

2020 Annual Dam and Dike Inspection Report

Bottom Ash Pond Complex

**John E. Amos Plant
Appalachian Power Co.
Putnam County, West Virginia**

August 13, 2020

Prepared for: Appalachian Power Co.
1530 Winfield Rd
Winfield, West Virginia 25213

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BOUNDLESS ENERGYSM

GERS-20-026

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John E. Amos Plant

Bottom Ash Pond Complex

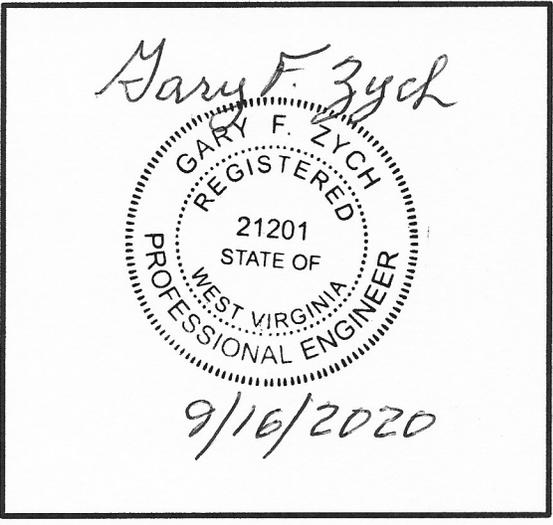
Document Number: GERS-20-026

Inspection Date: August 13, 2020

PREPARED BY *Brian G. Palmer* DATE 09/14/2020
Brian G. Palmer, P.E.(OH)
Principal Civil Engineer

REVIEWED BY *Dan Murphy* DATE 9/15/2020
Dan Murphy, P.E.(OH)
Principal Civil Engineer

APPROVED BY *Gary F. Zych* DATE 9/16/2020
Gary F. Zych, P.E.
Manager – Geotechnical Engineering Section



I certify to the best of my knowledge, information and belief the information contained in this report meets the requirements of 40 CFR § 257.83(b).

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- Attachment A – Figures
- Attachment B – Photos
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1.0 INTRODUCTION

This report was prepared by AEP- Geotechnical Engineering Services (GES) section, in part, to fulfill the US EPA requirements of 40 CFR 257.83 and the West Virginia Dept. of Environmental Protection, Division of Water Dam Inspection Section and to provide Appalachian Power Co. and John E. Amos (JEA) plant personnel with an evaluation of the facility.

The 2020 dam and dike inspection at the JEA bottom ash complex was conducted by Mr. Brian Palmer on August 13, 2020 with Mr. Donald Duncan who served as the project facility contact. Weather conditions were sunny, with temperatures ranging from the high 70° F to mid 80° F during the inspection. There was no precipitation on the proceeding day of inspection and 0.09 inches of accumulative rainfall during the seven day period prior to the inspection.

2.0 DESCRIPTIONS OF COAL COMBUSTION RESIDUALS (CCR) IMPOUNDMENTS

2.1 DEFINITIONS OF VISUAL OBSERVATIONS AND DEFICIENCIES

This summary of the visual observations uses terms to describe the general appearance or condition of an observed item, activity or structure. The meaning of these terms is as follows:

- | | |
|--------------|---|
| Good: | A condition or activity that is generally better or slightly better than what is minimally expected or anticipated from a design or maintenance point of view. |
| Fair or | A condition or activity that generally meets what is minimally Satisfactory:
expected or anticipated from a design or maintenance point of view. |
| Poor: | A condition or activity that is generally below what is minimally expected or anticipated from a design or maintenance point of view. |
| Minor: | A reference to an observed item (e.g., erosion, seepage, vegetation, etc.) where the current maintenance condition is below what is normal or desired, but which is not currently causing concern from a structure safety or stability point of view. |
| Significant: | A reference to an observed item (e.g. erosion, seepage, vegetation, etc.) where the current maintenance program has neglected to improve the condition. Usually, conditions that have been previously identified in the previous inspections, but have not been corrected. |
| Excessive: | A reference to an observed item (e.g., erosion, seepage, vegetation, etc.) where the current maintenance condition is above or worse than what is normal or desired, and which may have affected the ability of the observer to properly evaluate the structure or particular area being observed or which may be a concern from a structure safety or stability point of view. |

This document also uses the definition of a “deficiency” as referenced in the CCR rule section §257.83(b)(5) Inspection Requirements for CCR Surface Impoundments. This definition has been assembled using the CCR

rule Preamble as well as guidance from MSHA, “Qualifications for Impoundment Inspection” CI-31, 2004. These guidance documents further elaborate on the definition of deficiency. Items not defined by deficiency are considered maintenance or items to be monitored.

A “deficiency” is some evidence that a dam has developed a problem that could impact the structural integrity of the dam. There are four general categories of deficiencies. These four categories are described below:

1. Uncontrolled Seepage
 - a. Uncontrolled seepage is seepage that is not behaving as the design engineer has intended. An example of uncontrolled seepage is seepage that comes through or around the embankment and is not picked up and safely carried off by a drain. Seepage that is collected by a drain can still be uncontrolled if it is not safely collected and transported, such as seepage that is not clear. Seepage that is unable to be measured and/or observe it is considered uncontrolled seepage. [Wet or soft areas are not considered as uncontrolled seepage, but can lead to this type of deficiency. These areas should monitored my frequently.]
2. Displacement of the Embankment
 - a. Displacement of the embankment is large scale movement of part of the dam. Common signs of displacement are cracks, scraps, bulges, depressions, sinkholes and slides.
3. Blockage of Control Features
 - a. Blockage of Control Features is the restriction of flow at spillways, decant or pipe spillways, or drains.
4. Erosion
 - a. Erosion is the gradual movement of surface material by water, wind or ice. Erosion is considered a deficiency when it is more than a minor routine maintenance item.

2.2 BOTTOM ASH POND COMPLEX

The bottom ash pond complex is located in Putnam County, West Virginia immediately northwest of the John E. Amos (JEA) Power Plant between State Route 817 and the Kanawha River (Figure 1). The JEA pond complex is used for sedimentation and storage of bottom ash produced as a waste product in burning pulverized coal at the JEA Power Plant. The bottom ash ponds are comprised of Ponds 1A and 1B within the pond complex (Figure 2).

The Bottom Ash Pond, Reclaim Water Pond and Treatment Pond were generally formed by the construction of a dike at the confluence of Bill’s Creek with the Kanawha River. The primary dike is on the north side of the Reclaim Water pond and the Treatment Pond. Additional dikes were constructed at the northwest corner of Bottom Ash Pond 1B to redirect Bills’s Creek.

The north dike of the Reclaim Water Pond and Treatment Pond is approximately 800 feet long. The height of the dam is about 29 feet and the design crest width is 10 feet using concrete block face filled with compacted cohesive soil. The top of the dike is at elevation 588.0 feet with the natural ground surface beneath the dikes is at about elevation 559 feet. Field measurements indicate that dam side slopes are 2.5:H to 1:V (Figure 3).

Both the bottom ash ponds discharge sluice water through 36 inch diameter pipes to the Reclaim Water Pond. A portion of the flow into the Reclaim Water Pond is pumped backed to the JEA Power Plant for reuse. The remaining portion flows through a 36 inch diameter pipe to the Treatment Pond. From the Treatment Pond the water flows through a 24 in x 38 inch elliptical reinforced concrete pipe that transitions to a 36 inch diameter steel pipe. There is a flange connection from the steel pipe to the 36 inch diameter HDPE pipe that conveys the effluent to six diffuser ports submerged along the bottom of the Kanawha River.

An overflow spillway pipes, 36 inch diameter, are located along the Reclaim Pond and Pond 1B that discharge to Bill’s Creek.

3.0 REVIEW OF AVAILABLE INFORMATION (257.83(b)(1)(i))

A review has been conducted of available information regarding the status and condition of the JEA Bottom Ash Pond Complex that includes files available in the operating record such as previous 7 day inspection reports, piezometric measurements and previous annual inspections.

4.0 INSPECTION (257.83(b)(1)(ii))

4.1 BOTTOM ASH POND COMPLEX

4.1.1 CHANGES IN GEOMETRY SINCE LAST INSPECTION (257.83(b)(2)(i))

No modifications have been made to the geometry of the Bottom Ash Pond Complex since the 2019 annual inspection. The geometry of the impoundment has remained unchanged.

4.1.2 INSTRUMENTATION (257.83(b)(2)(ii))

The location and type of instrumentation is shown on Figure 2 and select piezometers are depicted in cross section along the perimeter dike embankment in Figure 3. The maximum recorded readings of each instrument since the previous annual inspection is shown in the table below.

Table 1 INSTRUMENTATION DATA Bottom Ash Pond Complex			
Instrument	Type	Maximum Reading since last annual inspection	Date of reading
PZ-1	Piezometer	571.60	January 14, 2020
PZ-3	Piezometer	566.60	March 27, 2020
PZ-6	Piezometer	567.73	April 21, 2020
PZ-7	Piezometer	569.02	April 21, 2020

4.1.3 IMPOUNDMENT CHARACTERISTICS (257.83(b)(2)(iii, iv, v))

Below is a summary of the minimum, maximum, and present depth and elevation of the impounded water & CCR since the previous annual inspection; the storage capacity of the impounding structure at the time of the

inspection; and the approximate volume of the impounded water and CCR at the time of the inspection.

IMPOUNDMENT CHARACTERISTICS		
Bottom Ash Pond Complex		
	Bottom Ash Pond 1A	Bottom Ash Pond 1B
Water Surface Elevation at time of the inspection	~581 ft.	~580 ft.
Approximate Minimum, Maximum, and Present depth/elevation of impounded water since last annual inspection	1 ft./579.1 ft. elev. 22 ft./581.46 ft. elev. 15 ft./581.2-ft. elev.	0 ft./559 ft. elev. 22 ft./580.85 ft. elev. 22 ft./580.5 ft. elev.
Approximate Minimum Maximum and Present depth/elevation of CCR since last annual inspection	<2 ft./561 ft. elev. 21 ft./580 ft. elev. <2 ft.)/561 ft. elev.	<1 ft./560 ft. elev. ~23 ft./582 ft. elev. Varies (<2-23 ft.)/561 ft. elev. to 582 ft. elev.
Storage Capacity of impounding structure at the time of the inspection	195 AC-Ft	167 AC-Ft
Approximate volume of impounded water at the time of the inspection	168 AC-Ft.	107 AC-Ft
Approximate volume of CCR at the time of the inspection	<27 AC-Ft	~60 AC-Ft

** Assumes base of impoundment to be at an elevation of 559 ft. based on design drawings.

4.1.4 VISUAL INSPECTION (257.83(b)(2)(i))

A visual inspection of the Bottom Ash Pond Complex was conducted to identify any signs of distress or malfunction of the impoundment and appurtenant structures. The inspection also included hydraulic structures underlying the base of the dike. Specific items inspected included all structural elements of the dam such as inboard and outboard slopes, crest, and toe; as well as appurtenances such as the outlet structure at the Bottom Ash Pond 1B, Reclaim Pond and the primary decant structure located within the Treatment Pond.

The following summarizes the visual inspection of each element:

- The crest of the main perimeter dike was observed to be in good condition. No significant settlement, misalignment, erosion, or seepage could be observed on the crest or the slopes of the main perimeter dike.
- The riprap revetment on the downstream toe of the main perimeter dike appeared in good shape.
- The inboard slope of the main perimeter dike exhibited a good vegetative cover. There were no visual signs of misalignment, settlement, sloughing, erosion, or bulging that would indicate any instability within the dike The primary decant skimmer structure was observed to be in an excellent condition.

- No erosion or seepage was noted along the pipe that extends out from exterior slope of the Main Perimeter dike at the Reclaim pond. This pipe was permanently abandoned by welding a steel plate at the discharge end of the pipe.
- The exterior slope of the dike at the northwest corner of BAP 1b has vegetation maintained to the toe area. Vegetation should be maintained 25-ft from the toe and groin areas.
- The reclaim pond's 36 inch diameter HDPE overflow pipe was observed to be in good condition from the block wall and no erosion was noted along the pipe.
- The outlet to the 36 inch diameter overflow pipe was free of vegetation and could flow unobstructed to Bills Creek.
- The 36 inch diameter HDPE overflow pipe (bottom ash pond 1B) was observed to be in good condition. No settlement, misalignment or other defects were observed for the two overflow spillways. The inlet and outlet to the overflow pipe were observed to be in satisfactory condition.
- The primary decant structure (outfall 003) was observed to be in excellent condition and no debris is entrained on trash rack that would impede discharge from the pond. No concrete spalling or other defects were observed at the upstream decant structure or the downstream headwall where the effluent discharges into the Kanawha River. Flow from the pond is discharged through the submerged diffuser ports.
- Bottom ash pond 1A has been excavated and returned to service to receive waste water discharges from the plant. Bottom Ash Pond 1B is in operation. Water elevations for all ponds within the bottom ash pond complex are measured via staff gauges in each pond as part of the plant's weekly inspection.

4.1.5 EVALUATION OF INSTRUMENTATION DATA

The instrumentation for the pond complex consists of staff gauges used to measure the pond water levels and four piezometers installed along the perimeter dike.

The elevations of pond water levels and respective piezometer water levels have remained fairly constant with no adverse trends observed that would impair the structural stability of the perimeter dike. Piezometer hydrographs are contained in Attachment C.

4.1.6 CHANGES THAT EFFECT STABILITY OR OPERATION (257.83(b)(2)(vii))

Based on interviews with plant personnel and field observations there were no changes to the dike system of the Bottom Ash Pond Complex since the last annual inspection that would affect the stability or operation of the impounding structure.

5.0 CORRECTIVE MEASURES TAKEN TO REMEDY DEFICIENCY OR RELEASE SINCE LAST INSPECTION

Based on the 7-day inspections, the 30-day instrumentation readings and interviews with plant personnel there have been no deficiencies or releases observed during any inspection since the last annual inspection.

6.0 SUMMARY OF FINDINGS

6.1 DEFICIENCIES & CHANGES WHICH AFFECT STABILITY OR OPERATIONS (257.83(b)(2)(vi, vii))

Based on interviews with plant personnel and field observations there were no significant changes to the Bottom Ash Pond Complex since the last annual inspection that would affect the stability or operation of the impounding structure.

There were no deficiencies or signs of structural weakness or disruptive conditions that were observed at the time of the inspection that would require additional investigation or remedial action.

6.2 ITEMS TO MONITOR

Bottom Ash Pond Complex

1. Static water levels should continue to be measured on its current frequency for piezometers PZ-1, PZ-3, PZ-6 and PZ-7.
2. The pond pool stages should continue to be recorded on a periodic basis.

6.3 MAINTENANCE ITEMS

The following maintenance items were identified during the visual inspection:

Bottom Ash Pond Complex

1. Extend vegetation controls 25-ft from the toe and groin of all areas with a focus on the exterior of the northwest dike.
2. Control of the vegetation cover (i.e. mowing) should be continued on its current regularly scheduled basis.

7.0 CONCLUSION

Overall the facility is in good condition. The impoundment is functioning as intended with no signs of potential structural weakness or other conditions that could potentially disrupt the safe operation of the impoundment. The embankments appear to be well maintained. Continue to perform the maintenance items previously noted.

ENGINEER'S INSPECTION VERIFICATION STATEMENT

For Compliance with Dam Safety Rules §47-34-15.4.c

I hereby verify that I supervised the visual inspection of the Amos Bottom
Ash Complex (ID# 07918) and its appurtenances on August 13, 2020. The
attached signed and sealed inspection report documents:

- 1) the current conditions as observed;
- 2) any maintenance items necessary to prolong safe functioning of the dam;
- 3) any conditions observed during the inspection which indicate that the
dam has a serious problem⁽¹⁾;
- 4) any conditions that will not allow proper functioning of the dam during
normal or maximum reservoir water level conditions.

Gary F. Zych

Signature

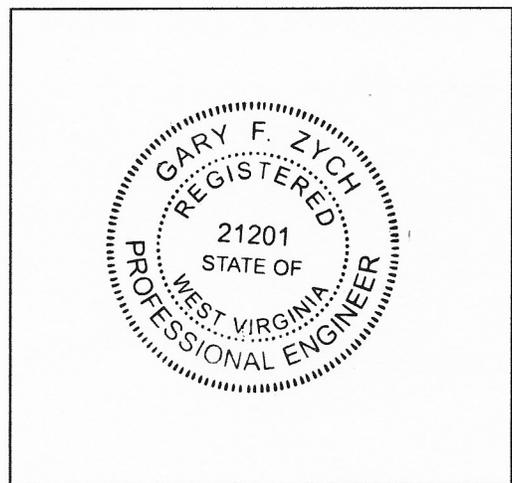
Gary F. Zych, P.E.

Manager

Geotechnical Engineering Services

American Electric Power Service Corporation

9/21/2020
Date



SEAL

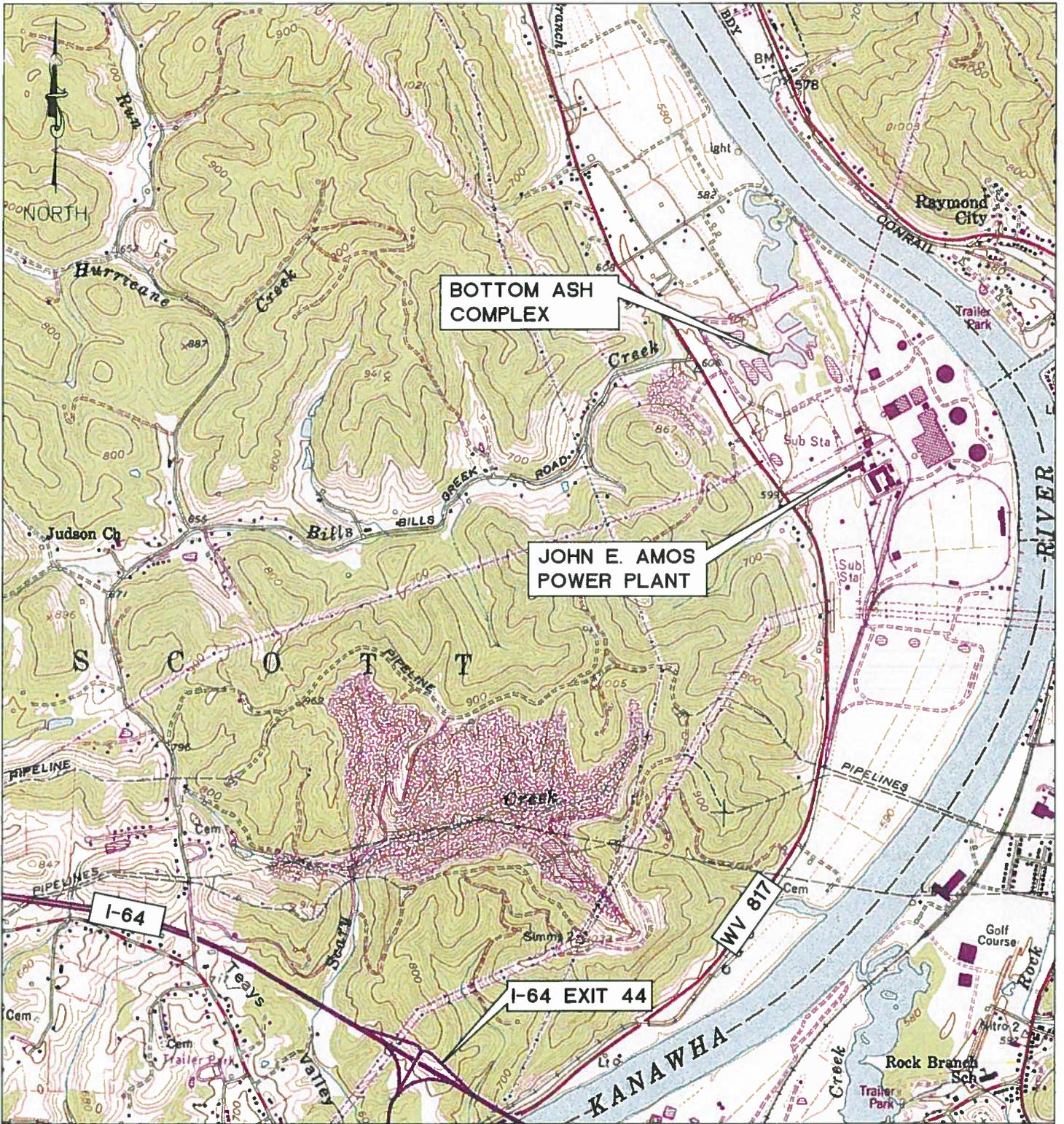
(1) As defined in Section 2.47 of the Dam Safety Rules

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ATTACHMENT A

Figures

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SAINT ALBANS, WV
7.5 MINUTE SERIES
UPDATED 1976

**JOHN E. AMOS PLANT
BOTTOM ASH COMPLEX**

LOCATION MAP

PUTNAM COUNTY

REV NO.

DATE

DESC.



gai consultants

CHARLESTON OFFICE
300 SUMMERS STREET,
SUITE 1100
CHARLESTON, WV 25301
304-926-8100

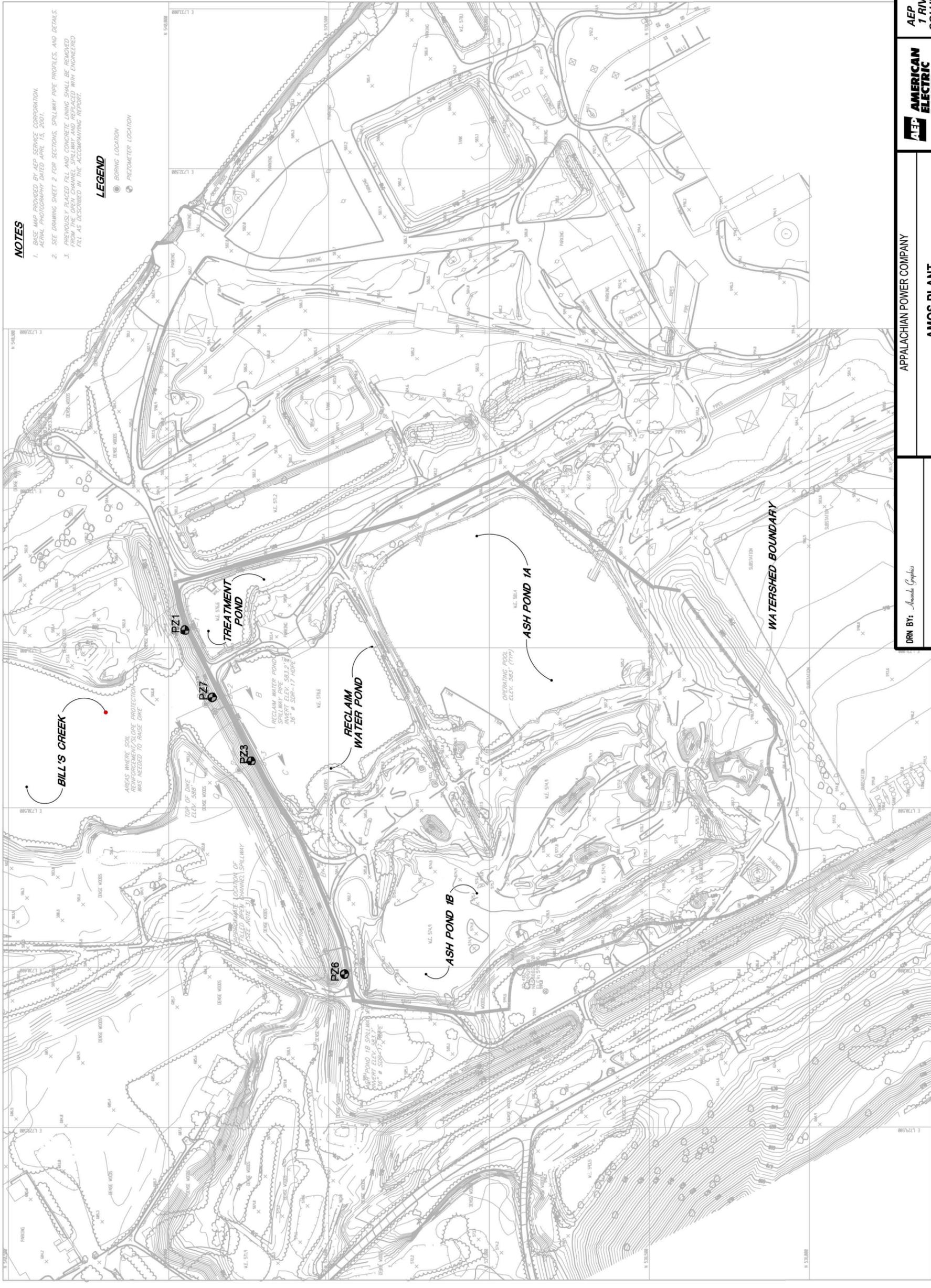
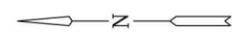
DATE	SCALE
7/8/13	1"=2000'

FIGURE NUMBER

1

SCALE 1" = 2000'





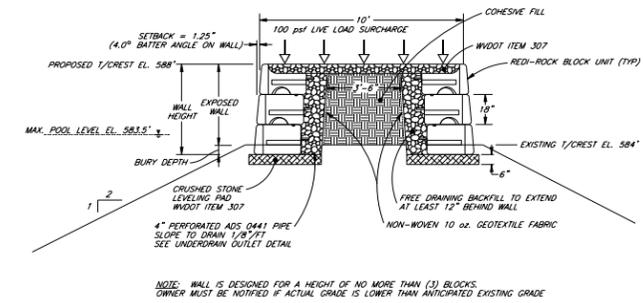
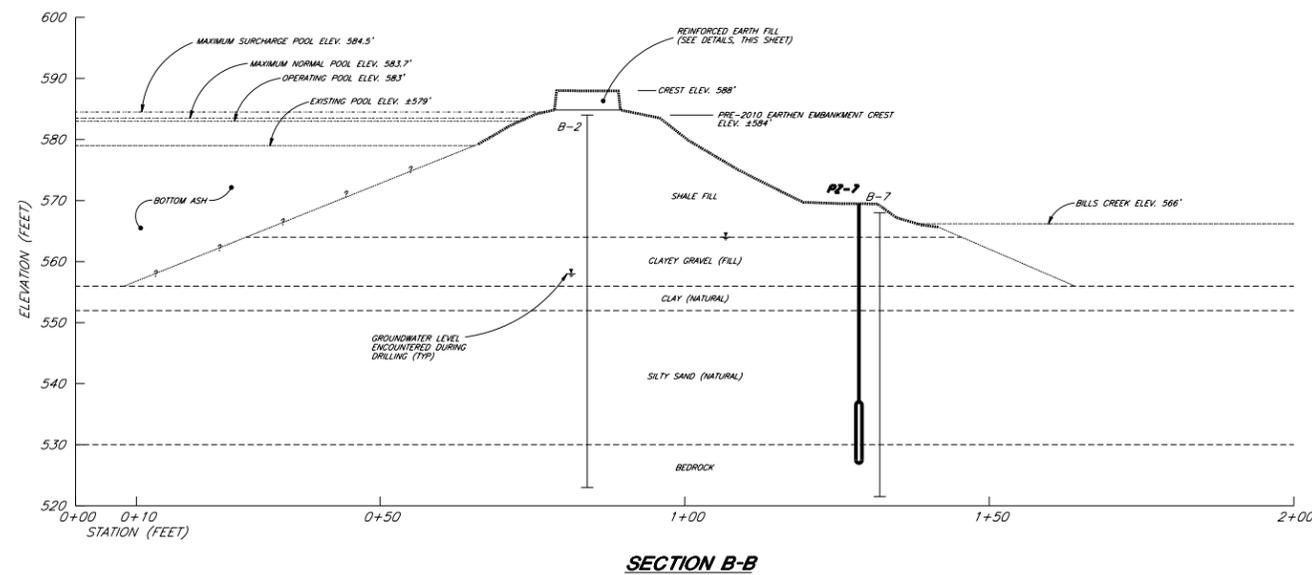
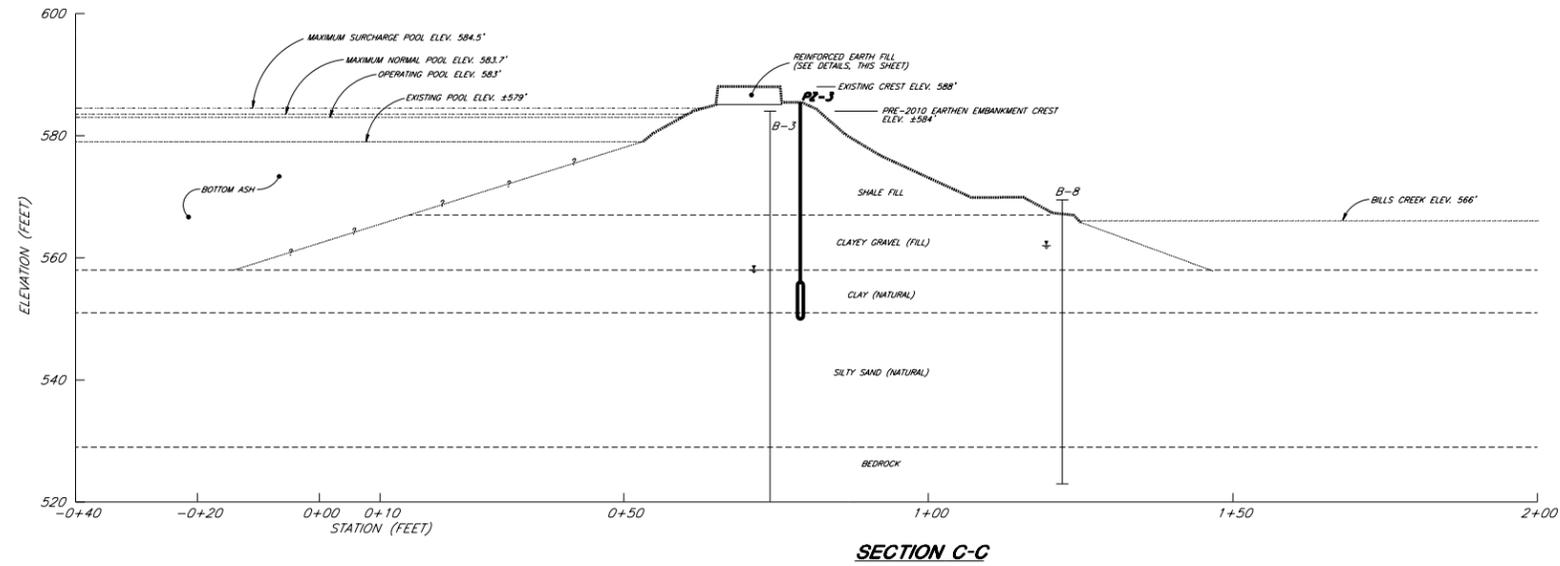
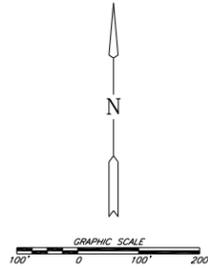
NOTES

1. BASE MAP PROVIDED BY AEP SERVICE CORPORATION. AERIAL PHOTOGRAPHY DATED APRIL 13, 2001.
2. SEE DRAWING SHEET 2 FOR SECTIONS, SPILLWAY PIPE PROFILES, AND DETAILS.
3. PREVIOUSLY PLACED TELL AND CONCRETE LINING SHALL BE REMOVED FROM THE OPEN CHANNEL SPILLWAY AND REPLACED WITH ENGINEERED FILL AS DESCRIBED IN THE ACCOMPANYING REPORT.

LEGEND

- BORING LOCATION
- PIEZOMETER LOCATION

APPALACHIAN POWER COMPANY		AEP SERVICE CORP. 1 RIVERSIDE PLAZA COLUMBUS, OH 43215	
SCARY		AMERICAN ELECTRIC POWER	
AMOS PLANT		WEST VIRGINIA	
DATE: 07/12/2016		BOTTOM ASH POND COMPLEX	
DRN BY: Amanda Graphics		FIGURE 2	
SCALE: N. T. S			



DETAIL - REINFORCED EARTH FILL TYPICAL SECTION
NOT TO SCALE

(EXCERPT FROM "BOTTOM ASH STORAGE AREA MODIFICATIONS 2010 DIKE RAISING, SECTIONS AND DETAILS"
PREPARED BY: AMERICAN ELECTRIC POWER, DATED 2/26/10 REV 6/16/11)

PIEZOMETER SCREEN

NOTES: 1. SEE SHEET 1 OF 2 FOR SECTION LOCATIONS.
2. EXISTING GROUND SURFACE FROM SURVEY DATA DATED 9/9/15 PROVIDED BY AEP.

DRN BY: <i>Amanda Graphics</i>	APPALACHIAN POWER COMPANY			AEP SERVICE CORP. 1 RIVERSIDE PLAZA COLUMBUS, OH 43215
DATE: 07/12/2016	SCARY	AMOS PLANT WEST VIRGINIA		
SCALE: N. T. S	EMBANKMENT SECTIONS & DETAILS		FIGURE 3	

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ATTACHMENT B

Photos

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LEGEND

1 ○ PHOTO LOCATION

➤ PHOTO DIRECTION

DRAWING NUMBER:		FIGURE 4	
		APPALACHIAN POWER CO.	
		AMOS BOTTOM ASH POND PHOTOGRAPH MAP	
WINFIELD	2020	WEST VIRGINIA	
 AMERICAN ELECTRIC POWER	AEP SERVICE CORP. 1 RIVERSIDE PLAZA COLUMBUS, OH 43215		

PLOT TIME: 11:37:47 AM
BY: sz79452
PLOT DATE: 9/4/2020
CROSS REF:

AEP GES Dam Inspection

Plant Name:

Inspector:

Unit:

Date:

Photo #:

Notes:



Photo #:

Notes:



AEP GES Dam Inspection

Plant Name:

Inspector:

Unit:

Date:

Photo #:

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Photo #:

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AEP GES Dam Inspection

Plant Name:

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AEP GES Dam Inspection

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Inspector:

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ATTACHMENT C

Instrumentation Data

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John E Amos Plant Piezometer Readings Bottom Ash Pond

