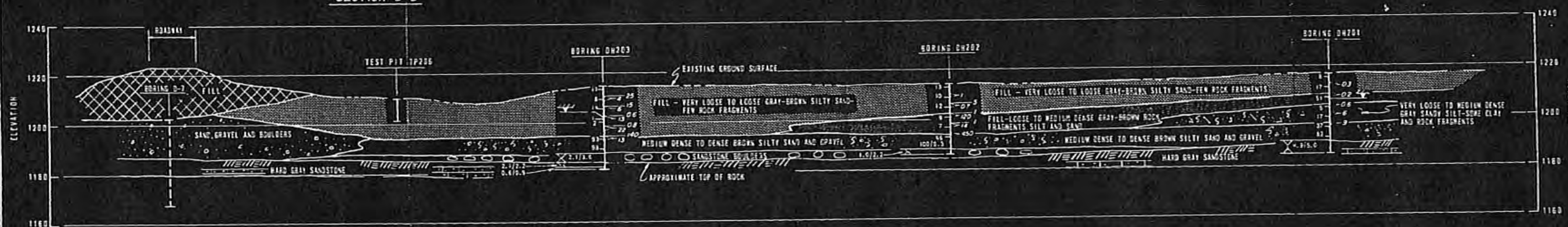
SECTION D-D



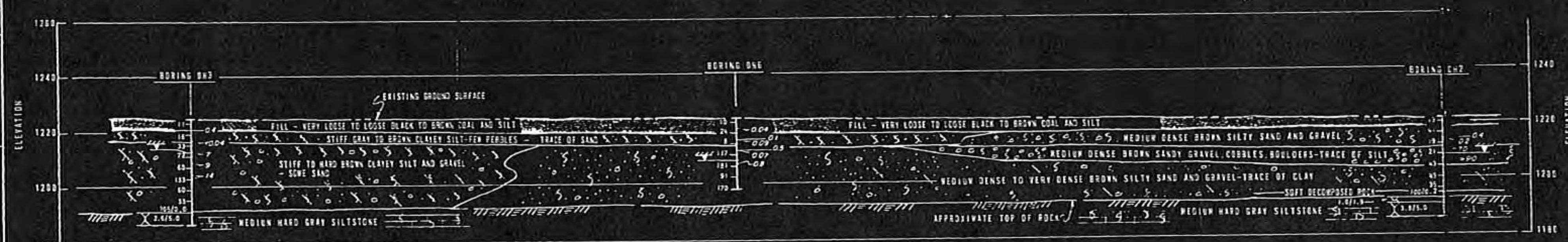
LOG OF BORING DH101

GENERAL NOTES:

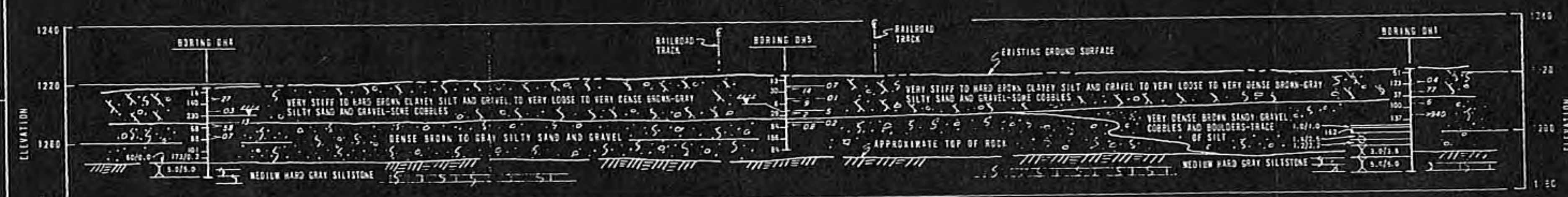
1. THE DEPTH AND THICKNESS OF THE SUBSURFACE STRATA INDICATED ON THE SECTIONS WERE GENERALIZED FROM AND INTERPOLATED BETWEEN TEST BORINGS FROM THE DATA REPORTED ON THE BORING LOGS. INFORMATION ON SUBSURFACE CONDITIONS AND WATER LEVELS EXISTS ONLY AT THE SPECIFIC LOCATION OF EACH TEST BORING AND AT THE PARTICULAR TIMES OF THE EXPLORATORY WORK. THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL AND/OR ROCK TYPES AND THE TRANSITION MAY BE GRADUAL. IT IS POSSIBLE THAT THE PASSAGE OF TIME MAY RESULT IN A CHANGE IN THE SOIL CONDITIONS AND OR WATER LEVELS AT THESE BORING LOCATIONS AND THAT THE SUBSURFACE CONDITIONS AND OR WATER LEVELS BETWEEN THE TEST BORINGS MAY VARY FROM THOSE INDICATED.
2. PENETRATION TESTING AND SOIL SAMPLING WERE PERFORMED IN CONJUNCTION WITH THE BORINGS. SOIL SAMPLES WERE OBTAINED BY DRIVING A 3-INCH O.D. SPLIT-BARREL SAMPLER FOR THREE CONSECUTIVE DEPTH INCREMENTS OF SIX INCHES. THE SAMPLER WAS DRIVEN BY BLOWS FROM A 300-POUND HAMMER FALLING FREELY FOR A DISTANCE OF 18 INCHES. BLOWS WERE COUNTED FOR EACH 6-INCH INCREMENT. THE SUM OF THE BLOWS FOR THE LAST TWO INCREMENTS IN SHOWN ON THE SECTIONS AT THE APPROPRIATE DEPTH TO THE LEFT OF EACH BORING. THESE BLOW COUNTS ARE NOT EQUIVALENT TO THE STANDARD PENETRATION RESISTANCE, BUT AN APPROXIMATE CORRELATION IS SHOWN IN A TABLE BELOW ON THIS DRAWING.
3. FIELD PERMEABILITY TESTS WERE CONDUCTED AT SELECTED DEPTHS IN SELECTED BORINGS IN ACCORDANCE WITH METHODS USED BY THE U.S. BUREAU OF RECLAMATION. THE COEFFICIENT OF PERMEABILITY, IN UNITS OF 10^{-4} CM-SEC. ARE SHOWN ON THE SECTIONS AT THE APPROPRIATE DEPTHS TO THE RIGHT OF THE SELECTED BORINGS.
4. FOR PLAN AND LOCATION OF BORINGS AND TEST PITS SEE DRAWING 75-614-E11 AND 75-614-E12.



SECTION C-C



SECTION B-B



SECTION A-A

APPROXIMATE PENETRATION TEST CORRELATION		
TEST NAME	NEW ENGLAND USCE PENETRATION TEST	STANDARD PENETRATION TEST
SAMPLER O.D.-IN.	3.00	2.00
HAMMER WEIGHT -LBS.	300	140
HAMMER DROP - IN.	18	30
RELATIVE DENSITY	BLOWS FOR LAST FOOT	BLOWS FOR LAST FOOT
VERY LOOSE	8 OR LESS	4 OR LESS
LOOSE	9 - 16	5 - 10
MEDIUM DENSE	17 - 55	11 - 30
DENSE	56 - 110	31 - 50
VERY DENSE	111 OR MORE	51 OR MORE
REFERENCE; HVORSLEV, M.J., SUBSURFACE EXPLORATION AND SAMPLING OF SOILS FOR CIVIL ENGINEERING PURPOSES, ENGINEERING FOUNDATION, 1965		
NOTE: CORRELATIONS BETWEEN PENETRATION TESTS ARE APPROXIMATE AND ARE INFLUENCED BY SOIL CONDITIONS, EQUIPMENT AND OPERATOR.		

SCALE 1" = 20'
20' 0 20' 40'

LEGEND

- ▩ FILL (VERY LOOSE TO LOOSE)
- ☐ FILL (LOOSE TO MEDIUM DENSE)
- ▤ FILL (VERY LOOSE TO LOOSE COAL AND SILT)
- ▦ FILL
- ▨ GRAVEL
- ▩ SAND
- ▨ SILT
- ▧ CLAY
- ▤ SILTSTONE
- ▤ SANDSTONE
- APPROXIMATE TOP OF ROCK
- COEFFICIENT OF PERMEABILITY UNITS ARE 10^{-4} CM-SEC. (SEE GENERAL NOTE 3).
- INFERRED STRATA
- EXISTING GROUND SURFACE
- 13 BLOWS REQUIRED TO DRIVE SPLIT-BARREL SOIL SAMPLER LAST 12 INCHES TOTAL PENETRATION OF 18 INCHES NOT STANDARD PENETRATION RESISTANCE SEE GENERAL NOTE 2.
- 50/0.5 INDICATES 50 BLOWS REQUIRED FOR SPLIT BARREL SAMPLER TO PENETRATE 0.5 FEET
- GROUND WATER LEVEL (12 OR MORE HOURS AFTER COMPLETION OF BORING)
- 4.7 LENGTH OF CORE RECOVERED
- 5.0 LENGTH OF DRILL RUN

DESCRIPTION	NO.	DATE
REVISIONS		

1000

GENERALIZED GEOLOGIC CROSS SECTIONS A-A, B-B, C-C AND D-D
NORTH AND SOUTH LAGOONS
ALBRIGHT POWER STATION
ALBRIGHT, WEST VIRGINIA

ALLEGHENY POWER SERVICE CORP.
GREENSBURG, PENNSYLVANIA

CONSULTANTS, INC.
Engineers • Geologists • Planners
Environmental Specialists
570 Beatty Rd. • Pittsburgh
Monroeville, Pa 15146
412-242-6530

DRAWN: GY APPROVED: REC
CHECKED: CRR DATE: 12/3/76
SCALE: 1" = 20' DRAWING NUMBER 75-614-E13 REV

Appendix B

USEPA Checklists

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: Albright Power Station	Date: September 18, 2012
Unit Name: North Process Wastewater Lagoon	Operator's Name: First Energy Corp
Unit I.D.:	Hazard Potential Classification: High Significant (Low)
Inspector's Name: James Vinson/Bevin Barringer	

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?	biweekly		18. Sloughing or bulging on slopes?	X	
2. Pool elevation (operator records)?	1213.5		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	1203.6		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	DNA		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	1214.0		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)?	X		From underdrain?	DNA	
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?	DNA		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?	DNA		Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?	DNA		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

1. Twice a month plant perimeter inspections and water sampling are performed. Staff will note if there are any issues, but no formal documentation exists.

3,12 Water drains over v-notched weir at El.1211 to outlet pipe at El.1203.6.

8. Construction documents indicate 6" of stripping prior to fill placement.

9. Largest tree is approximately 4 inches in diameter.

18. 10-ft-long section of 75-ft-long concrete crib retaining wall at west interior slope was bulging towards the lagoon.

23. Cheat River at east embankment exterior toe.

Vertical datum is NAVD88
N/A=not available
DNA=does not apply

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # WV0004723 INSPECTOR James Vinson, Bevin Barringer

Date September 18, 2012

Impoundment Name North Process Wastewater Lagoon

Impoundment Company First Energy Corp

EPA Region 3

State Agency (Field Office) Addresss West Virginia Department of Environmental Protection
601 57th Street SE, Charleston, WV 25304

Name of Impoundment North Process Wastewater Lagoon

(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: Received liquids from bottom ash dewatering hydrobins. The Albright Power Plant is closing and stopped producing power on August 20, 2012. Ash has been dredged from the north lagoon. Liquids entering the lagoon are from stormwater runoff and other plant generated liquids received after treatment at the onsite wastewater treatment facility.

Nearest Downstream Town : Name Albright, WV

Distance from the impoundment 600 feet

Impoundment Location: Longitude 79 Degrees 38 Minutes 24.0 Seconds
Latitude 39 Degrees 29 Minutes 22.0 Seconds
State WV County Preston

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

If So Which State Agency? West Virgina Department of Environmental Protection

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.

__X___ **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.

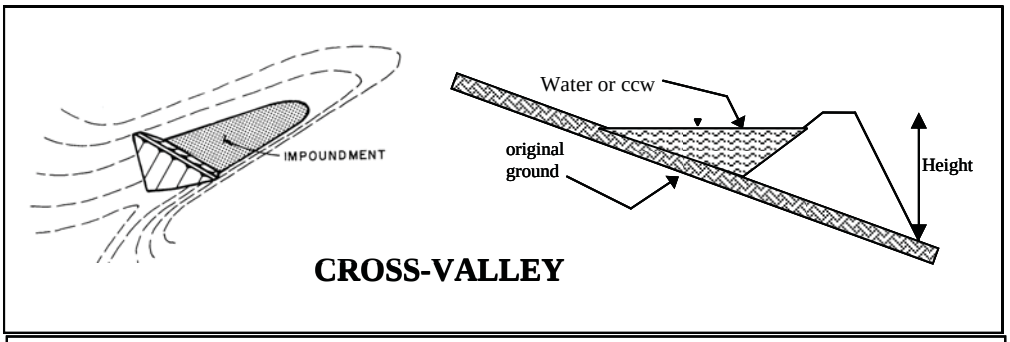
_____ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.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

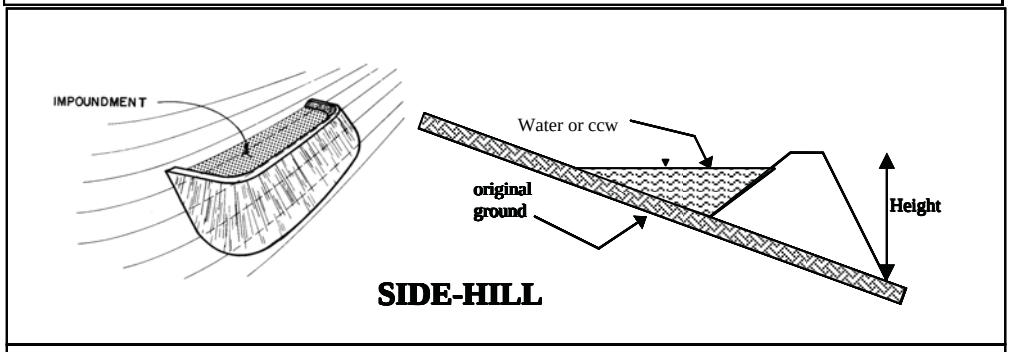
_____ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

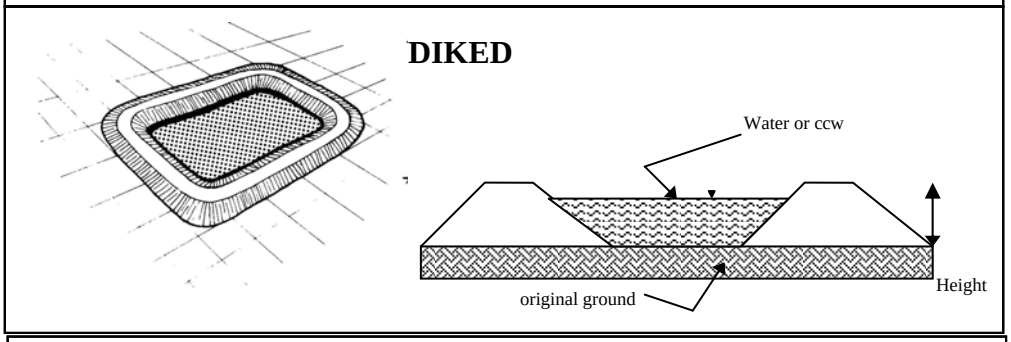
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

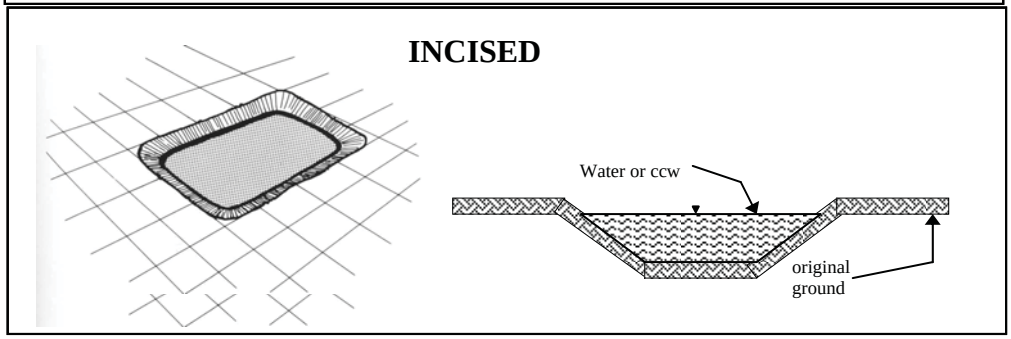
Due to the size of the impoundment and topography in the area, failure or misoperation of the impoundment would likely result in minimal economic and environmental damage to the Cheat River located just north of the impoundment.

CONFIGURATION:









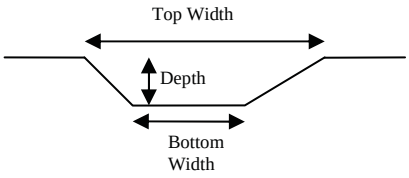
_____ Cross-Valley
__X__ Side-Hill
_____ Diked
_____ Incised (form completion optional)
_____ Combination Incised/Diked

Embankment Height __13__ feet Embankment Material __unknown__
Pool Area __1__ acres Liner __none__
Current Freeboard __0.5__ feet Liner Permeability __DNA__

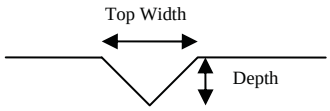
TYPE OF OUTLET (Mark all that apply)

_____ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

TRAPEZOIDAL

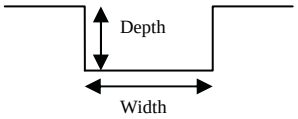


TRIANGULAR

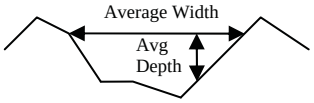


_____ depth
_____ bottom (or average) width
_____ top width

RECTANGULAR

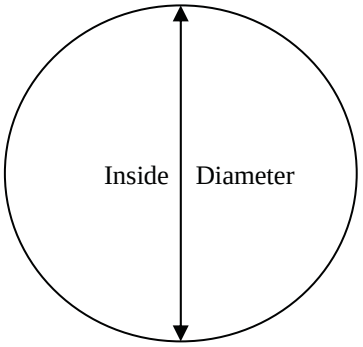


IRREGULAR



__X__ **Outlet**

__36"__ inside diameter



Material
_____ corrugated metal
_____ welded steel
__X__ 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 __Sanderson & Porter, Inc.__
_____

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 : _____

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: Albright Power Station	Date: September 18, 2012
Unit Name: South Process Wastewater Lagoon	Operator's Name: First Energy Corp
Unit I.D.:	Hazard Potential Classification: High Significant (Low)
Inspector's Name: James Vinson/Bevin Barringer	

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?	biweekly		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	1212.0		19. Major erosion or slope deterioration?	X	
3. Decant inlet elevation (operator records)?	1209.5		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	DNA		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	1223.0		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)?	X		From underdrain?	DNA	
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?	DNA		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?	DNA		Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?	DNA		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

1. Twice a month plant perimeter inspections and water sampling are performed. Staff will note if there are any issues, but no formal documentation exists.

3,12 Water drains over v-notched weir at El.1220 to outlet pipe at El.1209.5.

8. Construction documents indicate 6" of stripping prior to fill placement.

9. Largest tree is approximately 4 inches in diameter.

19. Erosion near pipe inlets at north and west interior slopes.

23. Cheat River at east embankment exterior toe. Coal pile runoff ditch at west embankment exterior slope.

Vertical Datum is NAVD88
N/A=not available
DNA=does not apply

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # WV0004723 INSPECTOR James Vinson, Bevin Barringer

Date September 18, 2012

Impoundment Name South Process Wastewater Lagoon

Impoundment Company First Energy Corp

EPA Region 3

State Agency (Field Office) Addresss West Virginia Department of Environmental Protection
601 57th Street SE, Charleston, WV 25304

Name of Impoundment South Process Wastewater Lagoon

(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: Received liquids from bottom ash dewatering hydrobins in the past. The Albright Power Plant is closing and stopped producing power on August 20, 2012. Ash was being dredged from the south lagoon during the assessment and no liquids were entering the lagoon. After dredging is complete the lagoon may recieve coal pile stormwater runoff and other plant generated liquids after treatment at the onsite wastewater treatment facility.

Nearest Downstream Town : Name Albright, WV

Distance from the impoundment 1000 feet

Impoundment Location: Longitude 79 Degrees 38 Minutes 6.5 Seconds
Latitude 39 Degrees 29 Minutes 13.0 Seconds
State WV County Preston

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

If So Which State Agency? West Virgina Department of Environmental Protection

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.

__X___ **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.

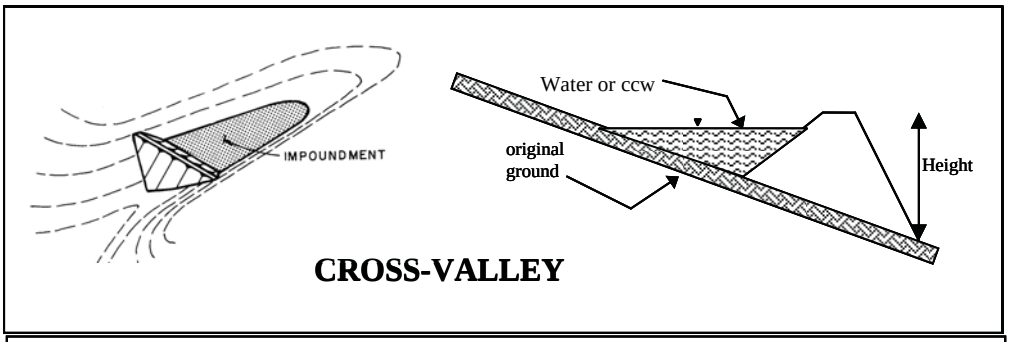
_____ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.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

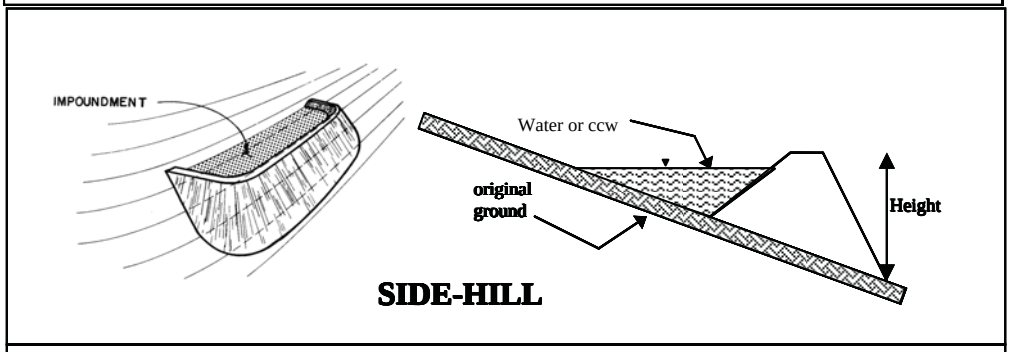
_____ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

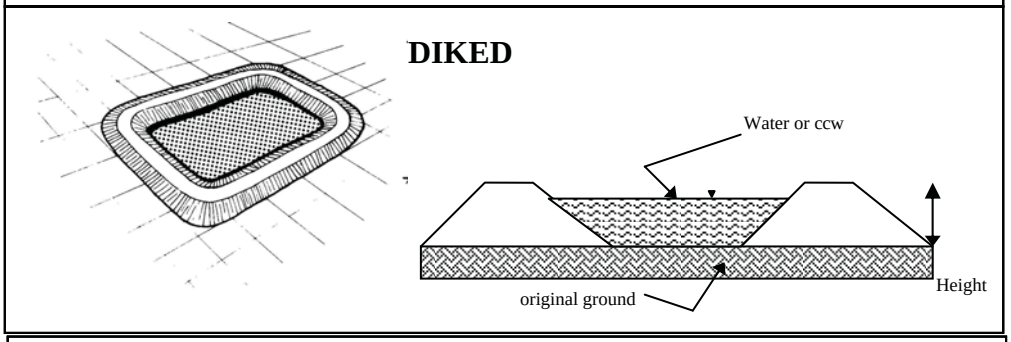
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

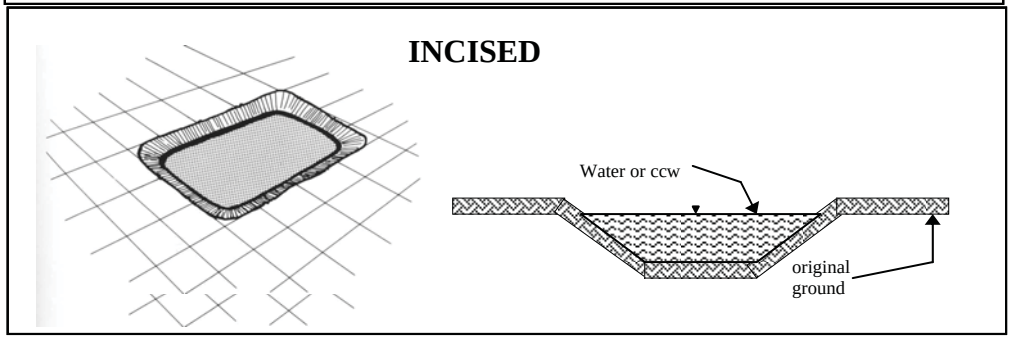
Due to the size of the impoundment and topography in the area, failure or misoperation of the impoundment would likely result in minimal economic and environmental damage to the Cheat River located just east of the impoundment.

CONFIGURATION:









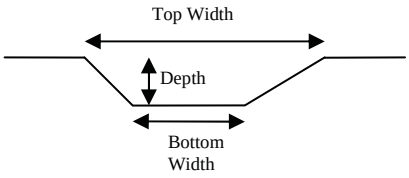
_____ Cross-Valley
_____ Side-Hill
_____ Diked
__X__ Incised (form completion optional)
_____ Combination Incised/Diked

Embankment Height __13__ feet
Embankment Material __unknown__
Pool Area __0.85__ acres
Liner __none__
Current Freeboard __11__ feet
Liner Permeability __DNA__

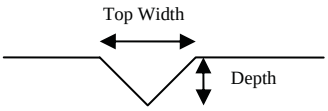
TYPE OF OUTLET (Mark all that apply)

_____ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

TRAPEZOIDAL

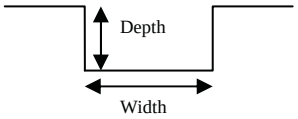


TRIANGULAR

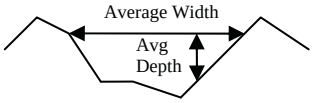


_____ depth
_____ bottom (or average) width
_____ top width

RECTANGULAR

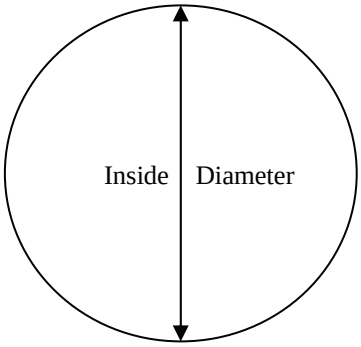


IRREGULAR



__X__ **Outlet**

__24"__ inside diameter



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

Is water flowing through the outlet? YES __X__ NO _____

Minimal water was flowing through the outlet during dredging operations due to the low water level.

_____ **No Outlet**

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

The Impoundment was Designed By __Sanderson & Porter, Inc.__

_____

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 : _____

Appendix C

Documentation from FirstEnergy Corp

[redacted]

LAGOON DIVERSION CHAMBER	1220.19	N 359371.62 E 1930470.93				

SITE PLAN

GENERAL NOTES:

1. WORK THIS DRAWING WITH DWG 21199-12-11-314, DWG 21199-12-11-315, ORBITAL ENGINEERING DWG 414-422, S&P DWGS 4993-C-2400, 4993-C-2404 & 4993-B-4425.

2. THE LENGTH OF HDPE PIPE SHOWN IS APPROXIMATE THE CONTRACTOR SHALL FIELD MEASURE THE PIPES AFTER CONSTRUCTING THE MANHOLES.

3. DIVERSION BOX LOCATIONS ARE APPROXIMATE CONTRACTOR SHALL CENTER DB ON EXIST LAGOON OUTFALL LINE-
   36"RCP AT NORTH LAGOON
   24"RCP AT SOUTH LAGOON

4. THE INFLOW AND OUTFLOW PIPES ARE CONNECTED TO THE MANHOLE AT THE CENTER OF M.H.

5. THE CONTRACTOR SHALL LOCATE ALL EXISTING UNDERGROUND PIPING CROSSING THE TRENCH LINE BEFORE EXCAVATION OF THE PIPE TRENCH. HAND EXCAVATION MAY BE NECESSARY TO EXPOSE THESE PIPES. IF AN INTERFERENCE IS DISCOVERED., THE OWNER SHALL BE NOTIFIED IMMEDIATELY.

6. PIPE MATERIAL ANDE INSTALLATION SHALL BE IN ACCORDANCE WITH SPECIFICATION 21199-120 "HIGH DENSITY POLYETHYLENE PIPE"

7. SEE PIPE PROFILE DWG 21199-12-11-315

8. BEDDING & BACKFILL
THE BEDDING MATERIAL SHALL BE SAND MIXTURES WITH LITTLE OR NO FINES. THE MAXIMUM SHALL NOT BE MORE THAN 1 INCH, PERCENT PASSING #4 SIEVE SHALL NOT BE MORE THAN 75% OF THE COARSE FRACTION AND PERCENT PASSING #200 SIEVE SHALL NOT BE MORE THAN 5%. THE BACKFILL MATERIAL AROUND AND TO 12" ABOVE THE PIPES SHALL BE WELL GRADED GRAVEL AND GRAVEL AND SAND MIXTURES WITH LITTLE OR NO FINES. THE MAXIMUM SIZE SHALL BE 1½INCH, PERCENT PASSING #4 SIEVE SHALL NOT BE MORE THAN 10% AND PERCENT PASSING #200 SIEVE SHALL NOT BE MORE THAN 5%. BACKFILL SHALL BE PLACED IN MAXIMUM 8" LOOSE LIFTS AND COMPACTED AT WITHIN 2% OF OPTIMUM MOISTURE CONTENT TO 95 % MODIFIED PROCTOR MAXIMUM DRY DENSITY (ASTM D1557).BENEATH ROADS AND PAVING, BACKFILL MATERIAL SHALL EXTEND TO PAVEMENT SUBGRADE. BACKFILL SHALL BE PLACED IN MAXIMUM " LOOSE LIFTS AND COMPACTED AT WITHIN 2% OF OPTIMUM MOISTURE CONTENT TO 95 % MODIFIED PROCTOR MAXIMUM DRY DENSITY (ASTM D1557).

REV	DATE	REVISIONS	BY	CHKD
A	12-07-07	PRELIMINARY BID ISSUE	BSR	DG
B	03-20-08	REVISED FOR BID ISSUE	JWP	TSH
0	05-22-08	ISSUE FOR CONSTRUCTION	JWP	

ISSUED	REV	DATE	SDE	PEM
PRELIMINARY BID ISSUE	A	12-07-07	AHM	W.
REVISED FOR BID ISSUE	B	03-20-08	TSH	W.
APPROVED FOR CONSTRUCTION	0	05-22-08		

NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED & DATED. DESTROY ALL PRINTS BEARING EARLIER DATE &/OR REV.NO.

PROJECT NO.: 21199 · DRAWN: BSR · DATE: 11-27-07 · CHECKED: AHM · DATE: 12-07-07 · SCALE: 1"=60' U.N.

WASTE WATER TREATMENT SYSTEM
NORTH LAGOON & SOUTH LAGOON CONN.PIPE
DRAINAGE PIPE LAYOUT PLAN & PROFILE

MONONGAHELA POWER COMPANY
AN ALLEGHENY ENERGY COMPANY
ALBRIGHT POWER STATION

Washington Group International

DWG. NO. 21199-12-11-313 REV 0

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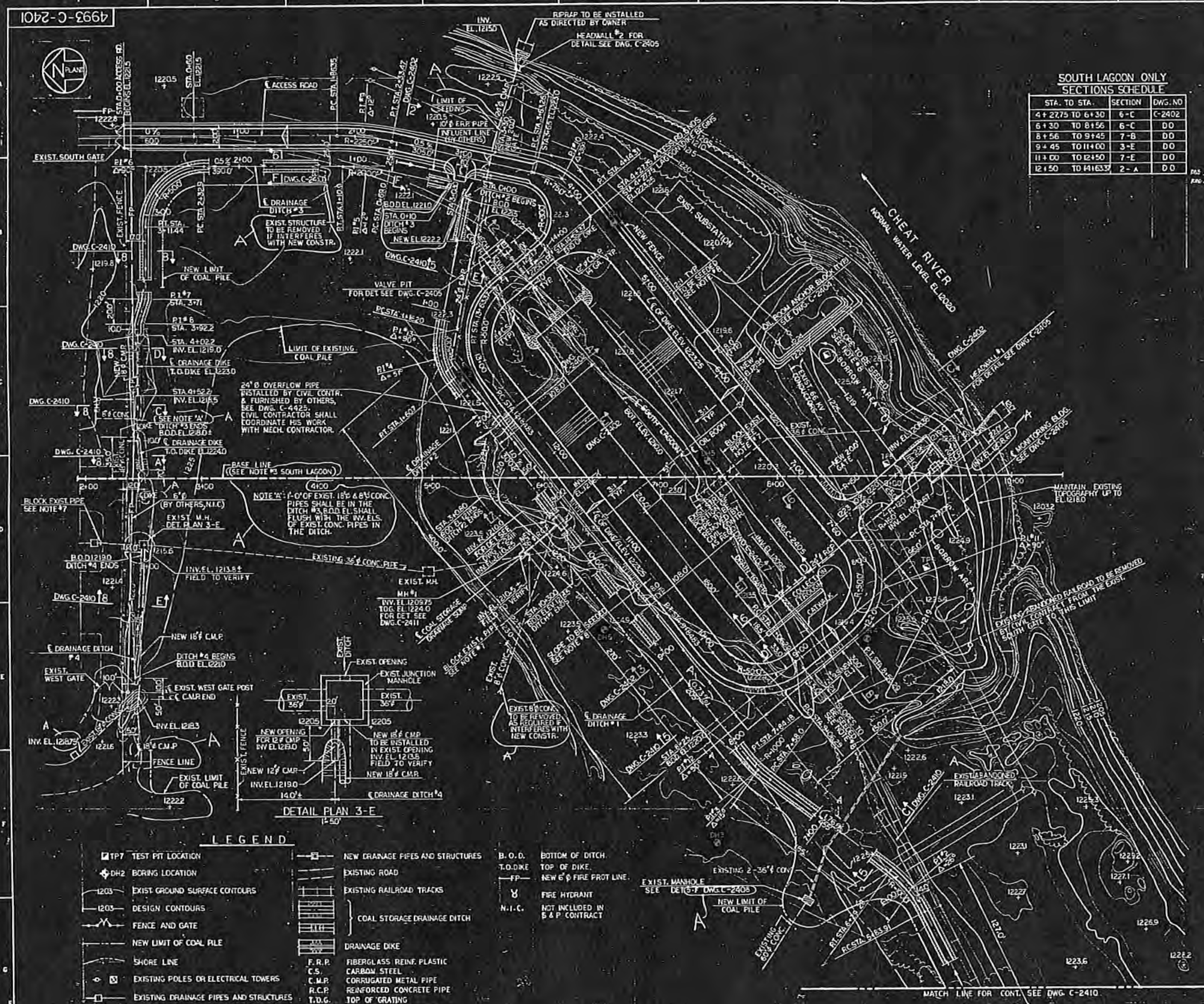
4993-C-2401



SOUTH LAGOON ONLY SECTIONS SCHEDULE

STA. TO STA.	SECTION	DWG. NO
4+27.75 TO 6+30	6-C	C-2402
6+30 TO 8+56	6-C	DO
8+56 TO 9+45	7-B	DO
9+45 TO 11+00	3-E	DO
11+00 TO 12+50	7-E	DO
12+50 TO 14+16.37	2-A	DO

REVISIONS

REV.	MADE BY	DATE	CHKD	APPVD	APPVD	DESCRIPTION
A	[illegible]	6-23-77	[illegible]	[illegible]	[illegible]	REVISED PLAN AS SHOWN

PRINTS ISSUED

REV.	DATE	FIELD	CLIENT	OTHERS	
-	3-1-77	-	10	10	FOR CLIENT APPROVAL
-	4-22-77	-	26	[illegible]	FOR BIDS
A	6-27-77	6+1	11	11	FOR CONSTRUCTION

NOTES

1. ALL ELEVATIONS AND CONTOURS SHOWN ARE BASED ON U.S.G.S. DATUM.
2. EXISTING TOPOGRAPHY IS A REPRODUCTION OF DWG. "ALBRIGHT POWER STATION COAL PILE PERIMETER PHOTOG DATED 6-17-76" PREPARED BY ALLEGHENY POWER SERVICE CORP. TO SCALE 1"=50', DWG. NO. 600-011.
3. ALL HORIZONTAL DIMENSIONS ARE TIED TO THE BASE LINES SHOWN ON THE DWG. "ALBRIGHT POWER STATION COAL PILE PERIMETER PHOTOG 6-17-76" PREPARED BY ALLEGHENY POWER SERVICE CORP. DWG. NO. 600-011.
4. ALL SOIL INFORMATION, GEOLOGICAL AND GEOTECHNICAL DATA, USED IN DESIGN IS BASED ON THE FINAL REPORT "GEOTECHNICAL INVESTIGATION, PROPOSED WASTEWATER TREATMENT FACILITIES, ALBRIGHT POWER STA., ALBRIGHT, WEST VIRGINIA" PREPARED BY G.A.I. CONSULTANTS INC. PITTSBURGH, PA. DATED DEC. 1976.
5. FOR INFLUENT AND EFFLUENT PIPING LAYOUT, AND DETAILS SEE DWGS. B-4425 & C-4426.
6. FOR GENERAL NOTES SEE DWG. C-2403
7. EXISTING DRAINAGE PIPES SHALL BE BLOCKED BY CONCRETE (2000 PSI) PLUG, 24" LONG FOR PIPES 36" DIA & OVER AND 15" LONG FOR PIPES UNDER 36" DIA. BY CIVIL CONTRACTOR.
8. ALL SEEDING SHALL BE IN ACCORDANCE WITH S & P SPEC. 4993-6.
9. FOR LIMITS OF STRIPPING SEE DWGS. C-2402 & C-2410.
10. ALL C.M. PIPES SHALL BE IN ACCORD. WITH S&P SPEC'S. 4993-6, GAGE 16, UNLESS NOTED.

REFERENCE DWGS.

APSC	600-011	ALBRIGHT POWER STATION COAL PILE PERIMETER PHOTOG 6-17-76
APSC	500-408	ALBRIGHT POWER STATION WASTEWATER TREATMENT FACILITY TOPOGRAPHIC MAP PREPARED BY L.R. KIMBALL, CONSULTING ENGINEERS EBENSBERG PA.
MPC	102-A-2258	PLANT LAYOUT UNITS NOS. 1, 2 & 3 ALBRIGHT STATION M.P.C.
MPC	205-B-2258	JUNCTION FOR 36" DIA CONC. PIPE UNIT NO. 3 ALBRIGHT STATION
S&P	4993-B-4425	LAGOON & COAL AREA DRAINAGE PIPING.
S&P	4993-C-4426	LAGOON & COAL AREA DRAINAGE SECT. & DETAILS.
S&P	4993-B-4401	MASTER FLOW DIAGRAM WASTEWATER TREATMENT SYS.
S&P	4993-B-4420	SITE PLAN
S&P	4993-C-4422	NEUTRALIZATION BASIN & GRIT CHAMBER PUMP DISCH. & MISC. PIPING.
S&P	4993-C-4423	MISC. PLANS & SECTIONS

LEGEND

TP7	TEST PIT LOCATION
DH2	BORING LOCATION
1203	EXIST. GROUND SURFACE CONTOURS
1203	DESIGN CONTOURS
	FENCE AND GATE
	NEW LIMIT OF COAL PILE
	SHORE LINE
	EXISTING POLES OR ELECTRICAL TOWERS
	EXISTING DRAINAGE PIPES AND STRUCTURES
	NEW DRAINAGE PIPES AND STRUCTURES
	EXISTING ROAD
	EXISTING RAILROAD TRACKS
	COAL STORAGE DRAINAGE DITCH
	DRAINAGE DIKE
F.R.P.	FIBERGLASS REINF. PLASTIC
C.S.	CARBON STEEL
C.M.P.	CORRUGATED METAL PIPE
R.C.P.	REINFORCED CONCRETE PIPE
T.O.G.	TOP OF GRATING
B.O.D.	BOTTOM OF DITCH
T.O.DIKE	TOP OF DIKE
FP	NEW 6" Ø FIRE PROT. LINE
	FIRE HYDRANT
N.I.C.	NOT INCLUDED IN S & P CONTRACT

S&P 4993-C-2401

APPROVED FOR CONSTRUCTION

WORK THIS DWG. WITH DWG. C-2410

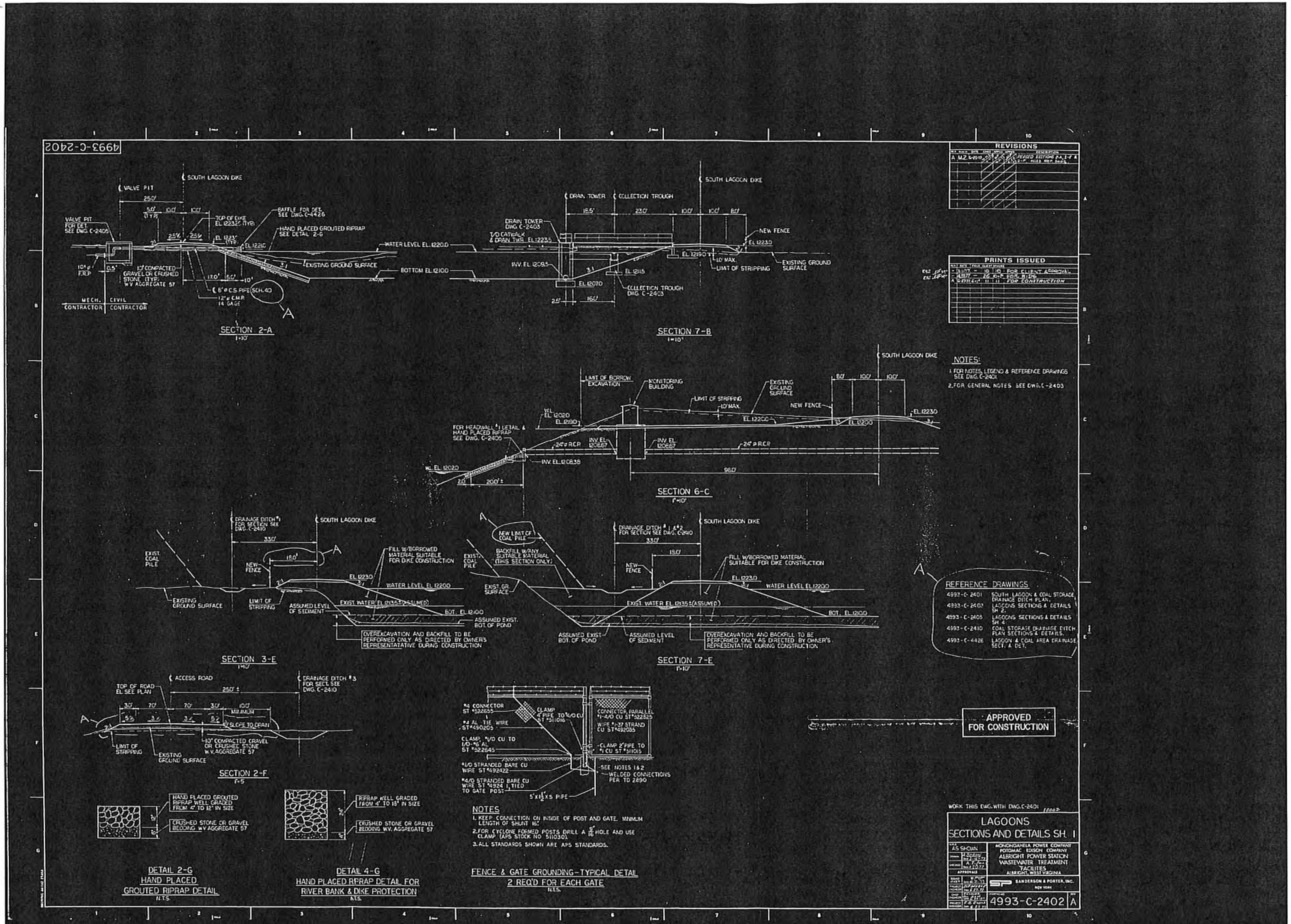
SOUTH LAGOON AND COAL STORAGE DRAINAGE DITCH PLAN

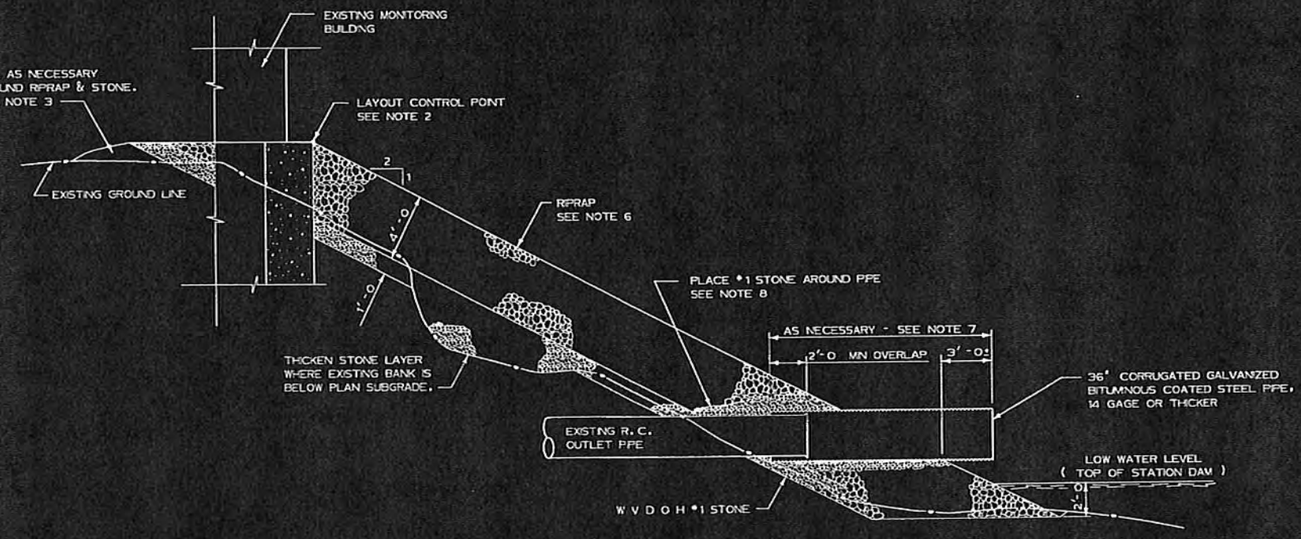
SCALE 1"=30' (U.N.)

MONONGAHELA POWER COMPANY
POTOMAC EDISON COMPANY
ALBRIGHT POWER STATION
WASTEWATER TREATMENT FACILITIES
ALBRIGHT, WEST VIRGINIA

SANDERSON & PORTER, INC.

500-785 A


4993-C-2402
SOUTH LAGOON DIKE
VALVE PIT
25.0'
5.0' (TYP) 10.0' 10.0'
VALVE PIT FOR DET. SEE DWG. C-2405
TOP OF DIKE EL.1223.5 (TYP)
BAFFLE FOR DET. SEE DWG. C-4426
HAND PLACED GROUTED RIPRAP SEE DETAIL 2-G
2.5% 2.5%
EL.1223.5 (TYP)
EL.1221.0
WATER LEVEL EL.1220.0
EXISTING GROUND SURFACE
BOTTOM EL.1210.0
10"ø F.R.P.
0.5'
10" COMPACTED GRAVEL OR CRUSHED STONE (TYP) W.V. AGGREGATE 57
17.0' 5.0' 10'
6"ø C.S. PIPE SCH.40
12"ø C.M.P. 14 GAGE
MECH. CONTRACTOR
CIVIL CONTRACTOR
SECTION 2-A
1=10'
DRAIN TOWER
COLLECTION TROUGH
18.5' 23.0' 10.0' 10.0' 8.0'
DRAIN TOWER DWG. C-2403
T/O CATWALK & DRAIN TWR. EL.1223.5
NEW FENCE
EL.1223.0
EL.1219.0
10' MAX.
LIMIT OF STRIPPING
EXISTING GROUND SURFACE
INV. EL.1209.5
EL.1211.5
EL.1207.0
COLLECTION TROUGH DWG. C-2403
2.5' 16.0'
SECTION 7-B
1=10'
LIMIT OF BORROW EXCAVATION
MONITORING BUILDING
LIMIT OF STRIPPING
10' MAX.
EXISTING GROUND SURFACE
NEW FENCE
8.0' 10.0' 10.0'
EL.1223.0
W.L. EL.1202.0
EL.1219.0
EL.1220.0
EL.1220.0
FOR HEADWALL #1 DETAIL & HAND PLACED RIPRAP SEE DWG. C-2405
24"ø R.C.P.
INV. EL. 1208.67
INV. EL. 1208.67
24"ø R.C.P.
INV. EL.1208.38
W.L. EL.1202.0
2.0' 200'±
96.0'
SECTION 6-C
1"=10'
DRAINAGE DITCH #1 FOR SECTION SEE DWG. C-2410
33.0'
18.0'
EXIST. COAL PILE
NEW FENCE
FILL W/BORROWED MATERIAL SUITABLE FOR DIKE CONSTRUCTION
EL.1223.0
WATER LEVEL EL.1220.0
EXISTING GROUND SURFACE
LIMIT OF STRIPPING
ASSUMED LEVEL OF SEDIMENT
EXIST. WATER EL.1213.5± (ASSUMED)
BOT. EL.1210.0
ASSUMED EXIST. BOT. OF POND
OVEREXCAVATION AND BACKFILL TO BE PERFORMED ONLY AS DIRECTED BY OWNER'S REPRESENTATATIVE DURING CONSTRUCTION
SECTION 3-E
1=10'
NEW LIMIT OF COAL PILE
BACKFILL W/ANY SUITABLE MATERIAL (THIS SECTION ONLY)
EXIST. COAL PILE
EXIST. GR. SURFACE
DRAINAGE DITCH #1 & #2 FOR SECTION SEE DWG. C-2410
33.0'
15.0'
NEW FENCE
FILL W/BORROWED MATERIAL SUITABLE FOR DIKE CONSTRUCTION
EL.1223.0
WATER LEVEL EL.1220.0
EXIST. WATER EL.1213.5± (ASSUMED)
BOT. EL.1210.0
ASSUMED EXIST. BOT. OF POND
ASSUMED LEVEL OF SEDIMENT
OVEREXCAVATION AND BACKFILL TO BE PERFORMED ONLY AS DIRECTED BY OWNER'S REPRESENTATIVE DURING CONSTRUCTION
SECTION 7-E
1"=10'
ACCESS ROAD
DRAINAGE DITCH #3 FOR SECT. SEE DWG. C-2410
TOP OF ROAD EL. SEE PLAN
25.0'±
3.0' 7.0' 7.0' 3.0' 10.0' MINIMUM
5% 3% 3% 5%
SLOPE TO DRAIN
LIMIT OF STRIPPING
EXISTING GROUND SURFACE
10" COMPACTED GRAVEL OR CRUSHED STONE W.V. AGGREGATE 57
SECTION 2-F
1"=5
HAND PLACED GROUTED RIPRAP WELL GRADED FROM 4" TO 12" IN SIZE
CRUSHED STONE OR GRAVEL BEDDING W.V. AGGREGATE 57
DETAIL 2-G
HAND PLACED
GROUTED RIPRAP DETAIL
N.T.S.
RIPRAP WELL GRADED FROM 4" TO 15" IN SIZE
CRUSHED STONE OR GRAVEL BEDDING W.V. AGGREGATE 57
DETAIL 4-G
HAND PLACED RIPRAP DETAIL FOR
RIVER BANK & DIKE PROTECTION
N.T.S.
#4 CONNECTOR ST #522655
CLAMP 4" PIPE TO 4/0 CU ST #511016
#4 AL TIE WIRE ST #490205
CONNECTOR, PARALLEL #1-4/0 CU ST #522825
WIRE #1-37 STRAND CU ST #492035
CLAMP #1/0 CU TO 1/0-#6 AL ST #522645
CLAMP 2" PIPE TO #1 CU ST #511015
#1/0 STRANDED BARE CU WIRE ST #492422
SEE NOTES 1&2
WELDED CONNECTIONS PER TD 2890
#4/0 STRANDED BARE CU WIRE ST #4924 1, TIED TO GATE POST
5'x1½"xS PIPE
NOTES
1. KEEP CONNECTION ON INSIDE OF POST AND GATE. MINIMUM LENGTH OF SHUNT 16".
2. FOR CYCLONE FORMED POSTS DRILL A 5/16" HOLE AND USE CLAMP (APS STOCK NO 511030).
3. ALL STANDARDS SHOWN ARE APS STANDARDS.
FENCE & GATE GROUNDING-TYPICAL DETAIL
2 REQ'D FOR EACH GATE
N.T.S.
REVISIONS
A M.Z. 6-29-77 REVISED SECTIONS 2-A, 3-E & 2-F. ADDED REF. DWGS.
PRINTS ISSUED
- 1-1-77 - 10 10 FOR CLIENT APPROVAL
- 4-18-77 - 26 10+F FOR BIDS
A 6-29-77 6+F 11 11 FOR CONSTRUCTION
NOTES:
1. FOR NOTES, LEGEND & REFERENCE DRAWINGS SEE DWG. C-2401
2. FOR GENERAL NOTES SEE DWG. C-2403
REFERENCE DRAWINGS
4993-C-2401 SOUTH LAGOON & COAL STORAGE DRAINAGE DITCH PLAN.
4993-C-2403 LAGOONS SECTIONS & DETAILS SH 2.
4993-C-2405 LAGOONS SECTIONS & DETAILS SH 4.
4993-C-2410 COAL STORAGE DRAINAGE DITCH PLAN SECTIONS & DETAILS.
4993-C-4426 LAGOON & COAL AREA DRAINAGE SECT. & DET.
APPROVED FOR CONSTRUCTION
WORK THIS DWG. WITH DWG. C-2401
LAGOONS
SECTIONS AND DETAILS SH. 1
AS SHOWN
MONONGAHELA POWER COMPANY
POTOMAC EDISON COMPANY
ALBRIGHT POWER STATION
WASTEWATER TREATMENT FACILITIES
ALBRIGHT, WEST VIRGINIA
SANDERSON & PORTER, INC.
NEW YORK
4993-C-2402 A



TYPICAL SECTION

NOTES:

1. THE CONTRACTOR SHALL REPAIR THE RIVER BANK AS SHOWN IN THE TYPICAL SECTION FOR A DISTANCE OF 30 LINEAL FEET UPSTREAM AND DOWNSTREAM FROM THE SOUTH LAGOON OUTLET PIPE (60 LINEAL FEET TOTAL LENGTH).

2. AT THE MONITORING BUILDING, THE TOP OF THE PROPOSED RIPRAP SLOPE SHALL COINCIDE WITH THE LAYOUT CONTROL POINT (SEE TYPICAL SECTION), UPSTREAM AND DOWNSTREAM. THE PLAN LAYOUT SHALL FOLLOW THE EXISTING CURVE OF THE RIVER BANK SUCH THAT THE RIPRAP SLOPE CONFORMS AS WELL AS POSSIBLE TO THE EXISTING BANK SLOPE AT THE ENDS. EXISTING RIVER BOULDERS SHALL BE PLACED AT THE UPSTREAM AND DOWNSTREAM ENDS OF THE RIPRAP AS NECESSARY TO MAKE SMOOTH TRANSITIONS.

3. THE CONTRACTOR SHALL USE EXCAVATED MATERIAL AS NECESSARY TO FILL AND GRADE AROUND THE TOP OF THE RIPRAP AND STONE TO ACHIEVE SMOOTH TRANSITIONS WITH EXISTING GROUND. ALL FILL SHALL BE PLACED IN LAYERS NO THICKER THAN ONE FOOT AND EACH LAYER COMPACTED BY AT LEAST SIX PASSES OF TRACKED EQUIPMENT. NO LOW SPOTS SHALL BE LEFT TO POND WATER.

4. THE CONTRACTOR SHALL DISPOSE OF EXCESS OR UNSUITABLE EXCAVATED MATERIAL IN THE ASH DISPOSAL AREA AT A LOCATION DESIGNATED BY THE OWNERS.

5. CRUSHED STONE SHALL MEET THE QUALITY REQUIREMENTS OF WVDOH 1982 SPECIFICATIONS SECTION 703.1 AND THE GRADING REQUIREMENTS OF TABLE 703.4 FOR THE SIZE INDICATED.

6. RIPRAP SHALL BE GRADED FROM 6 TO 48 INCHES IN SIZE WITH AT LEAST 50 PERCENT BY WEIGHT HAVING NO DIMENSION SMALLER THAN 24 INCHES. QUALITY SHALL MEET THE REQUIREMENTS OF WVDOH 1982 SPECIFICATIONS SECTION 704.2.

7. THE CONTRACTOR SHALL DETERMINE THE REQUIRED LENGTH OF CORRUGATED METAL PIPE SUCH THAT THE OVERLAP AND PROJECTION SHOWN ON THE TYPICAL SECTION ARE ACHIEVED.

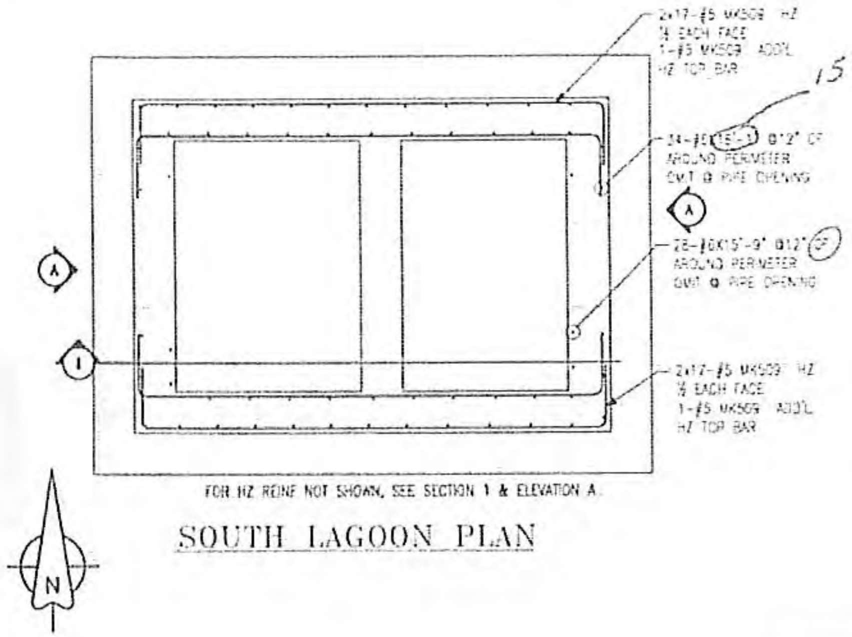
8. THE CONTRACTOR SHALL PLACE #1 STONE AROUND THE CONCRETE AND STEEL PIPES AS NECESSARY TO PREVENT DAMAGE FROM RIPRAP PLACEMENT.

DRAWN 5-8-86 T. AYRES	ALLEGHENY POWER SERVICE CORP.	
CHK'D WAS / DES'D APP'D DES 5-9-86 CLS 5-9-86	ALBRIGHT POWER STATION	
SOURCE R. E. CURTISS PWR ENGRG	SOUTH LAGOON OUTLET RIVER BANK REPAIR DETAIL	
REVIEWED REC		
APPROVED RFH DATE 5/15/86	AUTHORIZATION 66615	SCALE N. T. S.
	DRAWING NUMBER 409-414	REV

SHEET OF

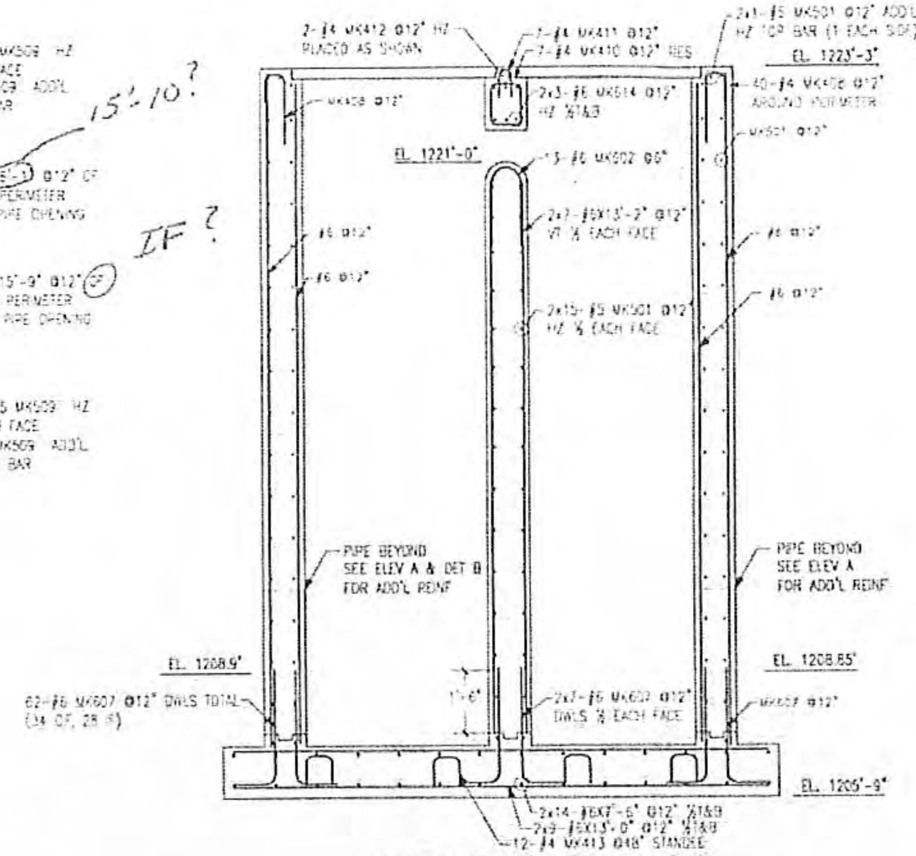
IGDS NO. MCP00003A

APSC SERIES 4



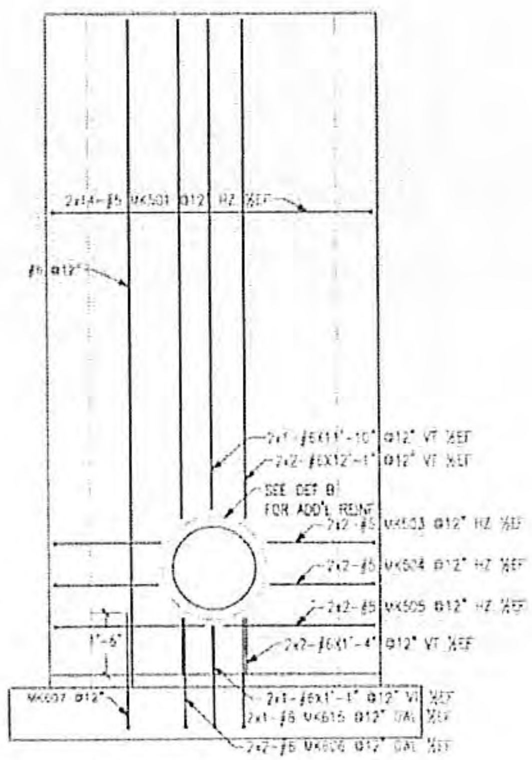
FOR HZ REINF NOT SHOWN, SEE SECTION 1 & ELEVATION A.

SOUTH LAGOON PLAN



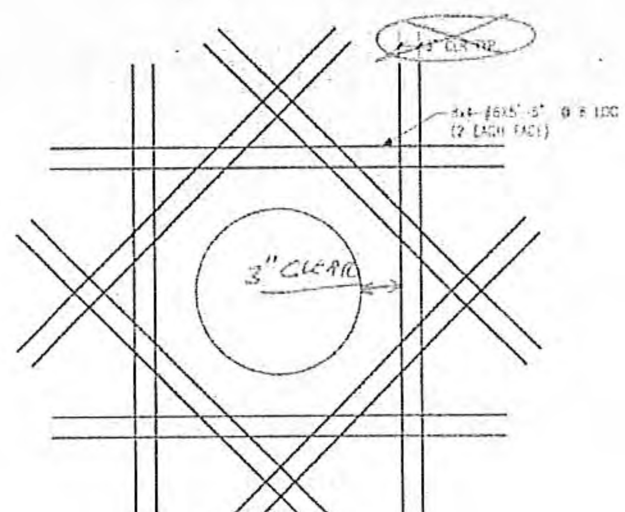
FOR REINF NOT SHOWN, SEE PLAN & ELEVATION A.

SECTION 1



FOR VT&FTG REINF NOT SHOWN, SEE PLAN VIEW

ELEVATION A
(@2 LOC)



DETAIL B

Release Code: *UNTITLED BENDING DETAILS

[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]								
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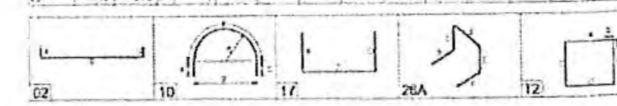


☐ REVIEWED
☐ REVIEWED WITH COMMENTS (REVISE AND RESUBMIT)
☐ REVIEWED AND ACCEPTED
☒ REVIEWED AND ACCEPTED AS NOTED (RESUBMIT FOR RECORD)
☐ NOT ACCEPTED (RESUBMIT FOR REVIEW)
☐ FOR INFORMATION ONLY (REVIEW WAIVED)
☐ REVIEWED AND ACCEPTED FOR CONSTRUCTION

THE REVIEW OF THIS SUBMITTAL IS ONLY FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPTS OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION IN DOCUMENTS, SPECIFICATIONS AND SUBMITTALS. THE VENDOR OR CONTRACTOR IS RESPONSIBLE FOR FULL COMPLIANCE WITH THE PROJECT SPECIFICATION REQUIREMENTS; FOR DIMENSIONS TO BE CONFORMED AND/OR RELATED AT THE JOBSITE; FOR INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESS; FOR DESIGNS ORIGINATED BY THE VENDOR OR CONTRACTOR; FOR TECHNIQUES OF CONSTRUCTION AND FOR COORDINATION OF THE WORK OF ALL TRADES.

SUBMITTAL REVIEW DOES NOT CONSTITUTE A CHANGE ORDER AND DOES NOT ALTER ANY CONTRACTOR TERMS AND CONDITIONS.

ALLEGHENY ENERGY SUPPLY COMPANY, LLC

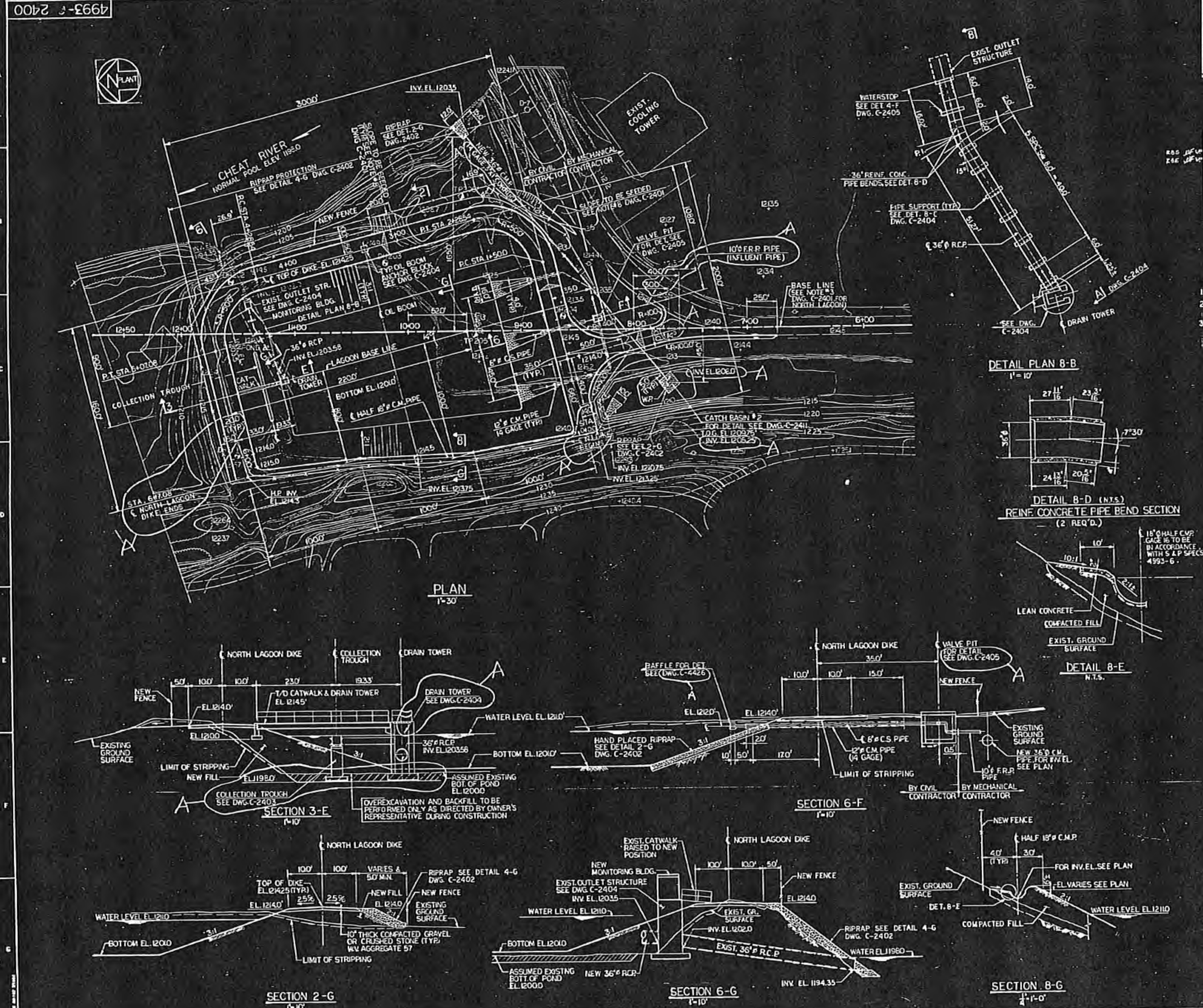
PER [illegible]
DATE 6-20-08

NOTE: CLASS 'B' LAPS UNO
USE THIS DRAWING IN CONJUNCTION WITH ARCHITECTS AND ENGINEERS DRAWINGS

REINF. GRADE: ASTM-A615-GR.60

The full intent of this drawing is the placing of reinforcing steel ONLY. It is not meant to be used as a means of communication between the Architect, Engineer, Contractor or any other subtrades. Contract documents are to be used for final approval and inspection purposes.	FREE STATE STEEL, INC. 1700 SOUTH HAVEN STREET BALTIMORE, MARYLAND 21224	REV. #	DESCRIPTION	DATE
			ISSUED FOR APPROVAL	6-19-08
	JOB ALBRIGHT POWER STATION - ALBRIGHT, W.VA.			
	DWG. COVERS SOUTH LAGOON DIVERSION CHAMBER			
	ARCHT. ENGR. WASHINGTON GROUP INTERNATIONAL			
	CONTR. JOSEPH B. FAY CO., INC.	BY DB	DATE 6-19-08	DWG. NO. 08234-08

4993-C 2400



REVISIONS							
REV		DATE	CHKD	APPRD	APPRD	DESCRIPTION
A	M.Z.	6.6.77				REVISED PLAN AND SECTION 3-E

PRINTS ISSUED					
REV	DATE	FIELD	CLIENT	OTHERS	
-	3-1-77	-	10	10	FOR CLIENT APPROVAL
-	4-12-77	-	86	10	FOR BIDS
A	6-22-77		11	11	FOR CONSTRUCTION

NOTES

1. FOR GENERAL NOTES SEE DWG. C-2403
2. FOR EXISTING TOPOGRAPHY, SOIL, ELEVATION & LOCATION DATA NOTES, SEE DWG. C-2401
3. REINF. CONC. PIPE BENDS SHALL BE AS MANUFACTURED BY CRETEX COMPANIES INC. FROM ELK RIVER, MINN. OR ENGR. APPROVED EQUAL AND SHALL MEET REQUIREMENTS FOR REINF. CONCRETE PIPES AS PER S & P SPEC'S. 4993-6.

APPROVED FOR CONSTRUCTION

S&P 4993-C-2400

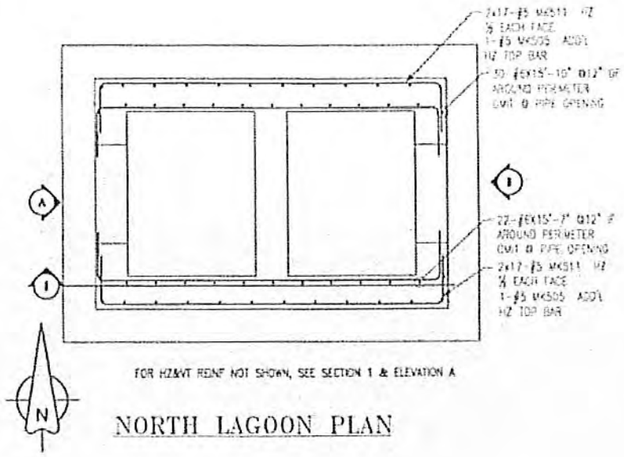
NORTH LAGOON PLAN AND SECTIONS

SCALE: AS NOTED

MONONGAHELA POWER COMPANY
POTOMAC EDISON COMPANY
ALBRIGHT POWER STATION
WASTEWATER TREATMENT FACILITIES
ALBRIGHT, WEST VIRGINIA

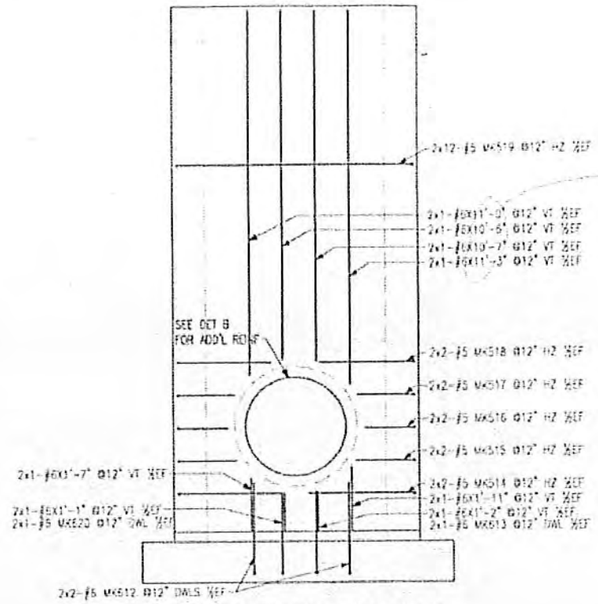
SANDERSON & PORTER, INC.
NEW YORK

DRAWING NO. 500-784 REV. A



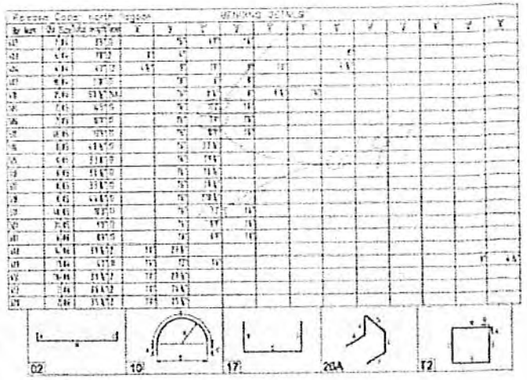
FOR HZ&VT REINF NOT SHOWN, SEE SECTION 1 & ELEVATION A

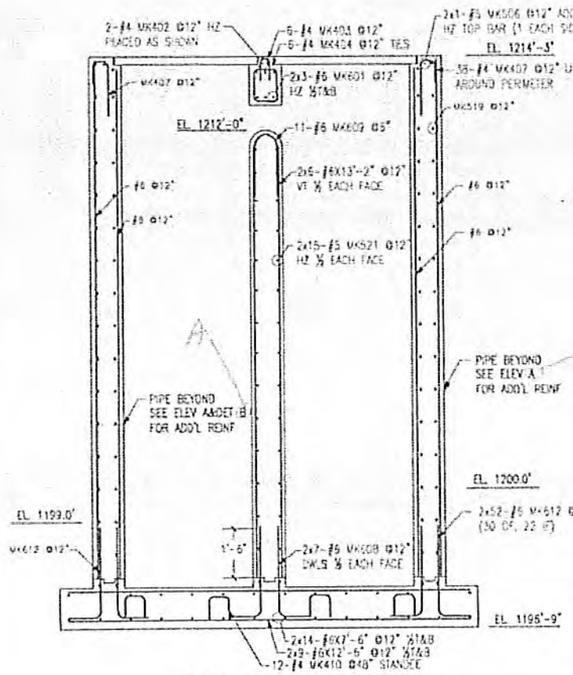
NORTH LAGOON PLAN



FOR VT&FTG REINF NOT SHOWN, SEE PLAN VIEW

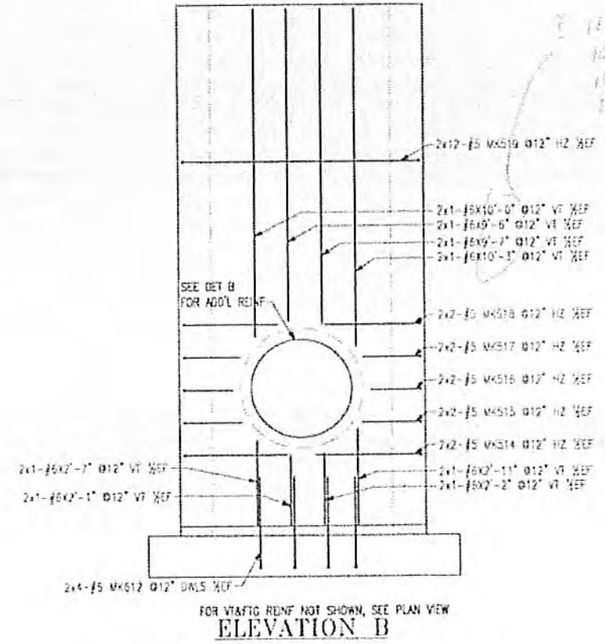
ELEVATION A





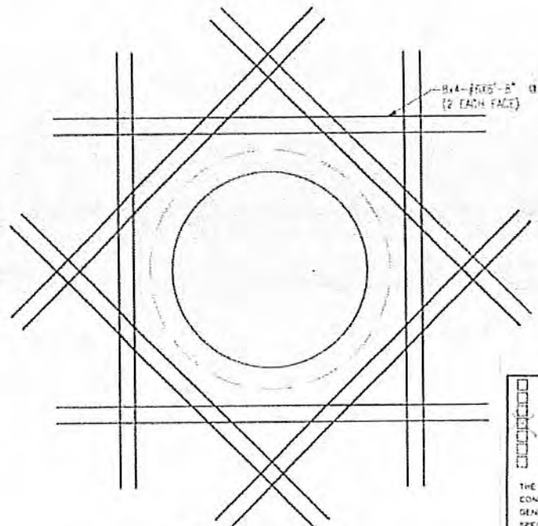
FOR REINF NOT SHOWN, SEE PLAN & ELEVATION A

SECTION 1



FOR VT&FTG REINF NOT SHOWN, SEE PLAN VIEW

ELEVATION B



DETAIL B
(2 SETS REQ'D)

REVIEWED
REVIEWED WITH COMMENTS (REVISE AND RESUBMIT)
REVIEWED AND ACCEPTED
REVIEWED AND ACCEPTED AS NOTED (RESUBMIT FOR RECORD)
NOT ACCEPTED (RESUBMIT FOR REVIEW)
FOR INFORMATION ONLY (REVIEW WAIVED)
REVIEWED AND ACCEPTED FOR CONSTRUCTION

THE REVIEW OF THIS SUBMITTAL IS ONLY FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPTS OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION IN DOCUMENTS, SPECIFICATIONS AND SUBMITTALS. THE VENDOR OR CONTRACTOR IS RESPONSIBLE FOR FULL COMPLIANCE WITH THE PROJECT SPECIFICATION REQUIREMENTS. FOR DIMENSIONS TO BE CONFORMED AND/OR RELATED AT THE JOBSITE; FOR INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESS; FOR DESIGNS ORIGINATED BY THE VENDOR OR CONTRACTOR; FOR TECHNIQUES OF CONSTRUCTION AND FOR COORDINATION OF THE WORK OF ALL TRADES.

SUBMITTAL REVIEW DOES NOT CONSTITUTE A CHANGE ORDER AND DOES NOT ALTER ANY CONTRACTOR TERMS AND CONDITIONS.

ALLEGHENY ENERGY SUPPLY COMPANY, LLC
BY
DATE 7-9-05

NOTE: CLASS 'B' LAP'S UNO
USE THIS DRAWING IN CONJUNCTION WITH ARCHITECTS AND ENGINEERS DRAWINGS

REINF. GRADE: ASTM-A615-GR.60

The full intent of this drawing is the placing of reinforcing steel ONLY. It is not meant to be used as a means of communication between the Architect, Engineer, Contractor or any other subtrades. Contract documents are to be used for final approval and inspection purposes.

FREE STATE STEEL, INC.
1700 SOUTH HAVEN STREET
BALTIMORE, MARYLAND 21224

REV. #	DESCRIPTION	DATE
	ISSUED FOR APPROVAL	7-1-05

JOB: ALBRIGHT POWER STATION - ALBRIGHT, W.VA.
DWG CONTENTS: NORTH LAGOON DIVERSION CHAMBER
ARCHT.: WASHINGTON GROUP INTERNATIONAL
ENGR.:
CONTR.: JOSEPH B. FAY CO., INC. BY DB DATE 7-1-05 DWG NO. 08234R-11

REF: 21199-12-A-314 Rev 1

TELEPHONE MEMO

Boundary

GAI CONSULTANTS, INC.
Engineers • Geologists • Planners
Environmental Specialists

Call By: Ralph Curtiss Ralph E. Curtiss
of GAI

Call To: M. P. Fedorov
of S&P

Project No. 75-614-20
Date: 11/8/76 Time:

Subject Preliminary Report on Albright Investigation

Sheet 1 of 2

Summary of Discussion, Decisions and Commitments

R. Curtiss gave M. Fedorov the following results of the Albright geotechnical investigation:

A. Steepest recommended slopes for Lagoons.

1. North Lagoon

a. Inside slope with cleaning equipment - 3:1, min. F.S. = 1.25 (F.S. can be brought up to 1.46 with a small rock berm at the inside toe, same function may be served by leaving fly ash in place at the toe);

b. Inside slope without cleaning equipment - 2-1/2:1, min. F.S. = 1.46;

c. Outside slope along river bank - leave existing slope undisturbed where possible, but any new slopes should be no steeper than 2-1/2:1. Riprap to flood elevation.

2. South Lagoon

a. Inside slope with cleaning equipment - 3:1, min. F.S. = 1.45;

Distribution:

TELEPHONE MEMO

gai CONSULTANTS, INC.
Engineers • Geologists • Planners
Environmental Specialists

Call By: Ralph Curtiss
of GAI

Call To: M. P. Fedorov
of S&P

Project No. 75-614-20
Date: 11/8/76 Time: ____

Subject Preliminary Report on Albright Investigation

Summary of Discussion, Decisions and Commitments

b. Inside slope without cleaning equipment - 2:1, min. F.S. = 1.42

3. Seepage considerations - both lagoons. Factors of safety above were developed under the assumption that partial drainage of slopes occurs concurrently with lowering of the pool. It is not practical to design slopes in these soils to be stable with full pool drawdown at a rapid rate, no slope drainage, and no support from fly ash. However, these conditions are unlikely.

B. Above data is based on calculations not fully checked yet.

C. Borings DH-2 and DH-6 in the South Lagoon area evidently penetrated an extremely acid aquifer. The standpipe in DH-2, 1-1/4 in I.D. galv. iron pipe, was corroded away below a depth of four feet in about a month. Water in DH-6 also shows signs of being acid. R. Curtiss will inform APS of this and mention problems in meeting discharge acidity requirements if this water enters the lagoon.

Distribution: HAS, REC, File
J. D. Brunot - 7
R. B. Evans - 4

J D Brunot

TELEPHONE MEMO

Boronky MF

GAI CONSULTANTS, INC.
Engineers • Geologists • Planners
Environmental Specialists

Call By: Ralph Curtiss Ralph E Curtiss
of GAI

Call To: M. P. Fedorov
of S&P

Project No. 75-614-20

Date: 11/4/76 Time:

Subject Geometry of South Lagoon at Albright Power Station LAGOON.

Summary of Discussion, Decisions and Commitments

For the purposes of slope stability analysis, R. Curtiss and M. Fedorov worked out the following geometric details for the South Lagoon:

1. Lagoon bottom elevation of 1210.0;
2. Water level elevation of 1220.0;
3. Dike top elevation of 1223.0;
4. Dike top width of 20.0 ft.

R. Curtiss and M. Boronky had decided earlier that the toe of the coal pile would be assumed to be 30 feet back of the top of the inside dike slope. Slope will be analyzed with cleaning equipment surcharges present.

Distribution: HAS, REC, File
J. D. Brunot - 7
R. B. Evans - 4

J. D. Brunot

TELEPHONE MEMO

Boundary 11 F

GAI CONSULTANTS, INC.
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Environmental Specialists

Call By: Ralph Curtiss Ralph E. Curtiss
of GAI

Call To: M. P. Fedorov
of S&P

Project No. 75-614-20
Date: 11/3/76 Time:

Subject Geometry of North Lagoon at Albright Power Station — LAGOON

Summary of Discussion, Decisions and Commitments

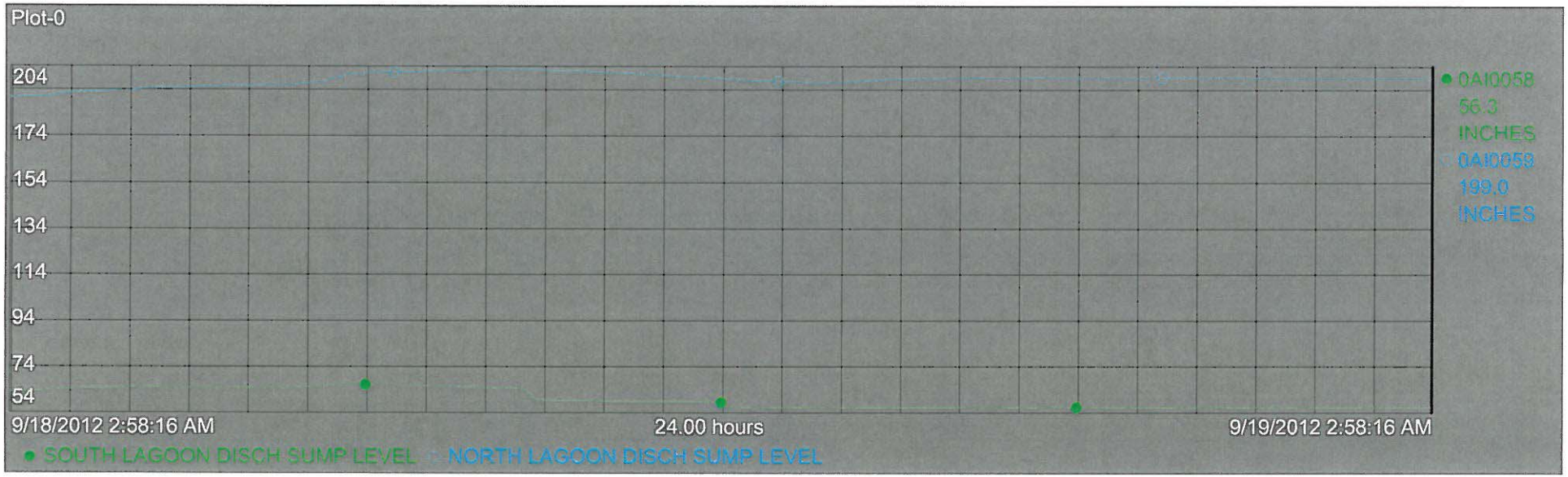
For the purposes of slope stability analysis, R. Curtiss and M. Fedorov worked out the following geometric details for the North Lagoon in the vicinity of the road:

1. Lagoon bottom elevation of 1201.0. Outlet riser inside bottom elevation is 1197.9.
2. Maximum water surface elevation of 1211.0. Lowest point on road is at elevation 1214.
3. Where road is at or near elevation 1214, allow following space between road and top of lagoon slope:

   4 feet shoulder, 10 feet for storm sewer installation, 20 feet for top of dike.
4. Where road is above elevation 1214, allow following space between road and top of lagoon slope:

   4 feet shoulder, slope down @ 2:1 to elevation 1214.0, 20 feet for top of dike.

Distribution: HAS, REC, File
J. D. Brunot - 7
R. B. Evans - 4



Note: Water levels, in inches, are measured from the floor slab of the sump structure at each lagoon.

Appendix D

Photographs

EPA Assessment, Albright Power Station – North Process Wastewater Lagoon, September 18, 2012

Photo 1: East embankment crest, looking northwest.

Photo 2: East embankment interior slope, looking northwest. Note vegetation on slope.

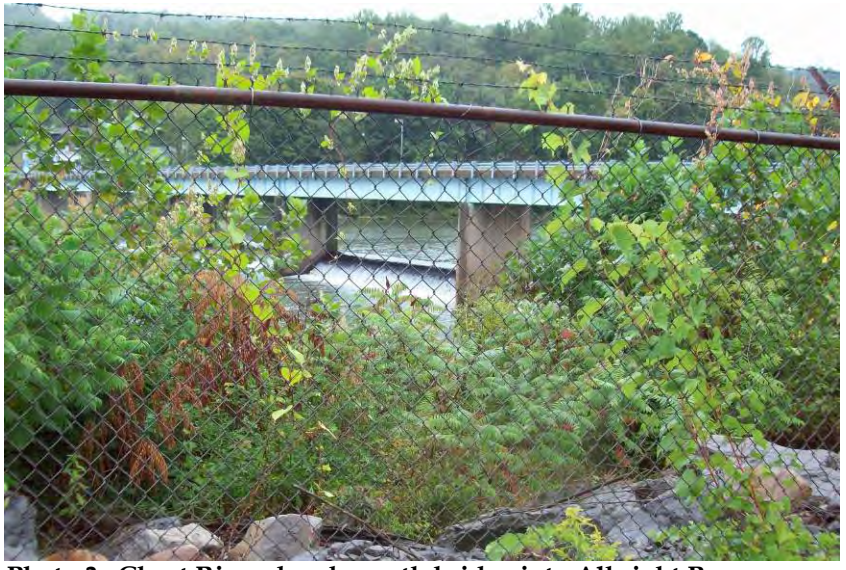


Photo 3: Cheat River dam beneath bridge into Albright Power Station

Photo 4: East embankment exterior slope, looking northwest. Note Cheat River in distance.

EPA Assessment, Albright Power Station – North Process Wastewater Lagoon, September 18, 2012

Photo 5: East embankment exterior slope, looking north. Note typical rip rap and Cheat River in distance.

Photo 6: Sump structure at northeast corner of lagoon.

Photo 7: 36-inch-diameter pipe discharging liquid from North Process Wastewater Lagoon sump into Cheat River.

Photo 8: East embankment exterior slope near northeast corner. Note typical riprap and Cheat River in distance.

EPA Assessment, Albright Power Station – North Process Wastewater Lagoon, September 18, 2012

Photo 9: North embankment crest, looking southwest.

Photo 10: North embankment exterior slope, looking west. Note typical vegetation and riprap.

Photo 11: North embankment interior slope, looking southwest. Note typical vegetation and catwalk to outlet structure.

Photo 12: Catwalk and outlet structure at north embankment.

EPA Assessment, Albright Power Station – North Process Wastewater Lagoon, September 18, 2012

Photo 13: Outlet structure, removed stoplogs shown to the left.

Photo 14: North embankment interior slope, looking west.

Photo 15: North embankment exterior slope, looking northwest. Note typical riprap and vegetation

Photo 16: North embankment exterior slope at northwest corner, looking southwest. Note hillside at west embankment in background.

EPA Assessment, Albright Power Station – North Process Wastewater Lagoon, September 18, 2012

Photo 17: West embankment interior slope, looking southeast. Note typical vegetation.

Photo 18: West embankment crest, looking southeast.

Photo 19: West embankment, looking southeast. Note hillside.

Photo 20: West embankment, looking southeast. Note concrete crib retaining walls.

EPA Assessment, Albright Power Station – North Process Wastewater Lagoon, September 18, 2012

Photo 21: West embankment interior slope, looking southeast.

Photo 22: West embankment interior slope, looking northwest. Note lateral movement of concrete crib retaining wall at interior slope

Photo 23: West embankment interior slope. Note lateral movement of concrete crib retaining wall at interior slope.

Photo 24: South embankment crest, looking northeast.

EPA Assessment, Albright Power Station – North Process Wastewater Lagoon, September 18, 2012

Photo 25: South embankment interior slope, looking northeast. Note four inlet pipes (one 18-in-dia HDPE, and three 8-in-dia DI).

Photo 26: East embankment exterior slope, looking northwest. Note typical vegetation and riprap.

Photo 27: East embankment exterior slope, looking west. Note typical vegetation and riprap.

EPA Assessment, Albright Power Station – South Process Wastewater Lagoon, September 18, 2012

Photo 28: North embankment crest, looking west.

Photo 29: North embankment interior slope, looking west. Note three 8-inch-diameter inlet pipes.

Photo 30: North embankment interior slope, looking northwest. Note inlet pipes.

Photo 31: North embankment interior slope, looking east. Note areas of erosion at pipe discharge.

EPA Assessment, Albright Power Station – South Process Wastewater Lagoon, September 18, 2012

Photo 32: West embankment crest, looking south.

Photo 33: West embankment interior slope, looking south.

Photo 34: West embankment interior slope, looking south. Note 10-inch-diameter inlet pipe from coal pile runoff.

Photo 35: West embankment interior slope, looking southeast. Note outlet structure in distance.

EPA Assessment, Albright Power Station – South Process Wastewater Lagoon, September 18, 2012

Photo 36: South embankment interior slope, looking east. Note outlet structure.

Photo 37: South embankment crest, looking east.

Photo 38: Outlet structure near south embankment.

Photo 39: V-notch weirs at outlet structure.

EPA Assessment, Albright Power Station – South Process Wastewater Lagoon, September 18, 2012

Photo 40: 24-in-dia pipe from outlet to sump.

Photo 41: Outlet structure showing stoplog slots.

Photo 42: South embankment interior slope, looking west at outlet structure.

Photo 43: East embankment crest, looking north.

EPA Assessment, Albright Power Station – South Process Wastewater Lagoon, September 18, 2012

Photo 44: East embankment interior slope, looking north.

Photo 45: East embankment interior slope, looking north.

Photo 46: East embankment interior slope, looking north. Note dredging equipment on embankment crest.

Photo 47: North embankment exterior slope, looking west.

EPA Assessment, Albright Power Station – South Process Wastewater Lagoon, September 18, 2012

Photo 48: West embankment exterior slope, looking south.

Photo 49: Coal pile runoff pond just west of the west embankment, looking southeast.

Photo 50: Coal pile runoff collection ditch just east of coal storage area, looking west.

Photo 51: Coal pile runoff pond just west of the west embankment, looking south.

EPA Assessment, Albright Power Station – South Process Wastewater Lagoon, September 18, 2012

Photo 52: West embankment exterior slope looking south. Note coal pile runoff pond to the left.

Photo 53: Coal pile runoff ditch to coal pile runoff pond, looking north.

Photo 54: Coal pile storage area west of the south lagoon, looking west.

Photo 55: South embankment exterior slope, looking east.

EPA Assessment, Albright Power Station – South Process Wastewater Lagoon, September 18, 2012

Photo 56: East embankment exterior slope at southeast corner, looking northeast. Note Cheat River in top right.

Photo 57: East embankment crest, looking north.

Photo 58: Sump structure near southeast corner, looking northwest.

Photo 59: East embankment exterior slope at stairs to outfall, looking northwest. Note typical vegetation.

EPA Assessment, Albright Power Station – South Process Wastewater Lagoon, September 18, 2012

Photo 60: 36-in-dia outfall into Cheat River at east embankment exterior slope, looking east.

Photo 61: Monitoring well associated with coal pile storage at east embankment crest, looking east.

Photo 62: East embankment exterior slope looking northeast. Note typical vegetation and Cheat River in background.

Appendix D
Photo GPS Locations

Site: Albright Power Station
Datum: NAD 1983
Coordinate Units: Decimal Degrees

Photo No.	Latitude	Longitude
1	39.48954	-79.63950
2	39.48952	-79.63954
3	39.48973	-79.63973
4	39.48810	-79.63980
5	39.48990	-79.64002
6	39.48988	-79.64010
7	39.48999	-79.64024
8	39.49000	-79.64030
9	39.48989	-79.64034
10	39.48998	-79.64030
11	39.48988	-79.64034
12	39.48986	-79.64044
13	39.48967	-79.64034
14	39.48966	-79.64036
15	39.48969	-79.64064
16	39.48969	-79.64065
17	39.48959	-79.64056
18	39.48954	-79.64059
19	39.48954	-79.64059
20	39.48931	-79.64014
21	39.48929	-79.64014
22	39.48914	-79.63970
23	39.48915	-79.63993
24	39.48913	-79.63972
25	39.48917	-79.63968
26	39.48959	-79.63935
27	39.48989	-79.63921
28	39.48762	-79.63495
29	39.48753	-79.63495
30	39.48744	-79.63498
31	39.48749	-79.63533
32	39.48739	-79.63539
33	39.48746	-79.63524
34	39.48713	-79.63534
35	39.48695	-79.63541
36	39.48658	-79.63538
37	39.48654	-79.63542
38	39.48648	-79.63522
39	39.48650	-79.63516
40	39.48662	-79.63509
41	39.48661	-79.63516
42	39.48654	-79.63491
43	39.48654	-79.63486
44	39.48660	-79.63486
45	39.48683	-79.63487
46	39.48702	-79.63491

Appendix D
Photo GPS Locations

Site: Albright Power Station
Datum: NAD 1983
Coordinate Units: Decimal Degrees

Photo No.	Latitude	Longitude
47	39.48763	-79.63531
48	39.48756	-79.63548
49	39.48721	-79.63565
50	39.48714	-79.63569
51	39.48710	-79.63546
52	39.48699	-79.63559
53	39.48635	-79.63553
54	39.48633	-79.63564
55	39.48633	-79.63549
56	39.48641	-79.63471
57	39.48652	-79.63469
58	39.48659	-79.63471
59	39.48663	-79.63431
60	39.48669	-79.63438
61	39.48686	-79.63475
62	39.48698	-79.63467

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