Big Sandy Plant

Notice of Completion of Closure—February 28, 2020 Revision 1

Bottom Ash Pond

On January 29, 2020, the Big Sandy bottom ash pond CCR unit was transitioned to closure status in accordance with 40 CFR 257.102. All CCR materials were removed from the unit, including removal of at least two feet of the natural lean clay or sandy lean clay and silt soils beneath the unit to remove any CCR potentially mixed with soil, and none of the monitored groundwater parameters were found to exceed their corresponding groundwater protection standards.

This notice of completion of closure is being placed in the operating record in accordance with 40 CFR 257.102(h).

CLOSURE CERTIFICATION BY QUALIFIED PROFESSIONAL ENGINEER

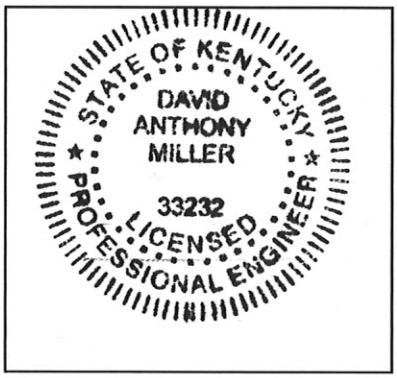
I certify that the Big Sandy Plant Bottom Ash Pond (BAP) has been closed in accordance with the closure plan specified by paragraph 257.102(b) and the requirements of section 257.102.

DAVID ANTHONY MILLER

Printed Name of Licensed Professional Engineer

David Anthony Miller

Signature



33232	KENTUCKY	01.29.2020
License Number	Licensing State	Date

Appendix—Record of Changes

Revision 1—Added notice of completion of closure to closure certification

2020 Annual Dam and Dike Inspection Report

Fly Ash Pond and Bottom Ash Pond Complex

Big Sandy Plant

Kentucky Power

Lawrence County, KY

November 19, 2020

Prepared for: Kentucky Power – Big Sandy Plant
Louisa, Kentucky

Prepared by: American Electric Power Service Corporation
1 Riverside Plaza
Columbus, OH 43215

AMERICAN ELECTRIC POWER
BOUNDLESS ENERGY℠

GERS-20-040

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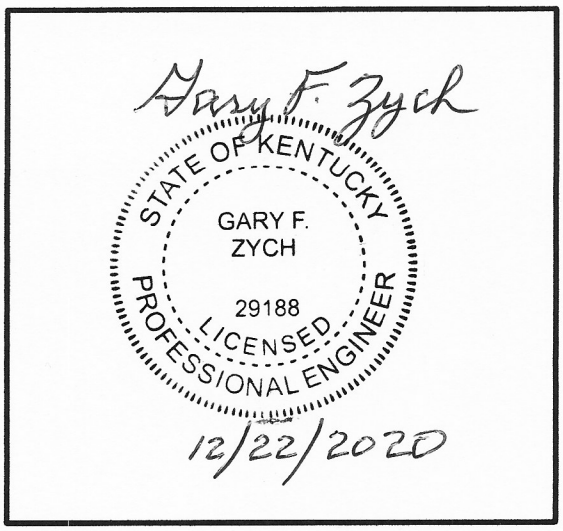
2020 Annual Dam and Dike Inspection Report

Big Sandy Plant
Fly Ash Pond and Bottom Ash Pond Complex
Document Number: GERS-20-040

PREPARED BY Brian G. Palmer, P.E. DATE 12/16/2020

REVIEWED BY Brett A. Dreger
Brett Dreger, P.E. DATE 12/21/2020

APPROVED BY Gary F. Zych
Gary F. Zych, P.E. DATE 12/22/2020
Manager – AEP Geotechnical Engineering



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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Attachments

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1.0 INTRODUCTION

This report was prepared by AEP- Geotechnical Engineering Services (GES) section, in part, to fulfill requirements of 40 CFR 257.83 and the Kentucky Department of Environmental Protection, Division of Water, Dam Inspection Section and to provide Kentucky Power and the Big Sandy Power Plant with an evaluation of the facility.

Mr. Keith Sergent, Process Supervisor for the Big Sandy Plant provided onsite coordination for inspection activities. The inspection was performed on November 19, 2020 by Brian Palmer of AEP Geotechnical Engineering. Weather conditions were mostly sunny and temperatures in mid 40°s F to upper 60°s F, during the inspection. Approximately 0.1 inches of precipitation had fallen in the previous 7-days, with none in the previous 3-days.

2.0 DESCRIPTIONS OF IMPOUNDMENTS

The Big Sandy Power Plant is located north of the City of Louisa, Lawrence County, Kentucky.

It is owned and operated by Kentucky Power. The facility has historically operated two surface impoundments for managing wastewater and storing CCRs called the Bottom Ash Pond Complex and the Fly Ash Pond.

The Big Sandy Power Plant has ceased burning coal and has been refueled for natural gas. The Bottom Ash Pond Complex has been repurposed as a wastewater pond complex. All CCR material has been removed from the Bottom Ash Pond and the area backfilled and regraded. The Notice of Completion of Closure was posted on February 28, 2020 to the operating record. This is the final CCR Inspection report for the Bottom Ash Pond.

The Fly Ash Pond discontinued receiving wastewater from the plant for discharge through the permitted outfall in the February of 2020. Closure activities for the Fly Ash Pond are nearing completion with substantial completion of closure activities expected by the end of 2020.

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 Satisfactory:	A condition or activity that generally meets what is minimally 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 observed is considered uncontrolled seepage. [Wet or soft areas are not considered uncontrolled seepage, but they can lead to this type of deficiency. These areas should be monitored frequently.]
2. Displacement of the Embankment
    a. Displacement of the embankment is a large scale movement of part of the dam. Common signs of displacement are cracks, scarps, settlement, bulges, depressions, sinkholes and slides.
3. Blockage of Water 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 FLY ASH POND

The Fly Ash Pond is a valley impoundment with a main dam and a saddle dam. When operational the Big Sandy Fly Ash Pond received sluiced fly ash and wastewater from the plant via the Bottom Ash Pond. Bottom Ash excavated from the Big Sandy Bottom Ash Pond was also placed within the Fly Ash Pond. Closure activities have removed the Saddle Dam, lowered the height of main dam, installed a new concrete spillway over the Main Dam, installed an Articulated Concrete Block Mat spillway structure at the former Saddle Dam, and installed a composite final cover system over the pond surface.

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

A review of available information regarding the status and condition of the Fly Ash Pond, which include files available in the operating record, such as design and construction information, previous periodic structural stability assessments, previous 7 day inspection reports, and previous annual inspections has been conducted. Based on the review of the data there were no signs of actual or potential structural weakness or adverse conditions.

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

4.1 FLY ASH POND

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

Construction activities as part of the pond closure of the fly ash pond reached the Main Dam Structure in 2020. The crest of the dam was lowered from 712 to a new low elevation of 656. The discharge pipe through the dam was filled with grout along with lower portion of decant structure. The upper portion of the decant structure was demolished soil backfilled over it. A new concrete spillway has been constructed but is not operational at the time of inspection as final cover over the pond area is competed.

The new Articulated Concrete Block Mat spillway (Auxiliary Spillway) downstream of the Saddle Dam has been completed. The final cover to the upstream of the Saddle Dam has sufficient vegetation to allow removal of the remaining portion of the Saddle Dam clay core.

Changes in the operation of the Fly Ash Pond are discussed in Section 4.2.5 below.

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

Location of instrumentation is included on figures in Attachment B. The maximum recorded readings of each piezometer since the previous annual inspection is shown in Table 3 below. A figure showing the readings since last year's annual inspection is included in Attachment C.

Table 3

INSTRUMENTATION DATA Fly Ash Pond			
Instrument	**Type**	**Maximum Reading since last annual inspection**	**Date of reading**
P-6*	Piezometer	580.15	Three times-CLOSED
P-7	Piezometer	576.84	4/23/20 & 5/18/20
P-8	Piezometer	576.94	4/23/20 & 5/18/20
P-124*	Piezometer	536.5	2/17/20 - CLOSED
P-130	Piezometer	548.9	3/30/20
PR-7	Piezometer	539.9	2/17/20
PR-21	Piezometer	541.1	2/17/20
PE*	Piezometer	548.85	5/18/20 - CLOSED
PZ-5C	Piezometer	548.8	2/17/20
9304-A*	Piezometer	544.57	1/24/20 - CLOSED
9304-B*	Piezometer	539.78	2/17/20 - CLOSED
9304-C*	Piezometer	556.21	2/17/20 - CLOSED
9305-A	Piezometer	553.05	2/17/20
9305-B	Piezometer	524.23	2/17/20
B-1*	Piezometer	Dry	NA - CLOSED
B-2*	Piezometer	564.42	2/17/20 - CLOSED
B-3*	Piezometer	613.11	6 dates - CLOSED

Piezometers readings were generally trending lower since last inspection likely related to the lowering of the pool behind the dam. The common maximum reading for several piezometers of 2/17/2020 corresponds to a high water event on Blaine Creek and the Big Sandy River. A graph of the piezometer readings is included in Attachment C. Nine of the Piezometers were closed and no longer monitored as part of the lowering of the main dam. As part of the construction, several of the piezometers were inaccessible during construction and the top of casing was lowered as part of construction.

In addition to the piezometers, the horizontal and vertical deformations of the Main Dam are monitored using 17 permanent reference points (survey monuments) and three (3) slope indicators. One slope indicator was removed as part of the dam lowering and another had the top of casing lowered to correspond to the new lower crest. Additionally, seven (7) of the reference points across the crest of the dam were removed with the lowering of the dam.The deformation surveys were conducted on a semi-annual basis until November 2015 when 30-day monitoring was implemented in accordance with 40CFR257.83. The report of the 30-day monitoring is submitted to the operating record and contains the historical readings of all the settlement monuments and the recent results for the slope indicators. The reports provide graphs of the vertical and horizontal displacements as a function of time for the survey monuments. The deformation of all the monuments have been reviewed as a part of this annual inspection and no unusual or unexpected behavior has been observed. The reports provide deformation profiles for the slope indicators. The deformation profiles presented in the report do not exhibit any unexpected or unexplained behavior.

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

Table 4 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.

Table 4

IMPOUNDMENT CHARACTERISTICS	**Fly Ash Pond**
Approximate **Minimum** depth of impounded water since last annual inspection	<1-ft
Approximate **Maximum** depth of impounded water since last annual inspection	~20-ft
Approximate **Present** depth of impounded water at the time of the inspection[2]	0 ft
Approximate **Minimum** depth of CCR since last annual inspection	~102-ft
Approximate **Maximum** depth of CCR since last annual inspection	~157-ft
Approximate **Present** depth of CCR at the time of the inspection[3]	~140-ft (avg)
Storage Capacity of impounding structure at the time of the inspection	N/A[4]
Approximate volume of impounded water at the time of the inspection	0 ac-ft
Approximate volume of CCR at the time of the inspection	8,275 ac-ft

Notes:

1) Water and CCR elevations vary across the Fly Ash Pond, as such the Min. and Max. exist simultaneously.
2) Water depth based on final area of final cover subgrade being prepared at time of inspection
3) Value based on estimated avg. elevation of 680.
4) Storage capacity of pond is not applicable based on the closure of the pond and the site grading. The stage-storage curve for the dam would indicate approximately 6,000 acre-ft of storage, which is less than the estimated volume of CCR material in the closed reservoir.

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

A visual inspection of the Fly Ash Pond was conducted to identify any signs of distress or malfunction of the impoundment and appurtenant structures. Specific items inspected included all structural elements of the dam such as upstream and downstream slopes, crest, and toe; as well as appurtenances such as the outlet structure from the Fly Ash Pond and pipe discharge structure.

Overall the facility is in good condition. As noted above the Main Dam has undergone major changes in the last year as part of the closure of the fly ash pond. The remaining structure of the Main dam is functioning as intended with no signs of potential structural weakness or conditions, which are disrupting to the safe operation of the impoundment. The final removal of an impounding structure at the saddle dam was nearly complete (since completed) and the new spillway is in place and operational.

Inspection photos are included in Attachment A. Additional pictures taken during the inspection can be made available upon request. Figures showing the Main Dam and the Saddle Dam are included in Attachment B. The aerial imagery used in the figures in Attachment was taken several days after the inspection and show construction activities more complete then at time of inspection.

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

As noted above the Main dam has undergone several changes since the last annual inspection that affects the stability of the Main Dam. The Saddle Dam has been removed as an impounding structure. The operation and configuration has changed with the following activities:

- The main pool behind the Main Dam has been drained and final cover installation nearly complete at the time of inspection (since has been substantially complete).
- The Main Dam has been lowered approximately 55-ft.
- A new concrete spillway has been constructed to convey storm water from the final cover system over the Main Dam. A temporary berm is located in front of inlet to the new concrete spillway to allow completion of pond closure activities. Water is pumped to discharge out the discharge below the main dam
- Continue pond closure activities, backfilling around the new concrete spillway, fencing, final grading, riprap in channels and slopes, seeding, and other miscellaneous activities.

5.0 SUMMARY OF FINDINGS

5.1 GENERAL OBSERVATIONS

The following general observations were identified during the visual inspection. Specific maintenance and items to monitor are described in the subsequent sections of this report.

Fly Ash Pond – Saddle Dam/Emergency Spillway (Auxiliary Spillway)

1) The remaining clay core of the Saddle Dam was removed and the new articulated concrete block mat spillway (Auxiliary Spillway) is complete and operational below the dam.

2) The closure of the upstream areas and removal of the Saddle Dam have made the Emergency Spillway unnecessary. Thus, this area is currently being used to stage construction equipment and materials.

Fly Ash Pond – Main Dam

3) The condition of the upstream slope has been impacted by construction. The open water pool has been removed and the upstream slope area needs final regrading and seeding as part of closure activities

4) The decant structure has been removed from service. The outfall pipe has been grouted closed as well as the lower portion of the decant structure. The upper portion of the decant structure was demolished to allow construction of final grades.

5) The crest of the dam changed with lowering of the dam but no signs of instability, misalignment, cracking, or large displacement were observed. Final grading and seeding of the crest remains to be completed as part of the construction activities

6) The condition of the remaining downstream slope limestone riprap was satisfactory. No significant weathering of the limestone was noted. Settlement monuments on the slope appeared to be in good condition. The slope did not show any visible signs of significant settlement, instability or misalignment.

7) The condition of the downstream toe area and crest of the lower sandstone buttress (590 berm) was satisfactory

8) The downstream sandstone buttress and toe ditch appeared to be in satisfactory condition with no indication of instability. No significant vegetative growth was noticed between the stones.

9) The vegetation on the right downstream groin has been sprayed.

10) The left downstream abutment was impacted by the construction of the new concrete spillway. The area did not show visible signs of instability. Area requires final grading and stabilization (riprap and seeding) as part of final construction activities.

11) The seepage area noted in previous inspection reports on the left abutment near the access road have been captured with new french drain feature being routed to the main outlet channel below the new concrete spillway. A flume will be installed to measure the flow from this seepage.

12) Seepage from the east side of the previous outlet channel have been collected and routed to the main channel below the new concrete spillway. A flume will be installed to measure the flow from this seepage.

13) The previous discharge pipe has been grouted closed and the channel and rectangular weir have been removed and a new riprap channel partially constructed. A new plunge pool still needs to be constructed for the new concrete spillway

14) The v-notched weir (Outfall 018) and channel on the right downstream side of the dam was functional and good condition.

15) The abandoned outfall pipe located near the middle of the stone buttress did not show any signs of seepage around or through the grouted pipe.

16) The seep collection system at the right downstream groin and the 590 berm appeared to be in good condition. This seep has historically had a red coloring and was pumped back to the main pool for discharge. A temporary treatment system is currently in-place and the discharge directed to flow to Outfall 018, a permanent treatment system will be installed.

5.2 MAINTENANCE ITEMS

The following maintenance items were identified during the visual inspection, see inspection map for locations:

Fly Ash Pond – Saddle Dam (Auxiliary Spillway)

1) None - Area under construction

Fly Ash Pond – Main Dam

2) As construction is completed it is recommended to continue to control vegetative growth on areas with riprap protection. Dried vegetation shall be removed.

5.2 ITEMS TO MONITOR

The following items were identified during the visual inspection as items to be monitored, see inspection map for locations:

Fly Ash Pond – Saddle Dam/Auxiliary Spillway

1) Monitor area for erosion and general stability during and after construction.

Fly Ash Pond – Main Dam

2) As construction is completed and the site stabilized, continue to monitor for any changes to the dam structure or in any of the new seep control/monitoring features.

5.3 DEFICIENCIES (257.83(b)(2)(vi))

There were no signs of structural weakness or disruptive conditions that were observed at the time of the inspection that would require additional investigation or remedial action. There were no deficiencies noted during this inspection or during any of the periodic 7-day or 30-day inspections. A deficiency is defined as either 1) uncontrolled seepage, 2) displacement of the embankment, 3) blockage of control features, or 4) erosion, more than minor maintenance. If any of these conditions occur before the next annual inspection contact AEP Geotechnical Engineering immediately

If you have any questions with regard to this report, please contact Brian Palmer at 614-716-3382 (Audinet: 200-3382) or Gary Zych at 614-716-2917 (Audinet: 200-2917).

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ATTACHMENT A

Photos

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AEP GES Dam Inspection

Plant Name: Big Sandy

Inspector: B. Palmer

Unit: Fly Ash Pond

Date: November 19, 2020

Photo #: 1

Notes: General condition of upstream slope looking east. Construction of final cover soils along area in progress.

N38 11.181 W82 37.884

Photo #: 2

Notes: General condition of lowered crest. Area needs final grading and stabilization.

N38 11.191 W82 37.894

AEP GES Dam Inspection

Plant Name: Big Sandy

Inspector: B. Palmer

Unit: Fly Ash Pond

Date: November 19, 2020

Photo #: 3

Notes: Installation of final cover system system. Soil/ ash subgrade on, the right, geosynthetics in the middle, and soil protective cover on the left

N38 11.178 W82 37.984

Photo #: 4

Notes: Entrance of new concrete spillway. Temporary berm in front to prevent discharge of untreated contact water.

N38 11.169 W82 37.992

AEP GES Dam Inspection

Plant Name: Big Sandy

Inspector: B. Palmer

Unit: Fly Ash Pond

Date: November 19, 2020

Photo #: 5

Notes: New concrete spillway looking downslope.

N38 11.214 W82 38.015

Photo #: 6

Notes: General condition of downstream slope along crest.

N38 11.220 W82 37.986

AEP GES Dam Inspection

Plant Name: Big Sandy

Inspector: B. Palmer

Unit: Fly Ash Pond

Date: November 19, 2020

Photo #: 7

Notes: General condition of lowered crest. Area needs final grading and stabilization.

N38 11.200 W82 37.978

Photo #: 8

Notes: General condition of downstream slope along crest looking from right.

N38 11.219 W82 37.887

AEP GES Dam Inspection

Plant Name: Big Sandy

Inspector: B. Palmer

Unit: Fly Ash Pond

Date: November 19, 2020

Photo #: 9

Notes: New concrete spillway looking upstream.

N38 11.291 W82 38.002

Photo #: 10

Notes: Area of stilling basin area of new spillway. Final grading of stilling basin to be completed.

N38 11.284 W82 38.011

AEP GES Dam Inspection

Plant Name: Big Sandy

Inspector: B. Palmer

Unit: Fly Ash Pond

Date: November 19, 2020

Photo #: 11

Notes: General condition of downstream butress

N38 11.270 W82 37.996

Photo #: 12

Notes: General condition of original discharge structure. No seeps noted.

N38 11.275 W82 37.910

AEP GES Dam Inspection

Plant Name: Big Sandy

Inspector: B. Palmer

Unit: Fly Ash Pond

Date: November 19, 2020

Photo #: 13

Notes: General condition of 018 outfall

N38 11.276 W82 37.862

Photo #: 14

Notes: General condition of red water sump. Settling tank in place as final treatment system is installed.

N38 11.266 W82 37.821

AEP GES Dam Inspection

Plant Name: Big Sandy

Inspector: B. Palmer

Unit: Fly Ash Pond

Date: November 19, 2020

Photo #: 15

Notes: General condition of toe at 590 bench.

N38 11.246 W82 37.972

Photo #: 16

Notes: General condition of 590 bench at outboard crest.

N38 11.259 W82 37.897

AEP GES Dam Inspection

Plant Name: Big Sandy

Inspector: B. Palmer

Unit: Fly Ash Pond

Date: November 19, 2020

Photo #: 17

Notes: General condition of downstream slope from 590 bench looking southwest

N38 11.254 W82 37.901

Photo #: 18

Notes: General condition of downstream slope from 590 bench looking southeast

N38 11.251 W82 37.901

AEP GES Dam Inspection

Plant Name: Big Sandy

Inspector: B. Palmer

Unit: Fly Ash Pond

Date: November 19, 2020

Photo #: 19

Notes: Construction to remove last portion of saddle dam.

N38 10.702 W82 37.636

Photo #: 20

Notes: New articulated concrete block mat spillway and plunge pool located in the area of former saddle dam.

N38 10.749 W82 37.503

ATTACHMENT B

Site Maps

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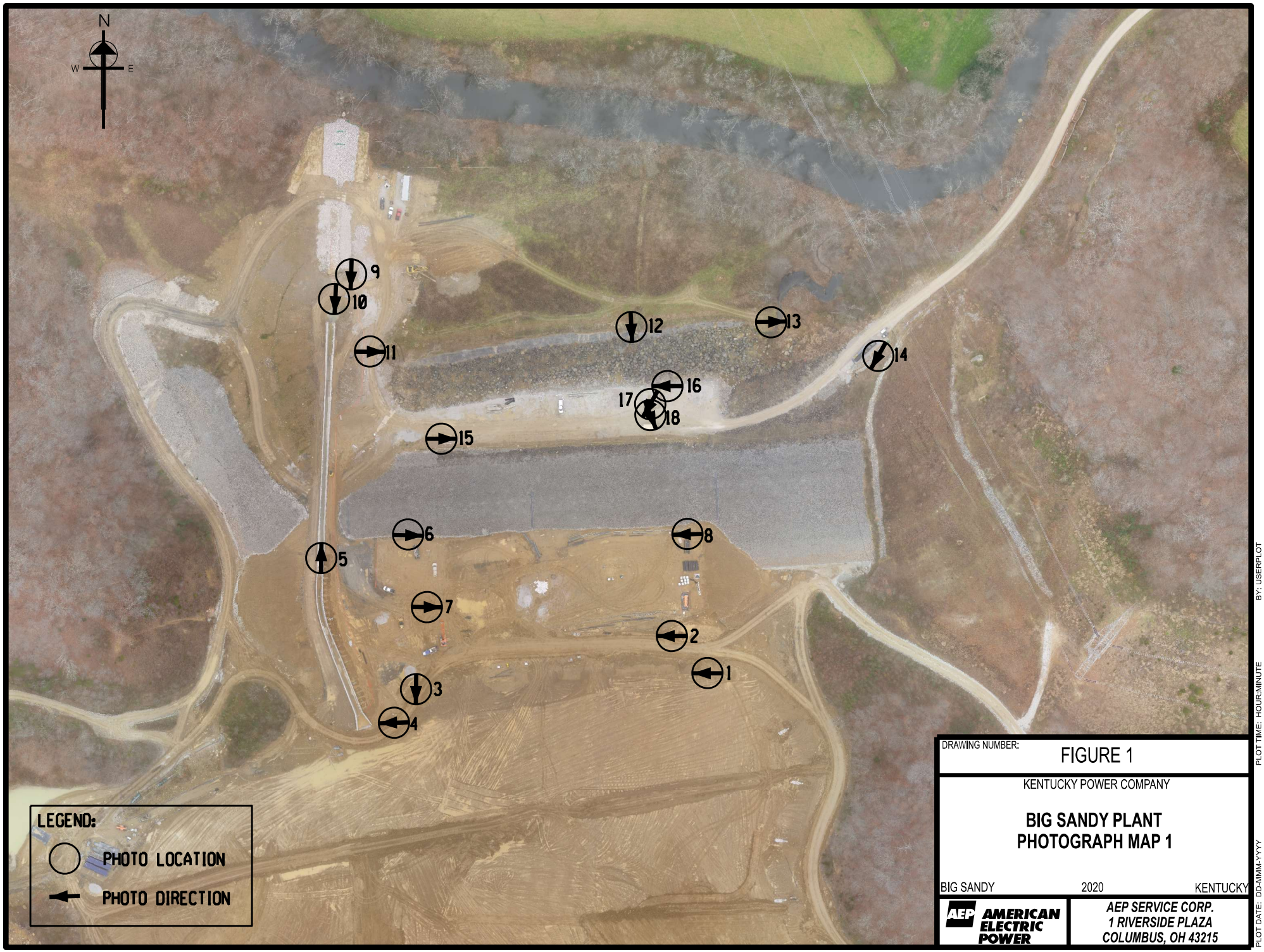

DRAWING NUMBER: FIGURE 1

KENTUCKY POWER COMPANY

BIG SANDY PLANT
PHOTOGRAPH MAP 1

BIG SANDY 2020 KENTUCKY

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

PLOT TIME: HOUR:MINUTE BY: USERPLOT

PLOT DATE: DD-MMM-YYYY

CROSS REFS:

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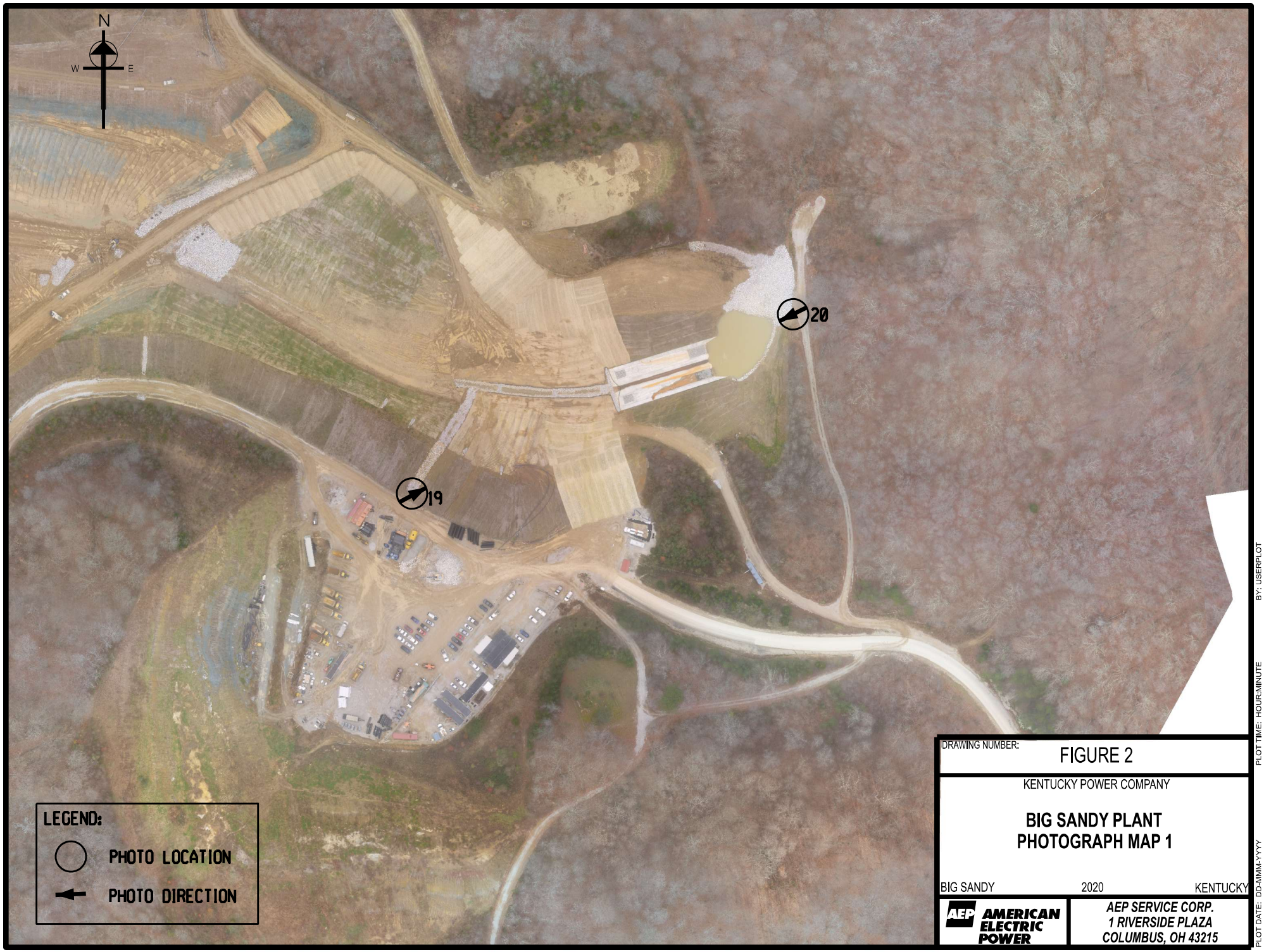


DRAWING NUMBER: FIGURE 2

KENTUCKY POWER COMPANY

BIG SANDY PLANT
PHOTOGRAPH MAP 1

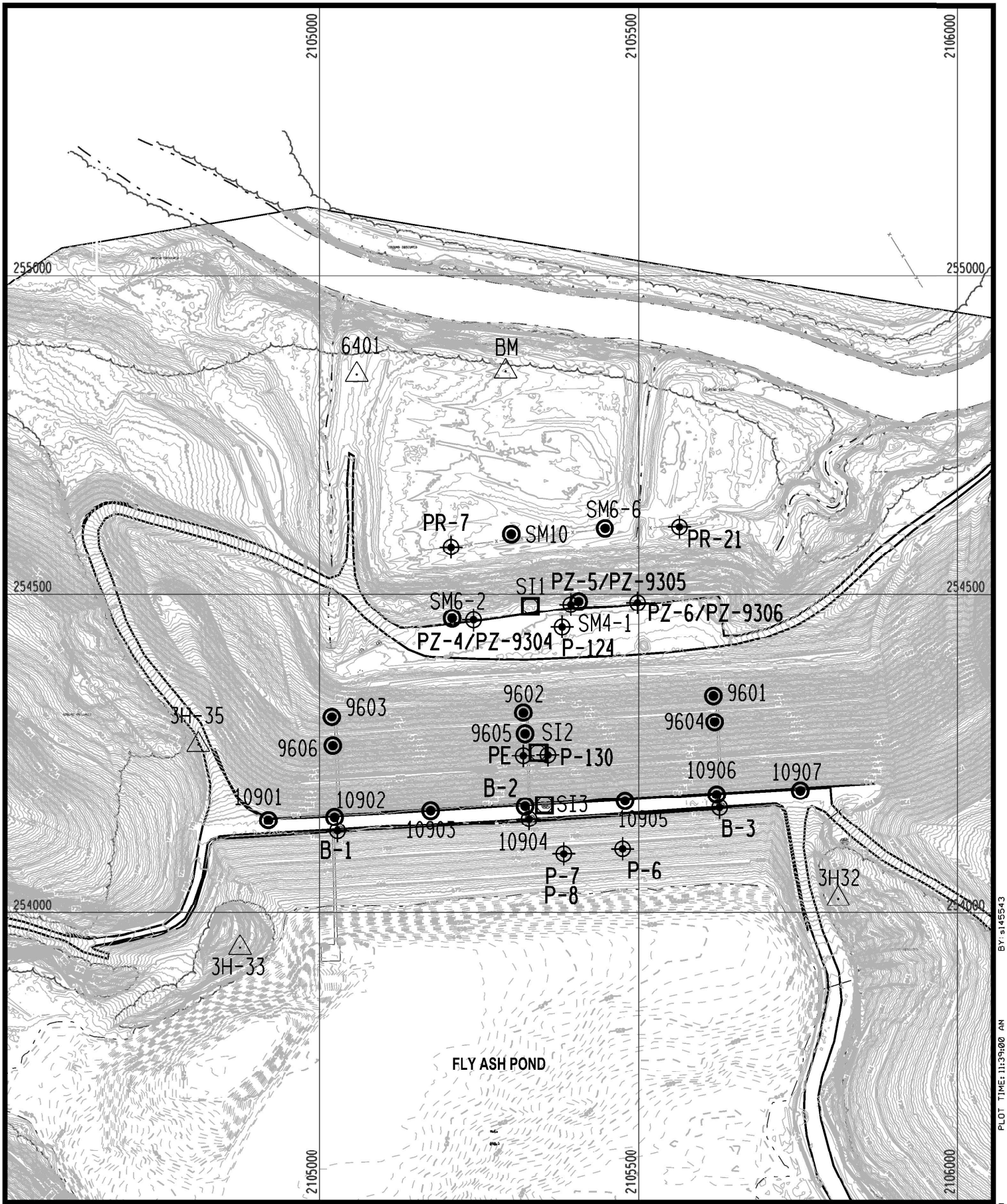
BIG SANDY 2020 KENTUCKY

AEP AMERICAN ELECTRIC POWER

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215

PLOT DATE: DD-MMM-YYYY
CROSS REFS:
PLOT TIME: HOUR:MINUTE
BY: USERPLOT

A (8.5"x11")



DRN BY:	BIG SANDY POWER STATION	DWG NO: FIGURE 4
DATE:	INSTRUMENTATION LOCATION	AEP AMERICAN ELECTRIC POWER
SCALE:1"=200'	FLY ASH DAM	AEP SERVICE CORP. 1 RIVERSIDE PLAZA COLUMBUS, OH 43215

PLOT DATE: 10/28/2019 PLOT TIME: 11:39:00 AM BY: s145543

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ATTACHMENT C

Instrumentation Data

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Big Sandy Plant
Fly Ash Pond
Active Piezometer Water Levels