

US EPA ARCHIVE DOCUMENT



**DRAFT REPORT
ROUND 10 DAM ASSESSMENT
AMERICAN ELECTRIC POWER
PICWAY GENERATING STATION
ASH POND**

DRAFT

PREPARED FOR:



**U.S. Environmental Protection Agency
Office of Resource Conservation and Recovery (5304P) USEPA
2733 Crystal Drive, 5th Floor
Arlington, VA 22202**

PREPARED BY:



**GZA GeoEnvironmental, Inc.
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GZA File No. 01.0170142.30**

November 21, 2011
File No. 01.0170142.30



Mr. Stephen Hoffman
Office of Resource Conservation and Recovery (5304P) USEPA
2733 Crystal Drive, 5th Floor
Arlington, Virginia 22202

Re: Round 10 Dam Assessment - Draft Report
EPA Contract No. EP10W001313
American Electric Power – Picway Generating Station
Ash Pond
Lockbourne, Ohio

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Dear Mr. Hoffman:

In accordance with our proposal 01.P000177.11, dated March 28, 2011, and U.S. Environmental Protection Agency (EPA) Contract No. EP10W001313, Order No. EP-B11S-00049, GZA GeoEnvironmental, Inc. (GZA) has completed our inspection of the American Electric Power (AEP) Picway Generating Station (PGS, Site) Ash Pond located in Lockbourne, Ohio. The Site visit was conducted on June 9, 2011. The purpose of our efforts was to provide the EPA with a Site-specific evaluation of the impoundments to assist EPA in visually assessing the structural stability of the impoundments under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act Section 104(e). We are submitting one hard copy and one CD-ROM copy of this Draft Report directly to the EPA.

Based on our visual inspection, and in accordance with the EPA's criteria, the Ash Pond is currently in **SATISFACTORY** condition, in our opinion. Further discussion of our evaluation and recommended actions are presented in the Round 10 Dam Assessment Report. The report includes: (a) completed Field Assessment Checklists; (b) figures of the impoundments; and (c) selected photographs with captions. Our services and report are subject to the Limitations found in **Appendix A** and the Terms and Conditions of our contract agreement.

We are happy to have been able to assist you with this inspection and appreciate the opportunity to continue to provide you with dam engineering consulting services. Please contact the undersigned if you have any questions or comments regarding the content of this Round 10 Dam Assessment Report.

Sincerely,

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EXECUTIVE SUMMARY



This Inspection Report presents the results of a visual inspection of the American Electric Power (AEP, Owner) Picway Generating Station (PGS, Site) Ash Pond located in Lockbourne, Ohio. The visual inspection was performed on June 9, 2011 by representatives of GZA GeoEnvironmental, Inc (GZA), accompanied by representatives of AEP and the Ohio Department of Natural Resources (ODNR).

Based on the maximum height of 24 feet and a storage volume of approximately 275 acre-feet (at the maximum elevation of approximately 573 feet NGVD 29), the Ash Pond is classified as a **Small** sized structure. Size classifications are based on U.S. Army Corps of Engineers (COE) guidelines. The ODNR has assigned an overall classification of "Class II" based on height ("Class IV", less than 25 feet), storage capacity ("Class III", greater than 50 acre-feet but less than 500 acre-feet) and hazard classification of "Class II".

Under the EPA classification system, as presented on page 2 of the EPA checklist (**Appendix C**) and Definitions section (**Appendix B**), it is GZA's opinion that the Ash Pond would be considered as having a **Significant** hazard potential. The hazard potential rating was assigned based on the available information that indicated that the failure or misoperation of the dam would result in no probable loss of life but could cause economic loss, environmental damage, damage of lifeline facilities (plant) or could impact other concerns. Losses would be primarily limited to the Owner's property, but the Scioto River is located in close proximity to the west embankment of the south pond and could receive ash-related material in the event of a failure or misoperation of the Ash Pond. The ODNR has assigned a hazard classification of "Class II" based on the potential for loss of public water supply, loss of a wastewater treatment facility or release of health hazardous waste, but has assigned an overall (combined size, storage and hazard) "Class II" designation to the Ash Pond.

Based on the results of the visual inspection, discussions with AEP personnel, and a review of available design documentation, the Ash Pond was found to have the following deficiencies:

1. Portions of the outer embankment slopes had not been mowed recently;
2. Presence of minor rodent burrows the exterior slopes of the embankments;
3. Presence of a bare area on the western exterior embankment of the south pond;
4. No instrumentation (i.e., staff gauge) to observe the elevation of the water within the pond/impoundment;
5. No instrumentation (i.e., survey/settlement monuments) to monitor crest elevations and/or embankment movement;
6. Bare areas, areas of limited vegetative growth or areas of gravel cover present on crest;
7. Presence of vegetation on the interior slopes of the embankment;
8. AEP personnel were unsure if the discharge pipe from the concrete discharge structure has been inspected internally since it was installed;
9. Visible variations in crest elevations, particularly along the west embankment of the south pond;
10. Minor ruts on crest from vehicle traffic;
11. Minor surficial pitting or flaking/cracking on the concrete discharge structure;

12. Reported crest and maximum pool elevations indicate potential for non-compliance with state freeboard requirement of five feet for Class II dams per OAC Rule 1501:21-13-07; and,
13. Presence of standing water at or near the toe of the exterior embankment slopes of the south pond, particularly near the southwest corner.



GZA recommends that the Owner arrange for the following to be performed:

Studies and Analyses:

1. Survey of the crest of both ponds by a licensed Professional Surveyor to evaluate the current elevation profile of the crest and confirm that survey monuments are not moving horizontally;
2. Monitor the vertical alignment of the crest of the north embankment of the Ash Pond yearly for movement or signs of embankment instability. In the event that settlement monuments are installed and surveyed in the future, survey measurements should be taken along the crest of the north embankment to ensure that the crest elevation is uniform;
3. Evaluate freeboard conditions based on maximum pool elevation and more recent topographical data; and,
4. Provide or perform spillway analysis to demonstrate capacity of discharge structures to accommodate the regulatory Spillway Design Flood with the maximum pool freeboard.
5. Camera survey of the CMP outfall should be performed.

Operation & Maintenance Activities:

1. Frequent monitoring of steep slopes for evidence of sloughing or erosion that could lead to instability, movement or failure of the embankments;
2. Review emergency action plan annually per OAC Rule 1501:21-21-04 and update as applicable;
3. Clear vegetation from the interior embankment slopes;
4. Remove trees and resulting stumps on or near the exterior slopes of the embankment, particularly near the west embankment of the south pond, Outfall 601 and the northern end of the clearwater pond;
5. Continue to monitor and control rodent activities and repair burrows as they are discovered. Keeping the embankments mowed can help to reduce populations of certain species;
6. Maintain interior slopes of at least 2H:1V during ash excavation as recommended by BBC&M;
7. Install a staff gauge on or near the outlet structure in Cell S3 and on or near the concrete discharge structure in the clearwater pond in order to take periodic measurements of the Ash Pond water surface elevation;
8. Inspect each of the monitoring wells installed in 2009 and ensure each well has a cap, lockable protective cover/casing and is visible during mowing operations;
9. Perform periodic water level measurements in the monitoring wells to evaluate water levels below the crest and at the toe of the embankments; and,
10. If AEP has the opportunity to stop discharging from the clearwater pond for a limited time period, inspect the discharge pipe from the concrete discharge structure to the duck-bill flap gate to verify that the pipe is operating correctly and is in good condition. This may be performed by video photography.

Repair Recommendations:

1. Minor concrete repair work on the concrete discharge structure in the clearwater pond;
2. Re-seed and/or over seed bare areas of the embankments and crest to establish healthy grass cover;
3. Clear the area of established vegetation near the lower portion and toe of the outer embankment slopes near the outfall structure; and,
4. Regrade areas near the toe of exterior slopes to facilitate proper drainage away from the embankments.



PREFACE



The assessment of the general condition of the embankments at the American Electric Power (AEP) Picway Generating Station is based upon available data and visual inspections. Detailed investigations and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of this report.

In reviewing this report, it should be realized that the reported condition of the embankments is based on observations of field conditions at the time of inspection, along with data available to the inspection team. In cases where an impoundment is lowered or drained prior to inspection, such action, while improving the stability and safety of the embankment, removes the normal load on the structure and may obscure certain conditions, which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is critical to note that the condition of the embankments 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 will continue to represent the condition of the embankment at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Prepared by:

GZA GeoEnvironmental, Inc.

Frank Vetere, P.E.

Senior Project Manager

Ohio License No.: _____ 62568 _____

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Ash Pond
AEP – Picway Generating Station

Date of Inspection: June 9, 2011

DRAFT REPORT

ASH POND
 AMERICAN ELECTRIC POWER
 PICWAY POWER PLANT
 LOCKBOURNE, OHIO



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ASH POND
AMERICAN ELECTRIC POWER
PICWAY POWER PLANT
LOCKBOURNE, OHIO



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Figure 2	Locus Plan (Digital Orthophoto / Aerial Imagery)
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APPENDICES

Appendix A	Limitations
Appendix B	Definitions
Appendix C	Inspection Checklist
Appendix D	Photographs
Appendix E	Selected Engineering Drawings Provided by AEP

1.0 DESCRIPTION OF PROJECT

1.1 General



1.1.1 Authority

The United States Environmental Protection Agency (EPA) has retained GZA GeoEnvironmental, Inc. (GZA) to perform a visual inspection and develop a report of conditions for American Electric Power (AEP, Owner) Picway Generating Station (PGS, Site) Ash Pond in Lockburne, Ohio. This assessment was authorized by the EPA under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 104(e). This assessment and draft report were performed in accordance with Round 10 of the Assessment of Dam Safety of Coal Combustion Surface Impoundments, RFQ-DC-16, dated March 16, 2011, and EPA Contract No. EP10W001313, Order No. EP-B11S-00049. The assessment generally conformed to the requirements of the Federal Guidelines for Dam Safety¹. This report is subject to the limitations contained in **Appendix A** and the Terms and Conditions of our Contract Agreement.

1.1.2 Purpose of Work

The purpose of this assessment was to visually assess and evaluate the present condition of the Impoundment(s) and appurtenant structures to attempt to identify observable conditions that may adversely affect their structural stability and functionality, to note the extent of any deterioration that may be observed, review the status of maintenance and needed repairs, and to evaluate the conformity with current design and construction standards of care.

The assessment was divided into five parts: 1) obtain and review available reports, investigations, and data from the Owner pertaining to the impoundments and appurtenant structures; 2) perform an on-Site review with the Owner of available design, inspection, and maintenance data and procedures for the Impoundments; 3) perform a visual assessment of the Site; 4) prepare and submit a field assessment checklist; and, 5) prepare and submit a draft and a final report presenting the evaluation of the Impoundments, including recommendations and proposed remedial actions.

1.1.3 Definitions

To provide the reader with a better understanding of the report, definitions of commonly used terms associated with dams are provided in **Appendix B**. Many of these terms may be included within this report. The terms are presented under common categories associated with dams which include: 1) orientation; 2) dam components; 3) size classification; 4) hazard classification; 5) general; and, 6) condition rating.

¹ FEMA/ICODS, April 2004: <http://www.ferc.gov/industries/hydropower/safety/guidelines/fema-93.pdf>

1.2 Description of Project

1.2.1 Location



The Picway Generating Station (PGS) is located approximately 2 miles southwest of the city of Lockbourne, Ohio, along the shore of the Scioto River, at the address 9301 South U.S. Route 23, Lockbourne, Ohio 43137. The Picway Ash Pond is located approximately 350 feet east of the PGS at latitude 39° 47' 21" North and longitude 83° 0' 34" West. A Site locus of the Ash Pond and surrounding area is shown on **Figure 1**. An aerial photograph of the Ash Pond and surrounding area is provided as **Figure 2**.

1.2.2 Owner/Caretaker

The PGS is owned and operated Columbus Southern Power Company, a subsidiary of AEP of Columbus, Ohio.

	Dam Owner/Caretaker
Name	Columbus Southern Power Company, a subsidiary of American Electric Power, Picway Generating Station
Mailing Address	9301 U.S. Route 23
City, State, Zip	Lockbourne, Ohio 43137
Contact	Gary Zych, PE
Title	Senior Engineer (AEP)
E-Mail	grzych@aep.com
Phone Number	614-716-2917

1.2.3 Purpose of the Pond

The PGS is a one unit (formerly 5 units) coal-fired power plant with a maximum generating capacity of approximately 106 megawatts. Commercial operation of the PGS facility began in 1955. The Ash Pond was constructed in conjunction with the PGS facility for the purpose of storing and disposing coal combustion byproducts and was commissioned in 1954. Wastewater discharged from the Ash Pond is regulated under a National Pollution Discharge Elimination System (NPDES) permit² issued by the Ohio Environmental Protection Agency (OEPA).

The Ash Pond was constructed for the purpose of storing and disposing plant wastewater, bottom ash and fly ash from the PGS facility. In addition to direct precipitation, the Ash Pond also receives inputs from the floor, lab and roof drain sump, the sump discharge collection pit runoff and water from the plant drains. The estimated combined average rate of all identified Ash Pond inputs is 644,710 gallons per day³, assuming Unit 5 of the PGS is operating at average load during the summer. The combined maximum rate of all identified Ash

² National Pollutant Discharge Elimination System (NPDES) Permit No. 41B00000*GD, Picway Generating Station, Ohio Environmental Protection Agency, March 30, 2007.

³ Based on estimated flows from a Water Balance Diagram provided by Mr. Gary Zych of AEP on June 16, 2011.



Pond inputs is 1,584,710 gallons per day, assuming a 10-year, 24-hour storm event⁴. Wastewater from the Ash Pond is discharged via Outfall 601 to a discharge canal at an estimated average rate of 100,000 gallons per day and an estimated maximum rate of 628,000 gallons per day⁵. The discharge canal ultimately discharges to the Scioto River at Outfall 001. The overall Fly Ash Pond plan is shown on **Figure 3**.

1.2.4 Description of the Ash Pond and Appurtenances

The following description of the Ash Pond is based on the Owner interview, design reports provided by the Owner, as-built drawings, and field observations by GZA.

The Ash Pond dam consists of approximately 4,900 feet of earthfill embankment and approximately 1,000 feet of natural embankment. The maximum crest height (from the lowest toe elevation to the top of embankment) is approximately 24 feet. An access road along the top of the crest has a width of approximately 10 to 15 feet and a design elevation of approximately 693 feet, National Geodetic Vertical Datum of 1929 (NGVD 29). Actual crest elevations are reportedly as low as 690 feet⁶. Portions of the Ash Pond base were reportedly keyed into the existing natural grade, and the design elevation of the base of the Ash Pond is 673 feet⁷. The inner slope of the embankment has a slope of approximately 1.5 horizontal to 1 vertical (1.5H:1V) and the outer slopes of the embankment have a slope of approximately 2H:1V. The Ash Pond has not been expanded or raised since its original construction.

The Ash Pond has one discharge point. The discharge (decant) structure is located in the southwestern portion of the clearwater pond and consists of a concrete tower with 36-inch stop-logs. The tower is equipped with a skimmer to prevent debris from clogging the screen affixed to the tower. Once water enters the discharge structure, it is conveyed through a 36-inch diameter corrugated metal pipe (CMP), through a duck-bill flap gate, and then into a canal that joins the Scioto River. The duck-bill flap gate at the end of the 36-inch CMP is identified as “Outfall 601” in the 2007 NDPES permit (refer to **Figure 3** for location).

No information was provided regarding invert elevations of the 36-inch CMP. However, based on a review of AEP Drawing 15-30011-0 provided by the Owner, the ground elevation in the immediate vicinity of the discharge point of the 36-inch CMP is approximately 668 feet, based on the 2006 contours shown. No information was provided regarding the presence of seepage collars along the 36-inch CMP as it penetrates the embankment.

The Ash Pond facility does not have any instrumentation or seepage collection systems. No survey monuments were observed along the top of the embankment during out site visit. Five monitoring wells (MW-0901S, MW-0901D, MW-0902S, MW-0902D and MW-0903S) were installed around the Ash Pond in 2009 as part of an evaluation of the embankments. According to AEP personnel, no samples from the monitoring wells have been collected to date, and no water level measurement data was available. Additional information on the construction and performance history of the Ash Pond is provided in Sections 1.3.5 and 1.3.6 of this report.

⁴ Based on estimated flows from a Water Balance Diagram provided by Mr. Gary Zych of AEP on June 16, 2011.

⁵ Based on estimated flows from a Water Balance Diagram provided by Mr. Gary Zych of AEP on June 16, 2011.

⁶ Based on Plate 3, Section E of Appendix A, of the report entitled AEP Picway Plant Ash Pond Investigation prepared by BBC&M Engineering, Inc. and dated April 2010.

⁷ Based on review of Drawing No. 18-530.00 provided by AEP, originally dated June 26, 1953.

Additional information on the construction and performance history of the Fly Ash Pond is provided in Section 1.3.7 of this report.



1.2.5 Operations and Maintenance of the Ash Pond

The Ash Pond operates under the regulations of the Ohio Department of Natural Resources (ODNR), including their dam safety regulations. According to the most recent ODNR dam safety report (February 9, 2009 inspection date), there is no permit number for the Ash Pond (permit no. listed as “N/A”), but the ODNR lists the Ash Pond as File No. 9630-001. In accordance with Ohio Revised Code Section 1521.062, owners of dams must monitor, maintain and operate their dams safely.

Operation and maintenance of the Ash Pond is regulated by the EPA, ODNR and the OEPA (NPDES Permit). Monitoring requirements under the NPDES permit are discussed below.

The Ash Pond and the surrounding area are operated and maintained by AEP personnel. A summary of the maintenance and inspection items listed in AEP’s February 2010 Operation, Maintenance and Inspection manual (OMI) (as provided to GZA) is provided below.

- Mow grassed slopes of embankments (external and internal) 4 times per year;
- Special maintenance items including seepage control, sloughing or slides of the embankments, and rehabilitation of rock berms are to be performed based on the recommendations in engineering inspection reports or as identified during quarterly plant inspections and discussions;
- Repair erosion gullies with compacted fill and stabilize with seed and mulch as appropriate as needed;
- Re-grade and compact ruts along the crest of the embankments as needed;
- Repair rodent damage by backfilling with mud packs as needed. If animals are persistent, trapping and/ or fumigants may be necessary;
- Remove debris around skimmer and discharge structure as needed;
- Repair discharge structure and skimmer as needed;
- Inspection within 24 to 48 hours after placing 3 or more stop logs in any discharge tower;
- Inspection within 3 days of switching between active cells in the south pond;
- Inspection within 24 hours of each rainfall event which results in 3 or more inches of rain over a 24-hour period;
- Inspection by a qualified individual experienced in dam engineering and under the supervision of a registered professional engineer at least once every 2 years;



- Monitoring of the items associated with the NPDES Permit in accordance with the permitted frequencies, which range from daily to monthly; and,
- Periodic (every 5 years) safety inspection performed by ODNR.

Inspection reports produced by ODNR are provided to AEP. If necessary, these reports may include required remedial measures or other discussion items that require action and/or response by AEP. The most recent ODNR report is dated May 4, 2009 and describes conditions and observations noted on February 9, 2009. According to this report, AEP is required to address any deficiencies noted in the inspection within 5 years, provide the ODNR with any plans, specifications, investigative reports or other supporting documentation for review and approval prior to construction and provide a record of all repairs in the OMI.

Based on GZA's discussions with AEP personnel and a review of the May 4, 2009 ODNR inspection report (refer to Section 1.3.7), it appears that progress toward completing the required remedial measures listed in the May 4, 2009 ODNR report is being made.

According to the NPDES permit, AEP is required to submit a monthly report to the OEPA that includes NPDES monitoring data. Specifically, at Outfall 601, AEP is required to record the flow rate daily, collect grab samples for pH twice each week, collect grab samples for total suspended solids on a weekly basis and collect grab samples for oil and grease and hexane on a monthly basis.

1.2.6 Size Classification

For the purposes of this EPA-mandated inspection, the size classifications will be based on United States Army Corps of Engineers (COE) criteria. According to guidelines established by the COE, dams with a storage volume between 50 to 1,000 acre-feet and/or a height between 25 and 40 feet are classified as Small sized structures. Based on the maximum height of 24 feet and a storage volume of approximately 275 acre-feet, the Ash Pond is classified as a **Small** sized structure.

The ODNR has assigned an overall classification of "Class II" based on height ("Class IV", less than 25 feet), storage capacity ("Class III", greater than 50 acre-feet but less than 500 acre-feet) and hazard classification of "Class II", discussed in Section 1.2.7 below.

1.2.7 Hazard Potential Classification

Under the EPA classification system, as presented on page 2 of the EPA checklist (**Appendix C**) and Definitions section (**Appendix B**), it is GZA's opinion that the Ash Pond would be considered as having a **Significant** hazard potential. The hazard potential rating was assigned based on the available information, which indicated that the failure or misoperation of the dam would result in no probable loss of life, but could cause economic loss, environmental damage, damage of lifeline facilities (plant) or could impact other concerns. Losses would be primarily limited to the Owner's property, but the Scioto River is located in close proximity to the west embankment of the south pond and could receive ash-related material in the event of a failure or misoperation of the Ash Pond. The overall site plan is shown on **Figure 3**.



The ODNR has assigned a hazard classification of “Class II” based on the potential for loss of public water supply, loss of a wastewater treatment facility or release of health hazardous waste, but has assigned an overall (combined size, storage and hazard) “Class II” designation to the Ash Pond. ODNR assigns a “Class I” hazard rating to those dams with the highest hazard potential and a “Class IV” hazard rating to those dams with the lowest hazard potential.

1.3 Pertinent Engineering Data

1.3.1 Drainage Area

The Ash Pond is an enclosed embankment built up from the natural ground surface. As such, the contributory drainage area is the surface area of the impoundment, approximately 27 acres. The Ash Pond also receives stormwater runoff from the roof drain of the power plant/generation building. The roof drain stormwater collection area was not visited by GZA during the Ash Pond inspection, and the associated drainage area acreage of this area was not provided but is presumed to be equal to the footprint of the building, or approximately 51,400 square feet based on measurements made from aerial photographs.

1.3.2 Ash Pond

The Ash Pond is located approximately 425 feet east of the Scioto River and is bordered by farmland to the north, east and south and by the PGS and the Scioto River to the west.

The Ash Pond consists of approximately 4,900 feet of earthfill embankment and approximately 1,000 feet of natural embankment. The maximum crest height (from the lowest toe elevation to the top of embankment) is approximately 24 feet. An access road along the top of the crest has a width of approximately 10 to 15 feet and a design elevation of approximately 693 feet, National Geodetic Vertical Datum of 1929 (NGVD 29). Actual crest elevations are reportedly as low as 690 feet⁸. Portions of the Ash Pond base were reportedly keyed into the existing natural grade and the design elevation of the base of the Ash Pond is 673 feet⁹. The inner slope of the embankment has a slope of approximately 1.5 horizontal to 1 vertical (1.5H:1V) and the outer slopes of the embankment have a slope of approximately 2H:1V. The Ash Pond has not been expanded or raised since its original construction.

At the crest elevation of 693 feet, the Ash Pond is estimated to have a surface area of approximately 27 acres and a storage volume of approximately 275 acre-feet.

1.3.3 Discharges at the Site

Discharges at the Site are regulated under the previously noted NPDES Permit. Under normal operating conditions, wastewater outflows from the Ash Pond to Outfall 601 and thence to a canal leading to the Scioto River where it is ultimately discharged at an estimated average rate of 100,000 gallons per day (assuming Unit 5 of the PGS is operating at average load during summer) and an estimated maximum rate of 628,000 gallons per day (assuming a 10-year, 24-

⁸ Based on Plate 3, Section E of Appendix A, of the report entitled AEP Picway Plant Ash Pond Investigation prepared by BBC&M Engineering, Inc. and dated April 2010.

⁹ Based on review of Drawing No. 18-530.00 provided by AEP, originally dated June 26, 1953.

hour storm event). Values were based on data provided on AEP's water balance diagram (undated).



1.3.4 General Elevations

Ash Pond elevations presented in this report, where available, are taken from design drawings, reports and other data provided by AEP. Elevations are based upon the NGVD 29 vertical datum. Actual elevations may be lower than design elevations.

A. Top of Embankment	± 693.0 feet
B. Maximum Operating Pool	± 688.0 feet
C. Normal Operating Pool	Variable, based on operations
D. Outlet Structure Inlet (Cell S3)	± 682.0 feet (681.0 feet plus estimated height of stop-logs present during site visit)
E. Discharge Structure Inlet	Not Available, estimated at ± 674.8 feet based on 2006 topographic contours
F. Invert of Outfall 601	Not Available, estimated at ± 668.0 feet based on 2006 topographic contours

1.3.5 Design and Construction Records and History of the Ash Pond

According to the information provided by AEP, the Ash Pond was designed by Columbus & Southern Ohio Electric Company of Columbus, Ohio. Construction of the Ash Pond was completed in 1955. The embankment was constructed to its full height prior to filling it with coal ash wastewater. The origin of the materials comprising the embankments and base of the pond was not specified, although it is possible that some portion of the fill material used in construction of the embankments was taken from the native soils. Select record drawings were provided to GZA for review including Drawing Nos. 18-530.00, Sheet 8 dated June 26, 1953, 18-530.00, Sheet 1 dated January 6, 1970 and 15-30011-0 dated September 22, 2006. These drawings are provided for reference in **Appendix E**.

1.3.6 Operating Records

Based on our interviews with AEP personnel and our review of Drawing No. 15-30011-0 dated September 22, 2006, the interior of the south pond was modified in 2007 by adding interior dikes to create three cells labeled Cells S1, S2 and S3. The three cells are reportedly used to facilitate operations and typically involves filling of only one cell at a time beginning with Cell S1 followed by Cell S2 and then by Cell S3.

The availability of operating records was limited to select inspection reports performed by AEP or an outside engineering firm. Findings from the reports provided to GZA are summarized in Section 1.3.7 below. No other operating records were provided by AEP.

1.3.7 Previous Inspection Reports

Various types of visual inspections of the Ash Pond are conducted by AEP on a monthly, quarterly or bi-annual basis. Informal inspections by the Owner are performed as needed during and after heavy rainfall events, defined by AEP as three inches or more in a 24-

hour period. Records of these inspections are maintained internally. In addition, AEP contracts with a Registered Professional Engineer to perform an inspection every two years.



The ODNR Division of Water performs an inspection every five years and prepares a report including remedial measures that is provided to AEP. A representative from ODNR was on-site during the assessment. The most recent ODNR inspection was performed on February 9, 2009. Key findings or recommendations from this inspection include, but were not limited to, the following:

1. Trees and brush are not permitted on embankment surfaces. Remove the trees and brush from all embankment surfaces.
2. The embankment crest must have a uniform elevation
3. Rodent burrows weaken dam embankments and must be repaired. Rodent activity must be controlled.
4. The embankment and spillways must be protected from erosion. A healthy grass cover should be present on embankment and spillways as needed. Establish a healthy grass cover on the embankment crest.
5. The owner must provide a device or plan to permit draining of the reservoir within a reasonable period of time in accordance with OAC Rule 1501:21-13-06.
6. The reservoir/lagoon must be maintained at or below its maximum operating level to ensure sufficient freeboard. Modify the operation of the reservoir to maintain sufficient freeboard. A written request for variance from this rule may be made to the chief if adequate justification is provided.
7. This dam must have an operation, maintenance and inspection manual (OMI). Prepare and OMI.
8. Monitor the steepest portions of the exterior slope for any signs of instabilities.

A separate Ash Pond Inspection was performed by BBC&M Engineering, Inc. (BBC&M) on March 16, 2009. Based on the findings of this inspection, BBC&M concluded that the north pond portion of the Ash Pond was in good condition and the south pond was in fair condition. Refer to Figure 3 for location of interior cells and ponds. Key findings or recommendations from this inspection include, but are not limited to, the following:

1. Due to the excessive number of rodent burrows and recurrence, fumigation and/or trapping should be considered.
2. Repair concrete riser in the south pond. The excessive honeycombing of the concrete will reduce its service life since the aggregate is not well protected.
3. Remove trees on the outboard slope of the western embankment of the south pond near the outlet structure.
4. Regrade any areas along the toe of the embankment where surface water is not draining away from the toe.
5. Repair bare areas on the slope by overseeding the embankment.
6. Continue to monitor the embankments. There are several areas that appear to have been eroded (over-steepened slopes) and/or had failures in the past.

Based on the findings of BBC&M's March 16, 2009 inspection, an investigation of the Ash Pond was performed by BBC&M in August and November of 2009 to develop subsurface data at five cross-sections through the Ash Pond embankments. Seepage and slope stability



analyses to provide an indication as to the level of safety provided by the embankments were performed at two cross-sections. The investigation consisted of the installation of eleven soil borings, including five borings (B-0903, B-0904, B-0906, B-0907 and B-0909) completed through the crest of the embankments, and four borings (B-0905, B-0908, B-0910 and B-0911) at the toe of the embankments.

According to BBC&M’s report, static and seismic analyses were performed for two cross-sections (Sections C and D) in the south pond since this area of the Ash Pond is periodically filled and excavated. The purpose of the cross-sections was to determine the factor of safety against rotational failure for the interior and exterior slopes using drained soil strength parameters. Rapid drawdown was also investigated for the interior slopes. A table summarizing the results of BBC&M’s stability analysis is provided below:

Analysis Case	Computed Factor of Safety			
	Interior Slopes		Exterior Slopes	
	Section C	Section D	Section C	Section D
Static (Steady-State Seepage)	2.51	4.15	1.53	1.54
Pseudo-Static	2.16	2.96	1.54	1.48
Rapid Drawdown	1.13 ¹	1.24	Not Applicable	Not Applicable

Notes:

1. Assumes interior slope will be maintained at a 2H:1V or flatter when ash excavation occurs.

Based on the results of their analyses, BBC&M concluded that at the two cross-sections evaluated, the embankments exhibit an adequate factor of safety relative to those recommended by the United States Army Corps of Engineers for existing facilities and assuming interior slopes of 2H:1V during ash excavation.

2.0 INSPECTION

2.1 Visual Inspection

The PGS Bottom Ash Pond and Fly Ash Pond were inspected on June 9, 2011 by Frank Vetere, P.E., and Matthew Vander Eide, P.G., of GZA. The weather conditions during the inspection were sunny with temperatures above 90 degrees Fahrenheit. The weather during the weeks leading up to GZA’s site visit was wet with higher than normal rainfall. Photographs to document the current conditions of the embankments were taken during the inspection and are included in **Appendix D**. Underwater areas were not inspected, as this level of investigation was beyond GZA’s scope of services. A copy of the EPA Checklist for both ponds is included in **Appendix C**.

With respect to our visual inspection, there was no evidence of prior releases, failures, or patchwork observed by GZA.



2.1.1 General Findings

In general, the PGS Ash Pond was found to be in **SATISFACTORY** condition and the Specific concerns are identified in more detail in the sections below.

2.1.2 Ash Pond

An overall Ash Pond site plan showing the pertinent features, including the location and orientation of photographs provided in **Appendix D**, is detailed on **Figure 3**.

2.1.2.1 Outer Embankment Slope (Photos 7, 10, 15, 17-19, 20, 24-26, 29, 30)

The outer embankment slope generally appeared to be steep, but in good condition. Most portions of the slopes had been mowed recently. Mowing in those areas not completed before GZA's site visit (south and east embankment of north pond) was reportedly scheduled to be completed in the near future. Similar to previous inspections by others, rodent burrows were observed in multiple locations, but did not appear to be excessive in size. One area on the western exterior embankment of the south pond was observed to be bare of vegetation (Photo 17). Evidence of standing water at the toe of the embankments was observed, particularly in the southwest corner of the south pond where an area of standing water measuring approximately 30 feet long by 5 feet wide was present (Photo 18). According to AEP personnel, recent rainfall had been excessive and the Scioto River had risen and flooded the portions of the area surrounding the south pond embankments. Rip rap has been used to address areas of erosion on the slope, such as the area shown in Photo 24. No unusual movement or sloughing was observed in the slope.

2.1.2.2 Crest (Photos 2, 5, 7, 9, 10, 15, 17, 21, 25, 27-30)

The crest of the Ash Pond serves as an access road around the perimeter of the pond and was generally grass covered, but had areas that were bare or covered with gravel. Minor ruts from vehicle traffic were observed on the crest between Cell S2 and the clearwater pond (Photo 7). The alignment of the top of the embankment appeared to vary, with visible elevation changes along the western embankment of the south pond in the vicinity of the clearwater pond and BBC&M boring B-0903 (Photo 15). Evidence of elevations less than the design elevation (693 feet) is noted in the topographic contours shown on Drawing No. 15-30011-0, dated September 22, 2006. According to AEP personnel, efforts to address the crest elevation have been ongoing. An elevation survey along the crest by a Professional Surveyor would be required to further evaluate the actual alignment of the top of the embankment and to determine current conditions.

2.1.2.3 Interior of Embankment (Photos 1, 2, 3, 5- 9, 21, 22, 23, 27)

The interior embankment slope generally appeared to be in good condition. As a result of the ash filling operations in the south pond, the volume of fly ash and water is variable and is not continuous during the year. As such, some vegetation has grown within the cells of the south pond (Photos 5-8, 21-23). Ash is periodically excavated from the south pond and relocated to the north pond, which is partially capped with cohesive materials, topsoil and grass. It is GZA's understanding, through interviews with AEP personnel, that operations at the PGS may be limited further than current levels or possibly ceased within 5 years.



Freeboard was not observed to be a concern during GZA's site visit based on the current operations. However, based on the information provided to GZA, freeboard could potentially be a concern in certain areas considering a maximum operating pool elevation of 688 feet and multiple areas of the crest shown with a 2006 elevation less than 693 feet (i.e., certain areas have less than 3 feet of freeboard at the maximum operating pool and less than the ODNR requirement of 5 feet). More recent topographical information was not available at the time of GZA's site visit.

According to AEP, the volume of material stored in the Ash Pond is variable, as ash is occasionally removed for beneficial reuse.

2.1.2.4 Appurtenant Structures (Photos 1, 2, 4, 5, 9-14, 16, 21-23)

There is one discharge structure associated with the Ash Pond. The concrete discharge structure is located in the clearwater pond located near the southwest portion of the pond (Photos 7, 9-14). Additionally, an outlet structure is located in Cell S3 of the south pond (Photos 2, 4, 23) and conveys water to the clearwater pond. Both of these structures were observed to be in good condition and clear of debris. The concrete visible above the water surface in the discharge structure appeared intact with minor surficial pitting or flaking/cracking. The interior of the concrete discharge structure could not be observed below the water level to evaluate sluice gates, piping or other features. The CMP discharge pipe associated with the concrete discharge structure is sub-grade and could not be visually inspected during the assessment. However, AEP reportedly has never had an issue with the discharge pipe since the Ash Pond was originally constructed. The terminus of the CMP was visible and was fitted with a duck-bill flap gate that appeared to be in good condition (Photo 16).

2.2 Caretaker Interview

Maintenance of the Ash Pond is the responsibility of AEP personnel. As detailed in previous sections, GZA met with AEP personnel and discussed the current operations and maintenance procedures, regulatory requirements, and the history of the Ash Pond since it was constructed.

2.3 Operation and Maintenance Procedures

As discussed in Section 1.2.5, AEP personnel are responsible for the regular operation and maintenance of the Ash Pond. AEP has developed internal inspection forms that are to be completed upon completion of the various inspections that are scheduled to be performed on a monthly, quarterly or bi-annual basis.

Routine maintenance procedures also include monitoring and sampling of the outfall from the clearwater pond in accordance with the existing NPDES permit (Outfall 601).

2.4 Emergency Action Plan

In accordance with Rules 1501:21-21-04 and 1501:21-15-07 of the Ohio Administrative Code (OAC), owners of Class I, Class II and Class III dams must prepare and maintain an emergency action plan (EAP). Further, Rule 1501:21-21-04 states the following: "The emergency action plan shall be updated on at least an annual basis including updating all emergency contact



information. The owner or the owner's representative shall meet with the local county emergency management director annually to review and update the plan. The owner shall annually submit to the division updated pages of the emergency action plan including a signature page from the county director indicating that the annual update meeting occurred and that the county director received a copy of the updated pages of the plan".

Review of AEP's EAP indicates that emergency detection, evaluation, classification, notification, contact information and procedures are addressed and provided in the plan.

2.5 Hydrologic/Hydraulic Data

GZA did not perform an independent assessment of the hydraulics and hydrology for the embankments, as this was beyond the scope of services. However, we did review available design documentation for the Ash Pond.

According to design drawings provided by AEP, the design crest elevation of the Ash Pond is 693 feet. The normal pool elevation varies, but the maximum operating pool elevation is documented as 688 feet. Subtracting the maximum pool elevation from the design crest elevation results in a theoretical freeboard of 5 feet. Actual crest elevations appear to vary however, and are as low as 690 feet (based on the available 2006 topographic data), which results in certain areas having freeboard less than the ODNR requirement of 5 feet. OAC Rule 1501:21-13-07 states that "For class I and class II dams that are upground reservoirs, the minimum elevation of the top of the dam shall be at least five feet higher than the elevation of the designed maximum operating pool level unless otherwise approved by the chief". According to ODNR representatives, AEP may request a variance to this rule that would decrease the minimum freeboard at this dam from 5 feet to 3 feet. More recent topographical information was not available at the time of GZA's site visit.

Additionally, GZA reviewed a Hydrology/Hydraulic report prepared by AEP and dated June 13, 2011¹⁰. The objective of this report was to "evaluate the hydraulic capacity of the diking system by analyzing the change in water surface elevation within [the] south ash pond during an extreme weather event". The design flood used in AEP's analysis was for a Class II structure, and was a 6-hour, 0.5 Probable Maximum Flood (PMF), which was generated from the 50 percent Probable Maximum Precipitation (PMP). According to AEP's evaluation, the maximum water surface elevation reached during the 50% PMF is 688.71 feet, when assuming a pool maximum operating pool elevation of 688 feet. This results in a potential pool elevation that is less than the documented crest elevations (approximately 690 to 693 feet) but also less than the ODNR requirement for freeboard (5 feet).

Based on the findings of their evaluation, AEP concluded that "the ash pond complex analysis has demonstrated that it is of adequate hydraulic capacity and storage. The ash pond complex can safely contain the design flood (50% PMF) without overtopping of the dike".

¹⁰ Hydrology/Hydraulic Report, Ash Pond Complex – File #9630-001, Picway Power Plant, prepared by AEP Civil Engineering Department, Geotechnical Engineering Section, June 13, 2011.

2.6 Structural and Seepage Stability

The original structural and seepage stability analyses, if any exist, were not available to GZA at the time of inspection. Slope stability analyses and seepage analyses have been performed recently in 2009 and are discussed above in Section 1.3.7. Foundation liquefaction analyses and settlement analyses reports were not available. The hydraulic conductivity of the earthfill materials was not available.



3.0 ASSESSMENTS AND RECOMMENDATIONS

3.1 Assessments

In general, based upon the information provided and our observations, the overall condition of PGS Ash Pond is judged to be **SATISFACTORY**.

The Ash Pond was found to have the following deficiencies:

1. Portions of the outer embankment slopes had not been mowed recently;
2. Presence of minor rodent burrows the exterior slopes of the embankments;
3. Presence of a bare area on the western exterior embankment of the south pond;
4. No instrumentation (i.e., staff gauge) to observe the elevation of the water within the pond/impoundment;
5. No instrumentation (i.e., survey/settlement monuments) to monitor crest elevations and/or embankment movement;
6. Bare areas, areas of limited vegetative growth or areas of gravel cover present on crest;
7. Presence of vegetation on the interior slopes of the embankment;
8. AEP personnel were unsure if the discharge pipe from the concrete discharge structure has been inspected internally since it was installed;
9. Visible variations in crest elevations, particularly along the west embankment of the south pond;
10. Minor ruts on crest from vehicle traffic;
11. Minor surficial pitting or flaking/cracking on the concrete discharge structure;
12. Reported crest and maximum pool elevations indicate potential for non-compliance with state freeboard requirement of five feet for Class II dams per OAC Rule 1501:21-13-07; and,
13. Presence of standing water at or near the toe of the exterior embankment slopes of the south pond, particularly near the southwest corner.

3.2 Studies and Analyses

The following recommendations and remedial measures generally describe the recommended approach to address current deficiencies. Prior to undertaking recommended maintenance, repairs, or remedial measures, the applicability of environmental permits needs to be determined for activities that may occur within resource areas under the jurisdiction of the appropriate regulatory agencies.

GZA recommends the following studies and analyses:



1. Survey of the crest of both ponds by a licensed Professional Surveyor to evaluate the current elevation profile of the crest and confirm that survey monuments are not moving horizontally;
2. Monitor the vertical alignment of the crest of the north embankment of the Ash Pond yearly for movement or signs of embankment instability. In the event that settlement monuments are installed and surveyed in the future, survey measurements should be taken along the crest of the north embankment to ensure that the crest elevation is uniform;
3. Evaluate freeboard conditions based on maximum pool elevation and more recent topographical data; and,
4. Provide or perform spillway analysis to demonstrate capacity of discharge structures to accommodate the regulatory Spillway Design Flood with the maximum pool freeboard.
5. Camera survey of the CMP outfall should be performed.

3.3 Recurrent Operation & Maintenance Recommendations

GZA recommends the following operation and maintenance level activities:

1. Frequent monitoring of steep slopes for evidence of sloughing or erosion that could lead to instability, movement or failure of the embankments;
2. Review emergency action plan annually per OAC Rule 1501:21-21-04 and update as applicable;
3. Clear vegetation from the interior embankment slopes;
4. Remove trees and resulting stumps on or near the exterior slopes of the embankment, particularly near the west embankment of the south pond, Outfall 601 and the northern end of the clearwater pond;
5. Continue to monitor and control rodent activities and repair burrows as they are discovered. Keeping the embankments mowed can help to reduce populations of certain species;
6. Maintain interior slopes of at least 2H:1V during ash excavation as recommended by BBC&M;
7. Install a staff gauge on or near the outlet structure in Cell S3 and on or near the concrete discharge structure in the clearwater pond in order to take periodic measurements of the Ash Pond water surface elevation;
8. Inspect each of the monitoring wells installed in 2009 and ensure each well has a cap, lockable protective cover/casing and is visible during mowing operations;
9. Perform periodic water level measurements in the monitoring wells to evaluate water levels below the crest and at the toe of the embankments; and,
10. If AEP has the opportunity to stop discharging from the clearwater pond for a limited time period, inspect the discharge pipe from the concrete discharge structure to the duck-bill flap gate to verify that the pipe is operating correctly and is in good condition. This may be performed by video photography.

3.4 Repair Recommendations

GZA recommends the following repairs which may improve the overall condition of the Ash Pond, but do not alter the current design of the embankment. The recommendations may require design by a licensed Professional Engineer and construction contractor experienced in embankment construction.



1. Minor concrete repair work on the concrete discharge structure in the clearwater pond;
2. Re-seed and/or over seed bare areas of the embankments and crest to establish healthy grass cover;
3. Clear the area of established vegetation near the lower portion and toe of the outer embankment slopes near the outfall structure; and,
4. Regrade areas near the toe of exterior slopes to facilitate proper drainage away from the embankments.

3.5 Alternatives

There are no practical alternatives to the repairs itemized above.

4.0 ENGINEER'S CERTIFICATION

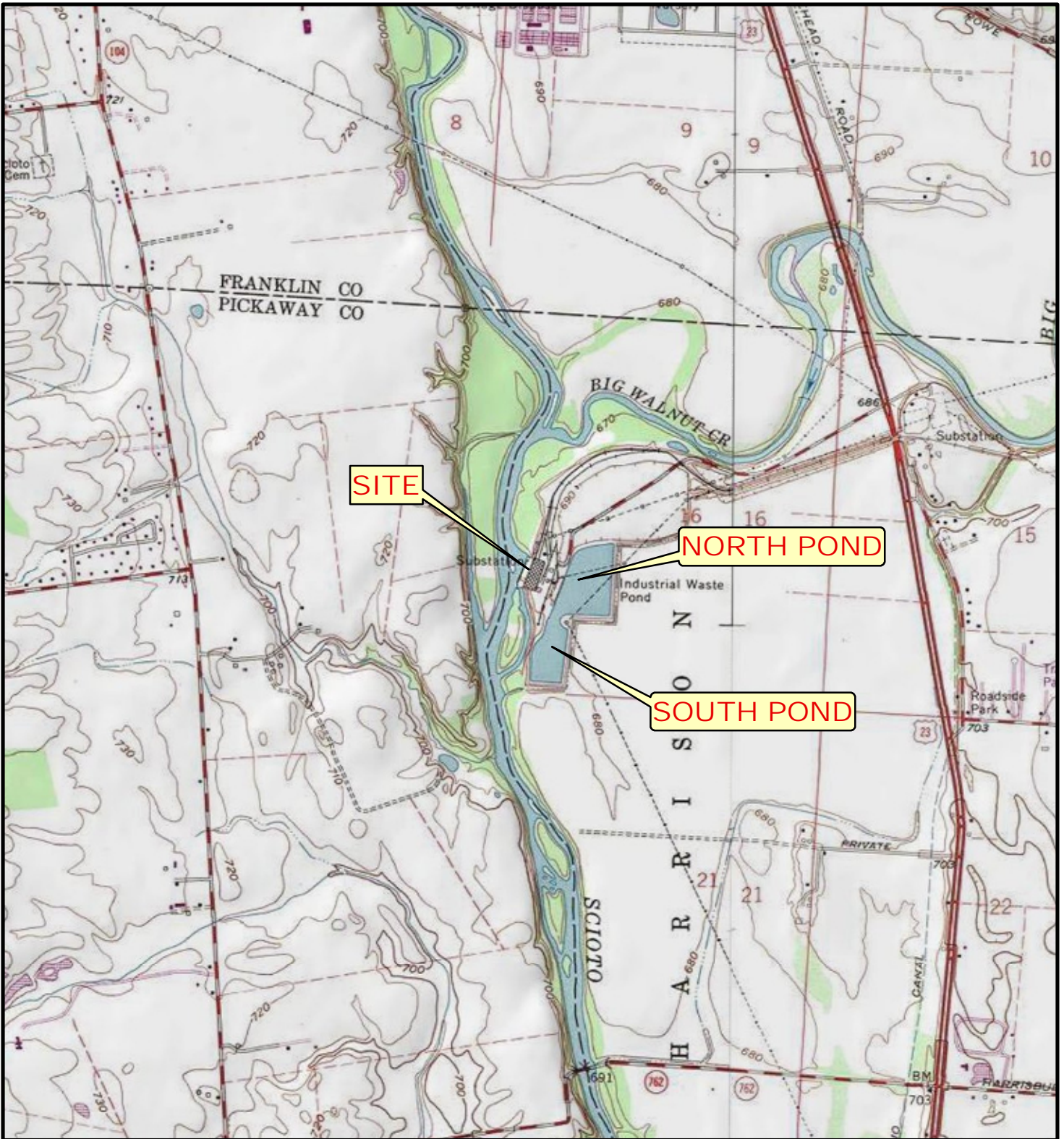
I acknowledge that the management units referenced herein, the Picway Generating Station Ash Pond, has been assessed to be in **SATISFACTORY** condition on June 9, 2011.

Frank Vetere, P.E.
Senior Project Manager

V:\01.xx Norwood\01.0170142.30 CCW Dams Round 10\AEP_Southern Picway\Report\AEP Southern Picway - Report_draft.docx




Figures



SOURCE : This map contains the ESRI ArcGIS Online World Topographic Map service, published February 2011 by ESRI ARCIMS Services. The service was compiled to uniform cartography using a variety of best available sources from several data providers.

Data Supplied by :



	PROJ. MGR.: MAV DESIGNED BY: MAV REVIEWED BY: PHB OPERATOR: EMD	LOCUS PLAN (USGS TOPOGRAPHIC QUAD)	JOB NO. 01.0170142.30
	DATE: 11-14-2011	PICWAY GENERATING STATION AMERICAN ELECTRIC POWER	FIGURE NO. 1



SOURCE : This map contains the ESRI ArcGIS Online World Imagery Map service, published February 2011 by ESRI ARCIMS Services. The service was compiled to uniform cartography using a variety of best available sources from several data providers.

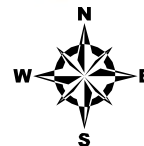
Data Supplied by :



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

SCALE IN FEET

DRAFT



PROJ. MGR.: MAV
DESIGNED BY: MAV
REVIEWED BY: PHB
OPERATOR: JRC

DATE: 11-14-2011

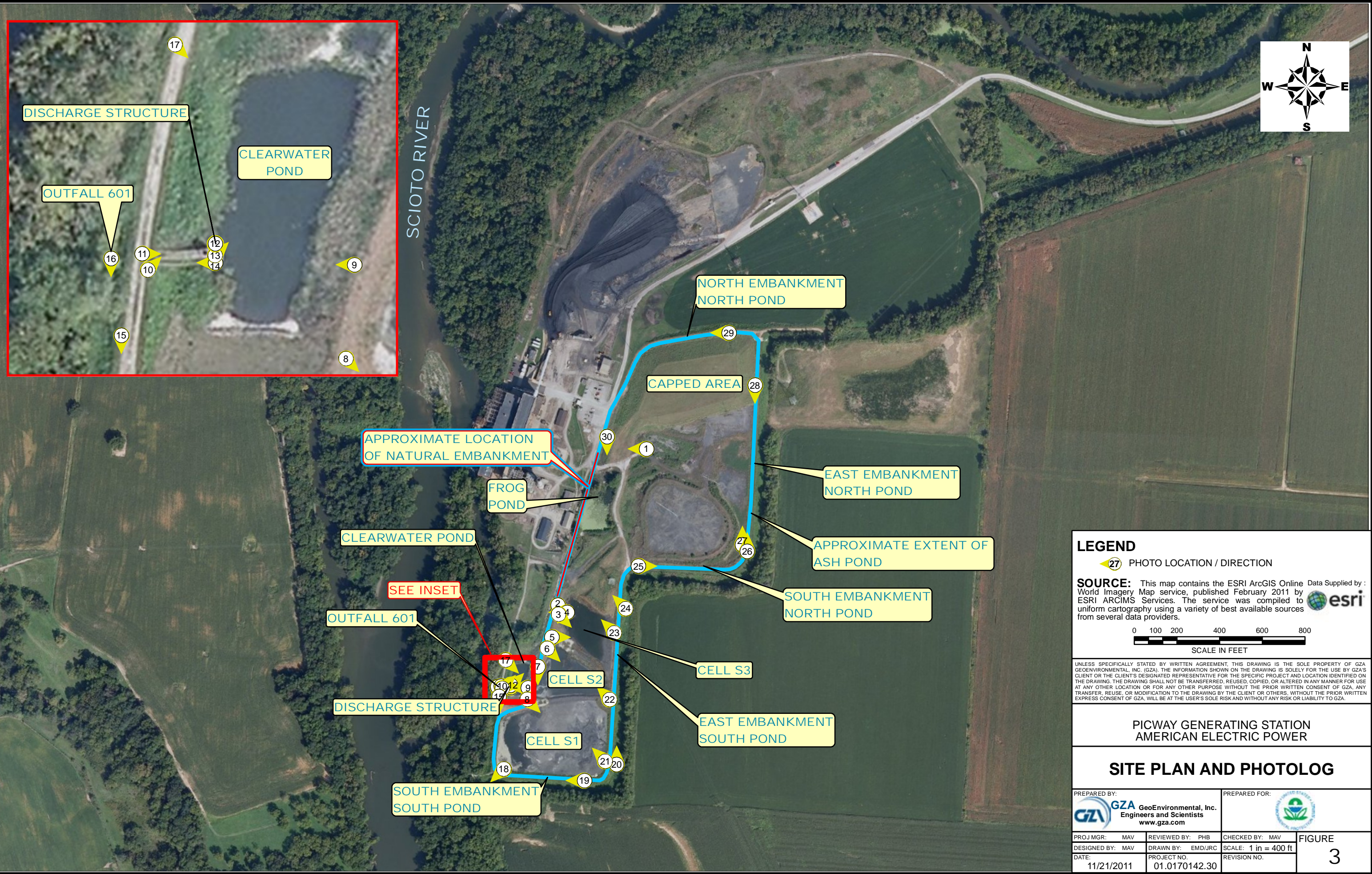
LOCUS PLAN
(DIGITAL ORTHOPHOTO/AERIAL IMAGERY)

PICWAY GENERATING STATION
AMERICAN ELECTRIC POWER

JOB NO.
01.0170142.30

FIGURE NO.
2

© 2011 - GZA GeoEnvironmental, Inc. - J:\170,000-179,999\170142\170142-30 Round 10\AEP Southern Picway Ashville, On\Figures\MXD\AEP Southern Picway_SitePlan-Photolog_FIG3.mxd, 11/21/2011, 1:19:33 PM, jonathan.coates



LEGEND
 27 PHOTO LOCATION / DIRECTION

SOURCE: This map contains the ESRI ArcGIS Online Data Supplied by : World Imagery Map service, published February 2011 by ESRI ARCSIMS Services. The service was compiled to uniform cartography using a variety of best available sources from several data providers.

0 100 200 400 600 800
 SCALE IN FEET

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PICWAY GENERATING STATION
 AMERICAN ELECTRIC POWER

SITE PLAN AND PHOTOLOG

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: 	
PROJ MGR: MAV	REVIEWED BY: PHB	CHECKED BY: MAV	FIGURE 3
DESIGNED BY: MAV	DRAWN BY: EMD/JRC	SCALE: 1 in = 400 ft	
DATE: 11/21/2011	PROJECT NO.: 01.0170142.30	REVISION NO.:	



Appendix A

Limitations

DAM ENGINEERING & VISUAL INSPECTION LIMITATIONS

1. The observations described in this report were made under the conditions stated herein. The conclusions presented in the report were based solely on the services described therein, and not on scientific tasks or procedures beyond the scope of described services or the time and budgetary constraints imposed by the United States Environmental Protection Agency (EPA).
2. In preparing this report, GZA GeoEnvironmental, Inc. (GZA) has relied on certain information provided by the Dayton Power and Light Company (DP&L) (and their affiliates) as well as Federal, state, and local officials and other parties referenced therein. GZA has also relied on certain information contained on the State of Ohio's website as well as Federal, state, and local officials and other parties which were available to GZA at the time of the inspection. Although there may have been some degree of overlap in the information provided by these various sources, GZA did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this work.
3. In reviewing this Report, it should be noted that the reported condition of the Ash Ponds is based on observations of field conditions during the course of this study along with data made available to GZA. The observations of conditions at the Ash Ponds reflect only the situation present at the specific moment in time the observations were made, under the specific conditions present. It may be necessary to reevaluate the recommendations of this report when subsequent phases of evaluation or repair and improvement provide more data.
4. It is important to note that the condition of a dam or embankment 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 dam or embankment will continue to represent the condition of the dam or embankment at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions may be detected.
5. Water level readings have been reviewed and interpretations have been made in the text of this report. Fluctuations in the level of the groundwater and surface water may occur due to variations in rainfall, temperature, and other factors different than at the time measurements were made.
6. GZA's comments on the history, hydrology, hydraulics, and embankment stability for the Ash Ponds are based on a limited review of available design documentation for the Killen Electric Generating Station. Calculations and computer modeling used in these analyses were not available and were not independently reviewed by GZA.
7. This report has been prepared for the exclusive use of EPA for specific application to the existing dam facilities, in accordance with generally accepted dam engineering practices. No other warranty, express or implied, is made.
8. This dam inspection verification report has been prepared for this project by GZA. This report is for broad evaluation and management purposes only and is not sufficient, in and of itself, to prepare construction documents or an accurate bid.
9. The Phase I investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.



Appendix B

Definitions

COMMON DAM SAFETY DEFINITIONS

For a comprehensive list of dam engineering terminology and definitions refer to references published by the U.S. Army Corps of Engineers, the Federal Energy Regulatory Commission, the Department of the Interior Bureau of Reclamation, or the Federal Emergency Management Agency.

Orientation

Upstream – Shall mean the side of the dam that borders the impoundment.

Downstream – Shall mean the high side of the dam, the side opposite the upstream side.

Right – Shall mean the area to the right when looking in the downstream direction.

Left – Shall mean the area to the left when looking in the downstream direction.

Dam Components

Dam – Shall mean any artificial barrier, including appurtenant works, which impounds or diverts water.

Embankment – Shall mean the fill material, usually earth or rock, placed with sloping sides, such that it forms a permanent barrier that impounds water.

Crest – Shall mean the top of the dam, usually provides a road or path across the dam.

Abutment – Shall mean that part of a valley side against which a dam is constructed. An artificial abutment is sometimes constructed as a concrete gravity section, to take the thrust of an arch dam where there is no suitable natural abutment.

Appurtenant Works – Shall mean structures, either in dams or separate there from, including but not be limited to, spillways; reservoirs and their rims; low level outlet works; and water conduits including tunnels, pipelines, or penstocks, either through the dams or their abutments.

Spillway – Shall mean a structure over or through which water flows are discharged. If the flow is controlled by gates or boards, it is a controlled spillway; if the fixed elevation of the spillway crest controls the level of the impoundment, it is an uncontrolled spillway.

General

EAP – Emergency Action Plan - Shall mean a predetermined plan of action to be taken to reduce the potential for property damage and/or loss of life in an area affected by an impending dam break.

O&M Manual – Operations and Maintenance Manual; Document identifying routine maintenance and operational procedures under normal and storm conditions.

Normal Pool – Shall mean the elevation of the impoundment during normal operating conditions.

Acre-foot – Shall mean a unit of volumetric measure that would cover one acre to a depth of one foot. It is equal to 43,560 cubic feet. One million U.S. gallons = 3.068 acre feet.

Height of Dam – Shall mean the vertical distance from the lowest portion of the natural ground, including any stream channel, along the downstream toe of the dam to the crest of the dam.

Spillway Design Flood (SDF) – Shall mean the flood used in the design of a dam and its appurtenant works particularly for sizing the spillway and outlet works, and for determining maximum temporary storage and height of dam requirements.

Condition Rating

SATISFACTORY - No existing or potential management unit safety deficiencies are recognized. Acceptable performance is expected under all applicable loading conditions (static, hydrologic, seismic) in accordance with the applicable criteria. Minor maintenance items may be required.

FAIR - Acceptable performance is expected under all required loading conditions (static, hydrologic, seismic) in accordance with the applicable safety regulatory criteria. Minor deficiencies may exist that require remedial action and/or secondary studies or investigations.

POOR - A management unit safety deficiency is recognized for any required loading condition (static, hydrologic, seismic) in accordance with the applicable dam safety regulatory criteria. Remedial action is necessary. POOR also applies when further critical studies or investigations are needed to identify any potential dam safety deficiencies.

UNSATISFACTORY - Considered unsafe. A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution. Reservoir restrictions may be necessary.

Hazard Potential

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

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

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

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.



Appendix C

Inspection Checklists



Site Name:	Picway Generating Station	Date:	June 9, 2011
Unit Name:	Ash Pond	Operator's Name:	AEP Ohio
Unit I.D.:	Ohio 9630-001; National # OH00570	Hazard Potential Classification: High Significant Low	
Inspector's Name: Frank Vetere, P.E. & Matt Vander Eide, P.G.			

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?	Quarterly		18. Sloughing or bulging on slopes?		✓
2. Pool elevation (operator records)?	Unavailable		19. Major erosion or slope deterioration?		✓
3. Decant inlet elevation (operator records)?	682 +/- feet		20. Decant Pipes:	[REDACTED]	
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		✓
5. Lowest dam crest elevation (operator records)?	690.0 feet		Is water exiting outlet, but not entering inlet?		✓
6. If instrumentation is present, are readings recorded (operator records)?	N/A		Is water exiting outlet flowing clear?	✓	
7. Is the embankment currently under construction?		✓	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):	[REDACTED]	
8. Foundation preparation (remove vegetation, stumps, topsoil in area where embankment fill will be placed)?	✓		From underdrain?	N/A	
9. Trees growing on embankment? (If so, indicate largest diameter below)	✓		At isolated points on embankment slopes?		✓
10. Cracks or scarps on crest?		✓	At natural hillside in the embankment area?		✓
11. Is there significant settlement along the crest?		✓	Over widespread areas?		✓
12. Are decant trashracks clear and in place?	✓		From downstream foundation area?		✓
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		✓	"Boils" beneath stream or ponded water?		✓
14. Clogged spillways, groin or diversion ditches?	N/A		Around the outside of the decant pipe?		✓
15. Are spillway or ditch linings deteriorated?	N/A		22. Surface movements in valley bottom or on hillside?	N/A	
16. Are outlets of decant or underdrains blocked?		✓	23. Water against downstream toe?	✓	
17. Cracks or scarps on slopes?		✓	24. Were Photos taken during the dam inspection?	✓	

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

Inspection Issue # Comments

The embankment comprised one unit but contained multiple "cells" which were separated by interior dikes. Additional comments corresponding to the checklist above are provided below:

- 2) The maximum operating elevation, or normal pool, is reportedly 688 feet. However, the plant does not operate continuously and the current pool elevation was not known during visit and varies depending on operations.
- 3) Decant inlet invert elevation is reported as 681 feet. Two stop logs were present and each appeared to be approximately 6-inches tall. Elevation of the top of the stop logs was estimated to be approximately 682 +/- feet.
- 5) Crest is reported as 693 feet in some documents including the but a cross section in a 2010 engineering report shows crest as low as 690 feet.
- 8) According to plant personnel, foundation preparation was performed.
- 9) Vegetation including small diameter trees (<2-inches) was present on downstream slope near the outlet structure in the "Clear Water Pond". The plant was actively cutting/mowing vegetation during site visit. Mature trees present around portions of the downstream perimeter of the embankment, but these trees were set back from the toe of the embankment.
- 23) Remnants of standing water observed against the downstream toe (east, south and west), reportedly due to excessive spring precipitation and resulting high Scioto River levels. Local soils are reportedly slow draining.

US EPA ARCHIVE DOCUMENT



Coal Combustion Waste (CCW) Impoundment Inspection

Impoundment NPDES Permit # OH0005398 INSPECTOR Frank Vetere, P.E. Matt Vander Eide, P.G.
Date June 9, 2011

Impoundment Name Picway Generating Station Ash Pond
Impoundment Company AEP Ohio (a.k.a Columbus & Southern Ohio Electric Co.)
EPA Region 5
State Agency (Field Office) Address 2045 Morse Road, Bldg. B-2 Columbus, Ohio 43229

Name of Impoundment Picway Generating Station Ash Pond
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New [x] Update

Is impoundment currently under construction? Yes No
Is water or ccw currently being pumped into the impoundment? X

IMPOUNDMENT FUNCTION: Storage of bottom and fly ash sluice

Nearest Downstream Town: Name Circleville, OH

Distance from the impoundment 13.25 miles

Impoundment

Location: Longitude 83 Degrees 0 Minutes 34 Seconds
Latitude 39 Degrees 47 Minutes 21 Seconds
State OH County Pickaway

Does a state agency regulate this impoundment? YES [x] NO

If So Which State Agency? Ohio DNR Division of Water I.D. 9630-001

US EPA ARCHIVE DOCUMENT

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

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

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

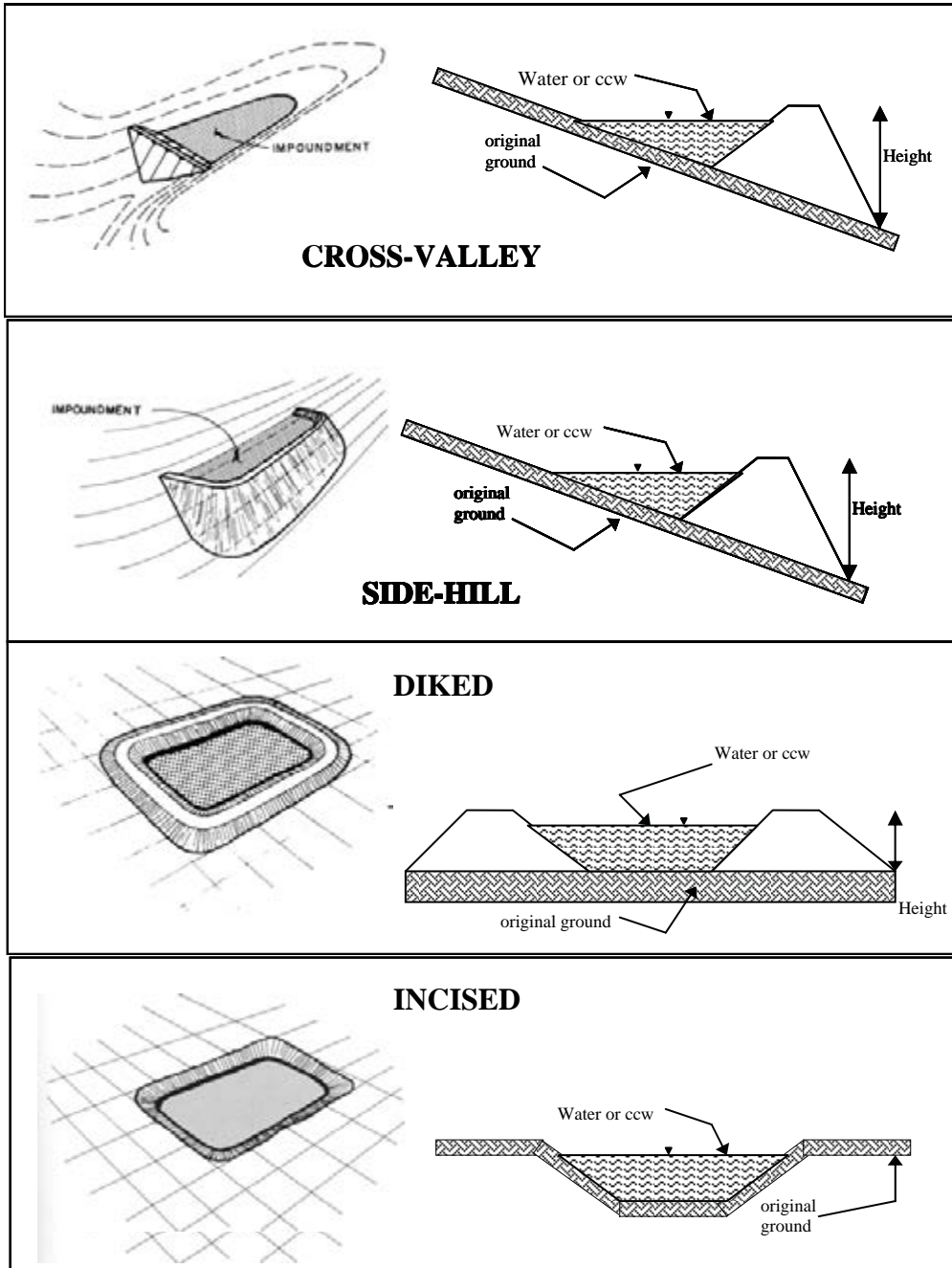
^x _____ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.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

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

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

Dam failure or misoperation would result in no probable loss of human life but could cause economic loss, environmental damage, damage of lifeline facilities (plant) or could impact other concerns. The losses would be primarily limited to the owner's property, but the Scioto River is located to the west of the western dike.

CONFIGURATION:



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

Embankment Height 24 feet Embankment Material Compacted clay
 Pool Area 26 acres Liner Compacted clay
 Current Freeboard >5 feet Liner Permeability unknown

TYPE OF OUTLET (Mark all that apply)

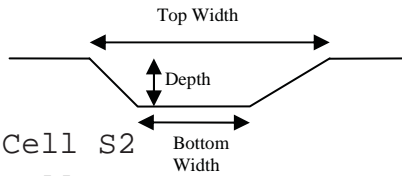
Open Channel Spillway

- (2) Trapezoidal
- Triangular
- Rectangular
- Irregular

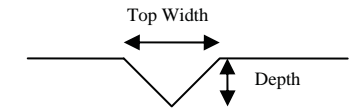
1. Cell S1 to Cell S2
2. Cell S2 to Cell S3

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

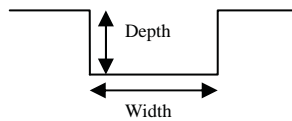
TRAPEZOIDAL



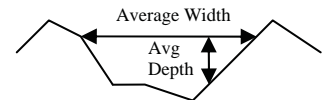
TRIANGULAR



RECTANGULAR



IRREGULAR

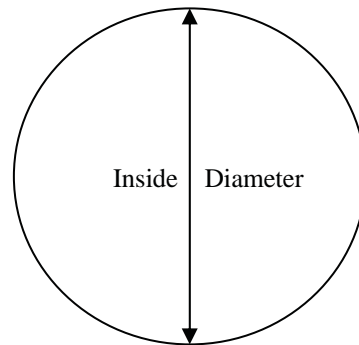


Outlet (from "Clear Water Pond" to canal that drains to Scioto River)

36 in inside diameter

Material

- corrugated metal (with duckbill valve
- welded steel at outlet)
- concrete
- plastic (hdpe, pvc, etc.)
- other (specify) _____



Is water flowing through the outlet? YES NO

No Outlet

Other Type of Outlet (specify) 30-inch corrugated metal pipe decants from Cell S3 to "Clear Water Pond"

The Impoundment was Designed By Columbus & Southern Ohio Electric Co.



Appendix D

Photographs



Client Name: U.S. Environmental Protection Agency

Site Location: American Electric Power (AEP) Picway Generating Station Lockbourne, Ohio

Project No. 01.0170142.30

Photo No. 1

Date: 06/09/11

Direction Photo Taken: West

Description:

Discharge pipe conveying bottom ash into the north pond. Picway Plant is shown in the background.



Photo No. 2

Date: 06/09/11

Direction Photo Taken: South

Description:

Outlet structure located in Cell S3 of south pond.






Client Name: U.S. Environmental Protection Agency		Site Location: American Electric Power (AEP) Picway Generating Station Lockbourne, Ohio	Project No. 01.0170142.30
Photo No. 3	Date: 06/09/11	 <p>06/09/2011</p>	
Direction Photo Taken: Southeast			
Description: View of Cell S3 in south pond.			

Photo No. 4	Date: 06/09/11	 <p>06/09/2011</p>	
Direction Photo Taken: West			
Description: View of outlet structure located in Cell S3 of south pond.			



Client Name: U.S. Environmental Protection Agency

Site Location: American Electric Power (AEP)
Picway Generating Station
Lockbourne, Ohio

Project No.
01.0170142.30

Photo No.
5

Date:
06/09/11

Direction Photo Taken:
East

Description:
View of rock berm separating Cell S2 (right) from Cell S3 (left).



Photo No.
6

Date:
06/09/11

Direction Photo Taken:
Southeast

Description:
View of Cell S2 of south pond.





Client Name: U.S. Environmental Protection Agency

Site Location: American Electric Power (AEP)
Picway Generating Station
Lockbourne, Ohio

Project No.
01.0170142.30

Photo No.
7

Date:
06/09/11

Direction Photo Taken:
South

Description:

View of berm dividing Cell S2 (left) from clearwater pond (right). Note concrete discharge structure in clearwater pond.



Photo No.
8

Date:
06/09/11

Direction Photo Taken:
Southeast

Description:

View of Cell S1 in south pond.





Client Name: U.S. Environmental Protection Agency

Site Location: American Electric Power (AEP)
Picway Generating Station
Lockbourne, Ohio

Project No.
01.0170142.30

Photo No.
9

Date:
06/09/11

Direction Photo Taken:
Southwest

Description:

View of concrete discharge structure in clearwater pond.



Photo No.
10

Date:
06/09/11

Direction Photo Taken:
Northeast

Description:

View of concrete discharge structure in clearwater pond.





Client Name: U.S. Environmental Protection Agency

Site Location: American Electric Power (AEP)
Picway Generating Station
Lockbourne, Ohio

Project No.
01.0170142.30

Photo No.
11

Date:
06/09/11

Direction Photo Taken:
East

Description:

View of access ramp to concrete discharge structure in clearwater pond .



Photo No.
12

Date:
06/09/11

Direction Photo Taken:
Not Applicable

Description:

View of interior of concrete discharge structure in clearwater pond.





Client Name: U.S. Environmental Protection Agency

Site Location: American Electric Power (AEP)
Picway Generating Station
Lockbourne, Ohio

Project No.
01.0170142.30

Photo No.
13

Date:
06/09/11

Direction Photo Taken:
Northeast

Description:

View of skimmer preceding inlet of concrete discharge structure in clearwater pond.



Photo No.
14

Date:
06/09/11

Direction Photo Taken:
West

Description:

View of screen located on concrete discharge structure in clearwater pond. Screen is positioned after the skimmer shown in photo 13 and precedes the inlet.






Client Name: U.S. Environmental Protection Agency		Site Location: American Electric Power (AEP) Picway Generating Station Lockbourne, Ohio	Project No. 01.0170142.30
Photo No. 15	Date: 06/09/11		
Direction Photo Taken: South			
Description: View of west embankment of the south pond in vicinity of concrete discharge structure in clearwater pond and vicinity of boring B-0903 performed by BBC&M in August 2009. Note variable elevation of crest			

Photo No. 16	Date: 06/09/11		
Direction Photo Taken: South			
Description: View of duck-bill flap gate outfall (Outfall 601 in NPDES permit). Water discharges from clearwater pond to a canal that ultimately discharge into the Scioto River.			



Client Name: U.S. Environmental Protection Agency

Site Location: American Electric Power (AEP)
Picway Generating Station
Lockbourne, Ohio

Project No.
01.0170142.30

Photo No.
17

Date:
06/09/11

Direction Photo Taken:
Southeast

Description:

Area of outer west embankment observed to be bare of vegetation. Note hand rail of concrete discharge structure in background for reference point (circled).



Photo No.
18

Date:
06/09/11

Direction Photo Taken:
Southwest

Description:

Area of standing water at the toe of the southwest corner of the outer south embankment of the south pond.






Client Name: U.S. Environmental Protection Agency		Site Location: American Electric Power (AEP) Picway Generating Station Lockbourne, Ohio	Project No. 01.0170142.30
Photo No. 19	Date: 06/09/11		
Direction Photo Taken: West			
Description: View of outer south embankment of south pond. Photo taken near the southeast corner of the south pond.			

Photo No. 20	Date: 06/09/11		
Direction Photo Taken: North			
Description: View of outer east embankment of south pond. Photo taken near the southeast corner of the south pond. Picway Plant stack is shown in background.			



Client Name: U.S. Environmental Protection Agency

Site Location: American Electric Power (AEP) Picway Generating Station Lockbourne, Ohio

Project No. 01.0170142.30

Photo No. 21

Date: 06/09/11

Direction Photo Taken: Northwest

Description:

View of Cell S1 of the south pond and fly ash slurry pipeline. Picway Plant is shown in the background.



Photo No. 22

Date: 06/09/11

Direction Photo Taken: Northwest

Description:

View of Cell S2 of the south pond and fly ash slurry pipeline. Picway Plant is shown in the background. Cell S2 was the active cell during the June 9, 2011 site visit.





Client Name: U.S. Environmental Protection Agency

Site Location: American Electric Power (AEP) Picway Generating Station Lockbourne, Ohio

Project No. 01.0170142.30

Photo No. 23

Date: 06/09/11

Direction Photo Taken: Northwest

Description:

View of Cell S3 of the south pond. Picway Plant and outlet structure (circled) are shown in the background.



Photo No. 24

Date: 06/09/11

Direction Photo Taken: Northwest

Description:

View of rip rap placed on the outer east embankment to address isolated area of erosion.






Client Name: U.S. Environmental Protection Agency		Site Location: American Electric Power (AEP) Picway Generating Station Lockbourne, Ohio	Project No. 01.0170142.30
Photo No. 25	Date: 06/09/11		
Direction Photo Taken: East-Southeast			
Description: View of crest and outer south embankment of the north pond. Note un-mowed vegetation.			

Photo No. 26	Date: 06/09/11	
Direction Photo Taken: North		
Description: View of outer east embankment of the north pond. Note un-mowed vegetation.		




Client Name: U.S. Environmental Protection Agency		Site Location: American Electric Power (AEP) Picway Generating Station Lockbourne, Ohio		Project No. 01.0170142.30
Photo No. 27	Date: 06/09/11			
Direction Photo Taken: North				
Description: View of crest of east embankment of the north pond. Note un-mowed vegetation on outer embankment and capped portion of north pond in left background.				

Photo No. 28	Date: 06/09/11			
Direction Photo Taken: South				
Description: View of crest of east embankment of the north pond. Note capped portion of north pond to right.				




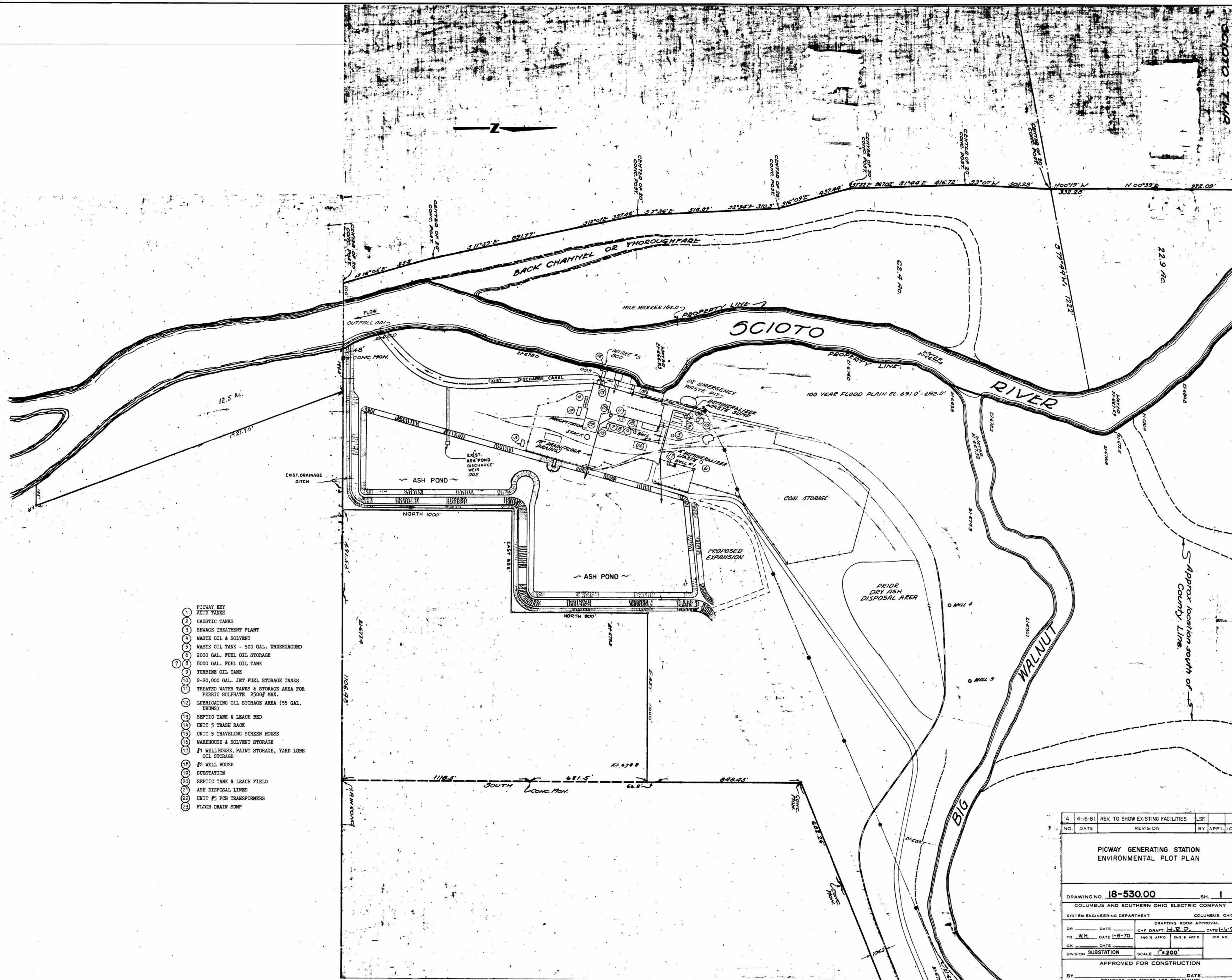
Client Name: U.S. Environmental Protection Agency		Site Location: American Electric Power (AEP) Picway Generating Station Lockbourne, Ohio	Project No. 01.0170142.30
Photo No. 29	Date: 06/09/11		
Direction Photo Taken: West			
Description: View of crest of north embankment of the north pond. Note capped portion of north pond to left and Picway Plant in the background.			

Photo No. 30	Date: 06/09/11		
Direction Photo Taken: South			
Description: View of crest of west embankment of the north pond. Note capped portion of north pond to left.			



Appendix E

Selected Engineering Drawings Provided by AEP



- FLOW KEY**
- 1 ACID TANKS
 - 2 CAUSTIC TANKS
 - 3 SEWAGE TREATMENT PLANT
 - 4 WASTE OIL & SOLVENT
 - 5 WASTE OIL TANK - 500 GAL. UNDERGROUND
 - 6 2000 GAL. FUEL OIL STORAGE
 - 7 8000 GAL. FUEL OIL TANK
 - 8 TURBINE OIL TANK
 - 9 2-20,000 GAL. JET FUEL STORAGE TANKS
 - 10 TREATED WATER TANKS & STORAGE AREA FOR FERRIC SULPHATE 2500# MAX.
 - 11 LUBRICATING OIL STORAGE AREA (55 GAL. DRUMS)
 - 12 SEPTIC TANK & LEACH BED
 - 13 UNIT 5 TRASH RACK
 - 14 UNIT 5 TRAVELING SCREEN HOUSE
 - 15 WAREHOUSE & SOLVENT STORAGE
 - 16 #1 WELL HOUSE, PAINT STORAGE, YARD LUBE OIL STORAGE
 - 17 #2 WELL HOUSE
 - 18 SUBSTATION
 - 19 SEPTIC TANK & LEACH FIELD
 - 20 ASH DISPOSAL LINES
 - 21 UNIT #5 PCB TRANSFORMERS
 - 22 FLOOR DRAIN SUMP

A	4-16-81	REV. TO SHOW EXISTING FACILITIES	LSF
NO.	DATE	REVISION	BY APPL. JOB
PICWAY GENERATING STATION ENVIRONMENTAL PLOT PLAN			
DRAWING NO. 18-530.00 SH. 1			
COLUMBUS AND SOUTHERN OHIO ELECTRIC COMPANY			
SYSTEM ENGINEERING DEPARTMENT		COLUMBUS, OHIO	
DR.	DATE	CHF. DRAFT	DRAFTING ROOM APPROVAL
TR.	DATE	ENG.'S APP'D	DATE
CK.	DATE	ENG.'S APP'D	JOB NO.
DIVISION SUBSTATION		SCALE 1" = 200'	
APPROVED FOR CONSTRUCTION			
BY	DATE	DRAWINGS NOT SIGNED ARE PRELIMINARY	



LEGEND - EXISTING

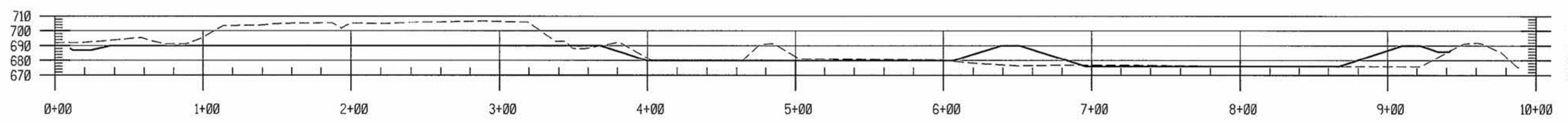
- SPOT ELEVATION
- INTERMEDIATE CONTOUR
- INDEX CONTOUR
- DEPRESSION CONTOUR
- TREES AND TREELINE
- STRUCTURE AND BUILDING
- FENCE
- POLE
- ROADS
- EDGE OF WATER
- MANHOLES / CATCH BASIN
- POWER POLE
- PIPES
- TOWER

LEGEND - PROPOSED

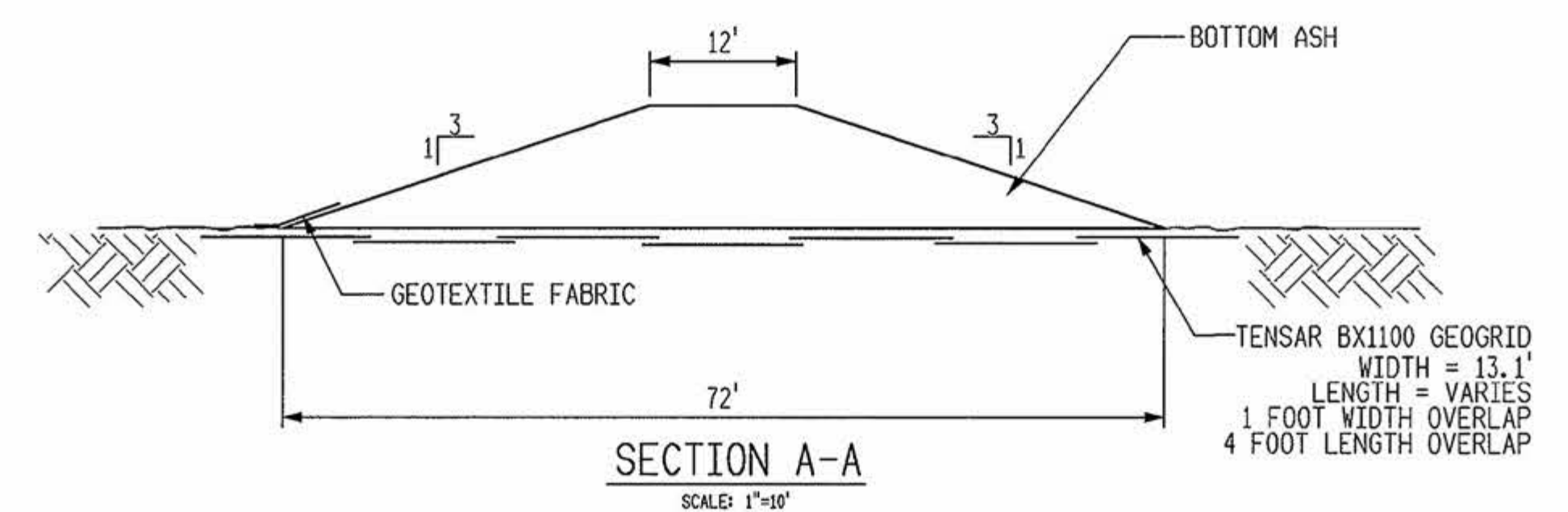
- 700 INDEX CONTOUR
- INTERMEDIATE CONTOUR

REFERENCE DRAWINGS

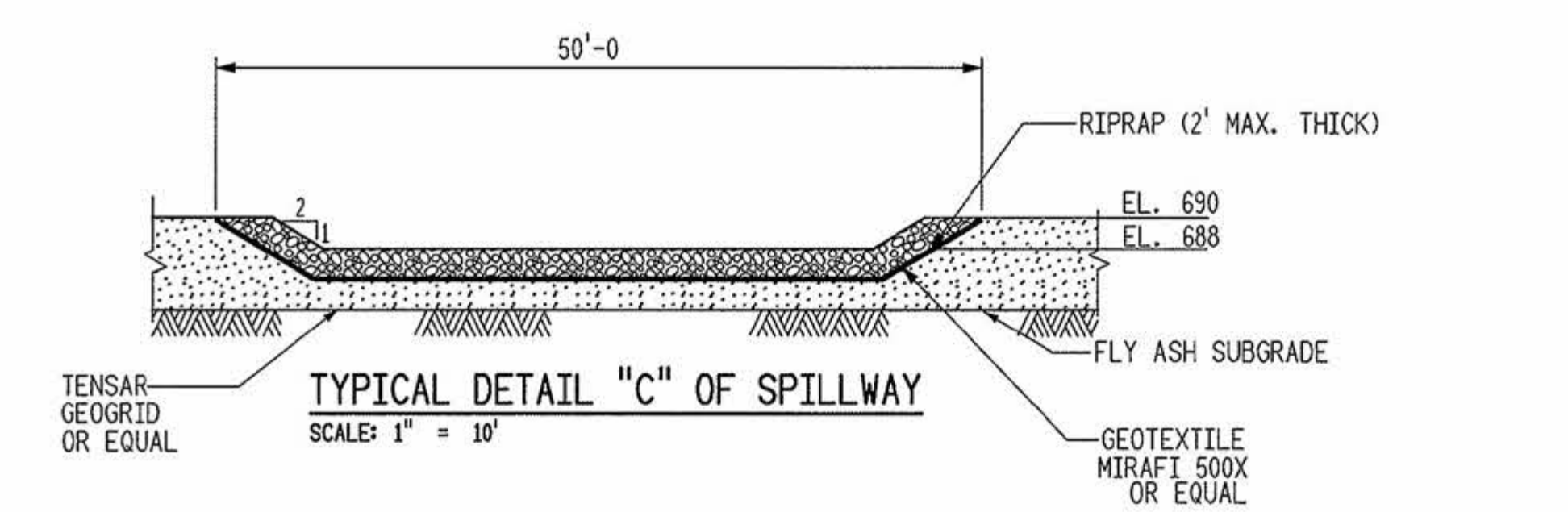
- 15-30003 - FINAL GRADING PLAN
- 15-30006 - NORTH PROFILES FILL
- 15-30010 - NORTH AND SOUTH FILL DITCH VERTICAL PROFILES



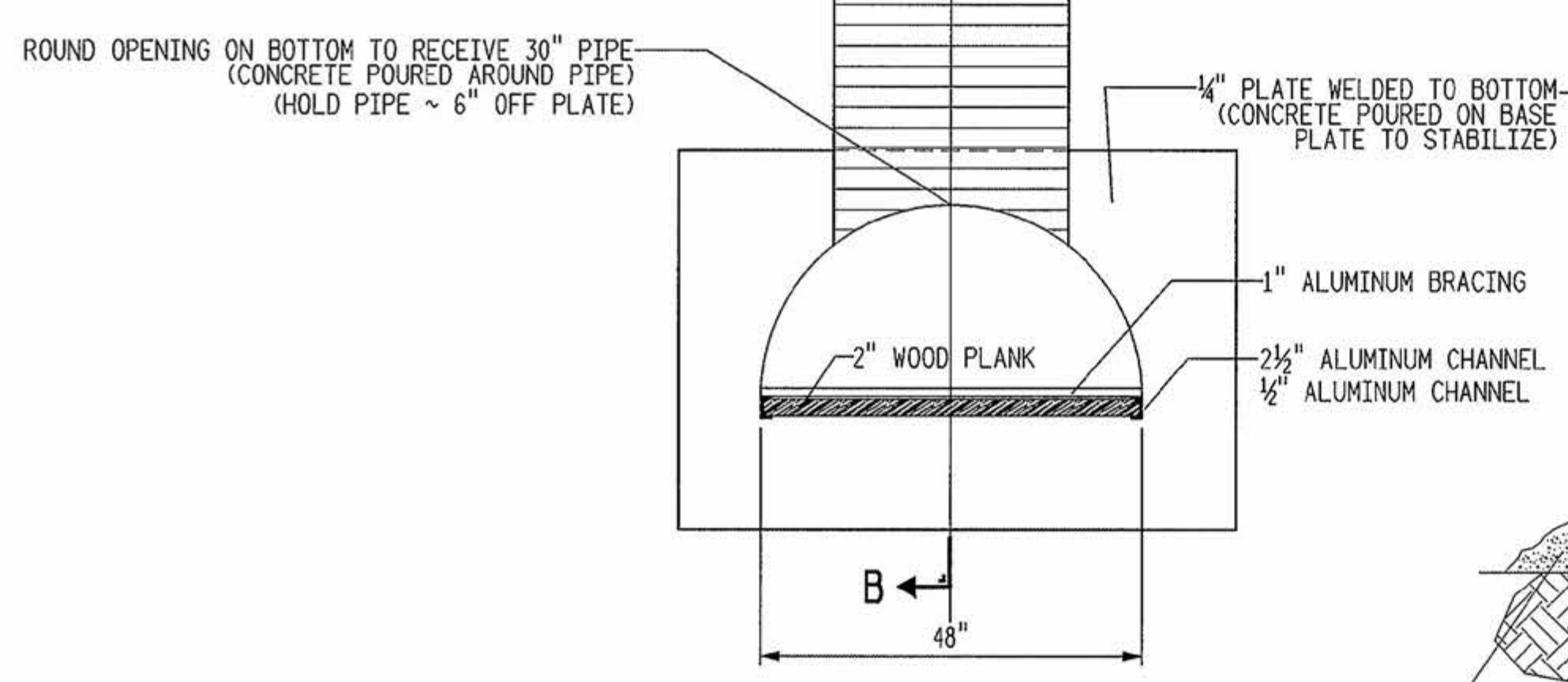
SECTION X-X
SCALE: 1"=10'



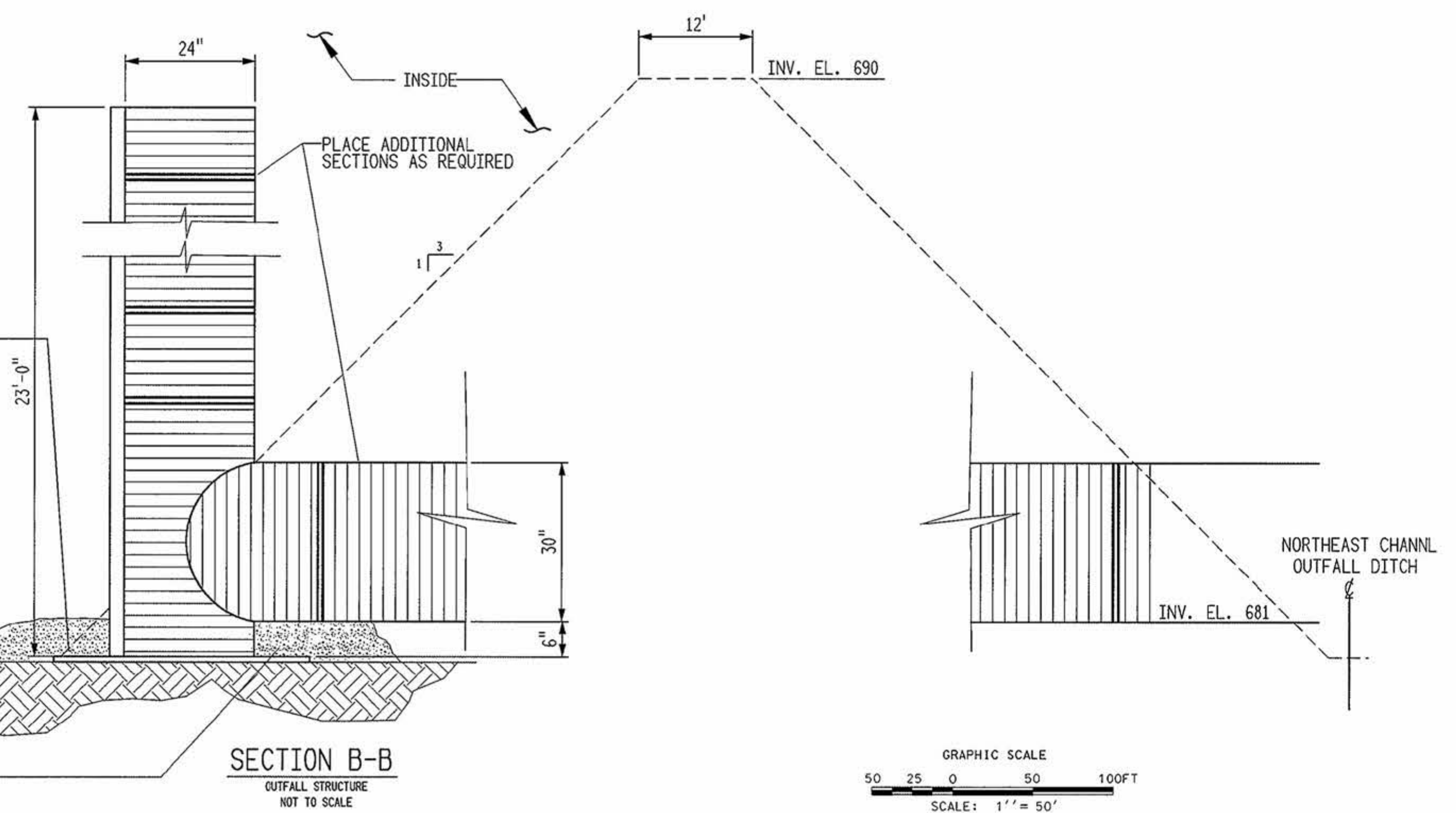
SECTION A-A
SCALE: 1"=10'



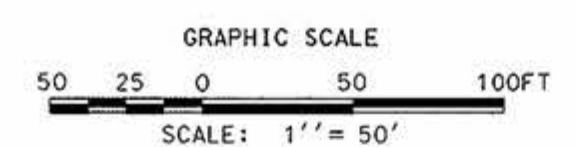
TYPICAL DETAIL "C" OF SPILLWAY
SCALE: 1" = 10'



PLAN VIEW
OUTFALL STRUCTURE
NOT TO SCALE



SECTION B-B
OUTFALL STRUCTURE
NOT TO SCALE



0	PRELIMINARY FOR COMMENTS	
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DATE	NO.	DESCRIPTION	APPROV.

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COLUMBUS SOUTHERN POWER CO.
PICWAY PLANT
LOCKBOURNE OHIO

PHASE II
SOUTH FILL
STAGE 1 CONSTRUCTION

DWG. NO. 15-30011-0

SCALE: 1"=50'
CIVIL ENGINEERING
DATE: 12/16/06

AEP SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OH 43215