DRAFT

DRAFT REPORT
ROUND 10 DAM ASSESSMENT
DAYTON POWER AND LIGHT COMPANY
KILLEN ELECTRIC GENERATING STATION
BOTTOM ASH POND AND FLY ASH POND

PREPARED FOR:

U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

PREPARED BY:

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GZA File No. 01.0170142.30

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March 12, 2012
File No. 01.0170142.30

Mr. Stephen Hoffman
U. S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: Round 10 Dam Assessment - Draft Report
EPA Contract No. EP10W001313
Dayton Power and Light Company – Killen Electric Generating Station
Bottom Ash Pond and Fly Ash Pond
Manchester, Ohio

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 Dayton Power and Light Company (DP&L) Killen Electric Generating Station (KEGS, Site) Bottom Ash Pond and Fly Ash Pond located in Manchester, Ohio. The Site visit was conducted on June 7, 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.

In GZA's professional opinion, the KEGS Bottom Ash Pond and Fly Ash Pond embankments appear to be sound and no immediate remedial action appears to be necessary, based upon the information provided and our observations. However, based on EPA's inspection criteria, the overall condition of both the KEGS Bottom Ash Pond and Fly Ash Pond is judged to be **POOR** because no geotechnical computations were made available to GZA for review. Thus, the stability of the embankments could not be independently verified**.** 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,

GZA GEOENVIRONMENTAL, INC.

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EXECUTIVE SUMMARY

This Inspection Report presents the results of a visual inspection of the Dayton Power and Light (DP&L, Owner) Killen Electric Generating Station (KEGS, Site) Bottom Ash Pond and Fly Ash Pond located in Manchester, Ohio. The visual inspection was performed on June 7, 2011 by representatives of GZA GeoEnvironmental, Inc (GZA), accompanied by representatives of DP&L and the Ohio Department of Natural Resources (ODNR).

Based on the maximum height of 58 feet and a storage volume of approximately 2,090 acre-feet (at the maximum elevation of approximately 573 feet NGVD 29), the Bottom Ash Pond is classified as an **Intermediate** sized structure. Based on the maximum height of 77 feet and a storage volume of approximately 11,350 acre-feet (at the maximum elevation of approximately 573 feet), the Fly Ash Pond is classified as an **Intermediate** sized structure. Size classifications are based on U.S. Army Corps of Engineers (COE) guidelines. The ODNR considers the Bottom Ash Pond and Fly Ash Pond to be one unit, and has assigned a classification of "Class I" based on height (greater than 60 feet) and storage capacity (greater than 5,000 acre-feet).

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 both the Bottom Ash Pond and Fly Ash Pond would be considered as having a **High** hazard potential. In addition to the potential for economic loss, environmental damage, damage of lifeline facilities (power plant, US 52 etc.) and impact to other concerns including the Ohio River, GZA's opinion as to the hazard potential rating is based on the possibility that loss of human life would occur as a result of failure or misoperation of the ponds, particularly given the proximity of the ponds to the power plant. The ODNR considers the Bottom Ash Pond and Fly Ash Pond to be one unit and has assigned a hazard classification of "Class II", but has assigned an overall (combined size, storage and hazard) "Class I" designation to the ponds.

In GZA's professional opinion, the KEGS Bottom Ash Pond and Fly Ash Pond embankments appear to be sound and no immediate remedial action appears to be necessary, based upon the information provided and our observations. However, based on EPA's inspection criteria, the overall condition of both the KEGS Bottom Ash Pond and Fly Ash Pond is judged to be **POOR** because no geotechnical computations were made available to GZA for review. Thus, the stability of the embankments could not be independently verified**.** Based on the results of the visual inspection, discussions with DP&L personnel, and a review of available design documentation, the following deficiencies were noted:

The Bottom Ash Pond was found to have the following deficiencies:

1. Portions of the outer embankment slopes had not been mowed recently;
2. No instrumentation (i.e., staff gauge) to observe the elevation of the water within the pond/impoundment;
3. Presence of undersized rip rap on portions of the interior embankment;
4. Presence of vegetation on the interior slope of the embankment;
5. Timber from recent vegetation clearing near Station 3+00 remains on the outer embankments slope;
6. DP&L personnel were unsure if the discharge pipes from the pump station inlet structure to the ash water pumps have been inspected internally since they were installed;

7. Limited freeboard in the vicinity of Station 3+00 to 5+00; and,
8. Reported crest and normal pool elevations indicate potential for non-compliance with state freeboard requirement of five feet for Class I dams.

The Fly Ash Pond was found to have the following deficiencies:

1. With the exception of the upper 20 to 30 feet, a majority of the outer embankment slopes had not been mowed recently;
2. Presence of undersized rip rap on portions of the interior embankment;
3. Apparent benching of the interior embankments slopes in the vicinity of Station 60+00;
4. Presence of vegetation on the interior slope of the embankment;
5. Presence of wet areas at or near the toe of the outer embankment slopes between Stations 36+00 to 39+00 and in the vicinity of Stations 80+00 and 88+00;
6. DP&L personnel were unsure if the discharge pipes from the decant structure to the outfall have been inspected internally since they were installed;
7. Reported crest and normal pool elevations indicate potential for non-compliance with state freeboard requirement of five feet for Class I dams; and,
9. Presence of established vegetation near the lower portion and toe of the outer embankment slopes near the outfall structure.

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. Install piezometers/observation wells in the noted wet areas (between Stations 36+00 to 39+00 and in the vicinity of Stations 80+00 and 88+00) to evaluate water levels, and possibly water chemistry, in these areas. This activity may require consultation and/or design by a licensed Professional Engineer;
3. Based on data from piezometers/observation wells, perform a seepage an analysis and assess need for subsurface toe drainage in wet locations and make improvements as needed;
4. Resolve pending variance with ODNR regarding reducing the minimum freeboard requirement from five feet to three feet;
5. Provide or perform spillway analysis to demonstrate capacity of discharge structures to accommodate the regulatory Spillway Design Flood with the proposed normal pool freeboard; and,
6. Provide or perform a slope stability analysis for the embankments. Analysis should include assessment of upstream slope stability in light of observed movement of riprap. Analysis may require a subsurface exploration program to develop appropriate input data. Most recent inspection should be provided to the EPA for review.

Operation & Maintenance Activities:

1. Clear vegetation from the interior embankment slopes of both ponds;
2. Remove stumps that are 4-inches or more in diameter resulting from the removal of trees and brush on the outer embankment near Station 3+00;

3. Install a staff gauge on or near the pump station inlet structure in order to take periodic measurements of the Bottom Ash Pond water surface elevation;
4. Inspect each of the piezometers around the toe of the pond embankments and ensure each piezometers has a cap, lockable protective cover/casing and is visible during mowing operations;
5. Ensure each survey monument is protected and is visible during mowing operations;
6. If DP&L has the opportunity to stop discharging from the Bottom Ash Pond for a limited time period, inspect the discharge pipes from the pump station inlet structure to the ash water pumps to verify that they are operating correctly and are in good condition. This may be performed by video photography; and,
7. If DP&L has the opportunity to stop discharging from the Fly Ash Pond for a limited time period, inspect the discharge pipes from the decant structure to the outfall structure to verify that they are operating correctly and are in good condition. This may be performed by video photography.

Repair Recommendations:

1. Clear the area of established vegetation near the lower portion and toe of the outer embankment slopes near the outfall structure; and,
2. Restore riprap in sections where displacement has occurred.

PREFACE

The assessment of the general condition of the embankments at the Dayton Power and Light Company's Killen Electric 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 embankment 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 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 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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BOTTOM ASH POND AND FLY ASH POND
THE DAYTON POWER AND LIGHT COMPANY
KILLEN ELECTRIC GENERATING STATION
MANCHESTER, OHIO

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APPENDICES

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 The Dayton Power and Light Company (DP&L, Owner) Killen Electric Generating Station (KEGS, Site) Bottom Ash Pond and Fly Ash Pond in Manchester, 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 Safety[1]. 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 Impoundments 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 Killen Electric Generating Station (KEGS) is located approximately 7 miles east of the city of Manchester, Ohio, along the shore of the Ohio River, at the address 14869 US 52, Manchester, Ohio 45144. The KEGS Bottom Ash Pond is located approximately 1,650 feet southeast of the KEGS at latitude 38˚ 41' 22" North and longitude 83˚ 28' 14" West. The KEGS Fly Ash Pond is located approximately 3,100 feet southeast of the KEGS at latitude 38˚ 41' 01" North and longitude 83˚ 28' 14" West. A Site locus of the Bottom Ash Pond, the Fly Ash Pond and surrounding area is shown on **Figure 1**. An aerial photograph of the Bottom Ash Pond, Fly Ash Pond and surrounding area is provided as **Figure 2**. The Bottom Ash Pond and Fly Ash Pond can be accessed by vehicles from a service road leading from the KEGS that leads to an access road on the crest of each embankment.

1.2.2 Owner/Caretaker

The KEGS is owned (67%) and operated by DP&L of Dayton, Ohio. The KEGS is also owned (33%) by Cincinnati Gas & Electric Company, a subsidiary of Duke Energy.

	Dam Owner/Caretaker
Name	The Dayton Power and Light Company, Killen Electric Generating Station
Mailing Address	14869 US 52
City, State, Zip	Manchester, Ohio 45144
Contact	John Hendrix, PE
Title	Project Manager
E-Mail	john.hendrix@dplinc.com
Phone Number	937-549-2641

1.2.3 Purpose of the Ponds

The KEGS is a one unit coal-fired power plant with a maximum generating capacity of approximately 600 megawatts. Commercial operation of the KEGS facility began in June 30, 1982. The Bottom Ash Pond and Fly Ash Pond were constructed in conjunction with the KEGS facility for the purpose of storing and disposing coal combustion byproducts. Wastewater discharged from the Bottom Ash Pond and the Fly Ash Pond is regulated under a National Pollution Discharge Elimination System (NPDES) permit[2] issued by the Ohio Environmental Protection Agency (OEPA).

The Bottom Ash Pond was constructed for the purpose of storing and disposing plant wastewater, cooling tower blow-down, bottom ash sluice water, and excess stormwater. Coal pile runoff and water from the plant drains was historically directed to the Bottom Ash Pond, but

[2] National Pollutant Discharge Elimination System (NPDES) Permit No. OIB00022, Killen Electric Generating Station, Ohio Environmental Protection Agency, August 1, 2009.

was reportedly re-directed to the Fly Ash Pond in 2010. Pond stormwater (direct precipitation) and bottom ash wastewater pumped from the KEGS bottom ash system and cooling tower basin is directed to the Bottom Ash Pond at an estimated combined maximum rate of 30.7 million gallons per day[3] (MGD). Wastewater is discharged from the Bottom Ash Pond to the Fly Ash Pond via an overflow structure at an estimated maximum rate of 30.5 MGD[4] and also recycled to the bottom ash system, fly ash system and the oil and grease separator at a combined maximum rate of 12.7 MGD. The overall Fly Ash Pond plan is shown on **Figure 3**.

The Fly Ash Pond was constructed for the purpose of storing and disposing plant wastewater and fly ash from the KEGS facility. Beginning in 2010, the Fly Ash Pond also receives coal pile runoff and water from the plant drains. Pond stormwater (direct precipitation) and bottom ash wastewater pumped from the KEGS bottom ash system and cooling tower basin is directed to the Bottom Ash Pond at an estimated combined maximum rate of 27.3 MGD[5] and from the Bottom Ash Pond at an estimated maximum rate of 30.5 MGD. Wastewater from the Fly Ash Pond is discharged to the Ohio River at an estimated maximum rate of 57.7 MGD[6]. The overall Fly Ash Pond plan is shown on **Figure 3**.

1.2.4 Description of the Bottom Ash Pond and Appurtenances

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

The Bottom Ash Pond consists of an earthfill embankment with an impervious fill core and a crest length of approximately 5,075 feet. The maximum crest height (from the lowest toe elevation to the top of embankment) is approximately 58 feet. A road along the top of the crest has a width of approximately 10 feet and a design elevation of approximately 573 feet, National Geodetic Vertical Datum of 1929 (NGVD 29). Actual crest elevations reportedly range from 572.1 to 573 feet. The Bottom Ash Pond base was reportedly keyed into the existing natural grade (bottom of excavation elevation of 492 feet) and supplemented with a 6 foot thick impervious fill layer to form the pond liner with a top of liner elevation of 498 feet. A 6-foot thick layer of impervious fill was also placed on a portion of the interior slope to tie into the existing natural clay materials. Both the inner and outer slopes of the embankment have a slope of approximately 2.5 horizontal to 1 vertical (2.5H:1V). The Bottom Ash Pond has not been expanded or raised since its original construction.

The Bottom Ash Pond has two discharge points. Outfall No. 1 is located near the southeast corner of the Bottom Ash Pond and provides recycled make-up water to the power plant. Outfall No. 1 is comprised of an 8-foot diameter, 58-foot high reinforced concrete pump station intake tower with a 36-inch sluice gate[7]. Water flow is conveyed by gravity from the

[3] Based on estimated maximum flows from a Water Balance Diagram (Figure 2 of NPDES Permit) provided by Mr. Scott Arentsen of DP&L on June 7, 2011.
[4] Based on estimated maximum flows from a Water Balance Diagram (Figure 2 of NPDES Permit) provided by Mr. Scott Arentsen of DP&L on June 7, 2011.
[5] Based on estimated maximum flows from a Water Balance Diagram (Figure 2 of NPDES Permit) provided by Mr. Scott Arentsen of DP&L on June 7, 2011.
[6] Based on estimated maximum flows from a Water Balance Diagram (Figure 2 of NPDES Permit) provided by Mr. Scott Arentsen of DP&L on June 7, 2011.
[7] Based on review of DP&L Drawing 400-12-1092 provided by Mr. John Hendrix of DP&L on June 7, 2011.

Bottom Ash Pond to the plant by one 36-inch diameter ductile iron pipe which rests on a 9-inch thick sand bedding within a 72-inch diameter corrugated metal pipe with an open annulus.

According to DP&L Drawing 400-12-1092 provided by the Owner, the 72-inch diameter pipe exits the intake tower at an invert elevation of 511 feet, extends through the embankment and joins other plant related equipment at an invert elevation of 509.75 feet. Six seepage collars are shown along the pipeline at even spacing.

Outfall No. 2 is located near the northeast corner of the Bottom Ash Pond on the intermediate berm that divides the Bottom Ash Pond from the Fly Ash Pond. Outfall No. 2 is a 10-foot wide reinforced concrete channel with stop logs to control water level starting at an invert elevation of 565 feet and with a maximum elevation of approximately 572.75 feet, which is the bottom of the 15-inch thick concrete slab comprising the bridge over the discharge structure (top of concrete elevation shown as 574 feet).

Two drainage ditches, Ditch A and Ditch B, were constructed around the perimeter of the Bottom Ash Pond and the Fly Ash Pond, beyond the toe of the embankments. The purpose of the ditches is to divert runoff from the exterior slopes and several T-drains located on the embankments and direct it away from the embankments and ultimately to the Ohio River. Refer to **Figures 3 and 4** for the approximate locations of Ditch A and Ditch B.

Instrumentation at the Bottom Ash Pond includes two survey monuments (SM2 and SM3) installed on the top of the embankment (at the edge of the exterior slope) and two piezometers (W-1 and W-2) installed at the toe of the exterior slope. Refer to **Figures 3 and 4** for the locations of the survey monuments and piezometers. Additional information on the construction and performance history of the Bottom Ash Pond is provided in Sections 1.3.6 and 1.3.8 of this report.

1.2.5 Description of the Fly Ash Pond and Appurtenances

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

The Fly Ash Pond consists of an earthfill embankment with an impervious fill core and a crest length of approximately 11,200 feet. The maximum crest height (from the lowest toe elevation to the top of embankment) is approximately 77 feet, according to DP&L's draft Operation, Maintenance and Inspection (OMI) Manual dated May 5, 2010. However, conflicting information is presented in the April 7, 2008 Dam Safety Inspection Report prepared by the Ohio Department of Natural Resources (ODNR), which indicates a dam height of 84 feet. A road along the top of the crest has a width of approximately 10 feet and a design elevation of approximately 573 feet. Actual crest elevations reportedly range from 572 to 573 feet. The Fly Ash Pond base was reportedly keyed into the existing natural grade (bottom of excavation elevation of 498 feet) and supplemented with a layer of impervious fill to form a pond liner with a thickness ranging from 2 feet near the center of the pond to 6 feet at the toe of the interior slope. The Fly Ash Pond liner was designed with a top of liner elevation ranging from 500 feet near the center of the pond to 504 feet at the toe of the interior slope. A 6-foot thick layer of impervious fill was also placed on a portion of the interior slope to tie into the existing natural clay materials. Both the inner and outer slopes of the embankment have a slope of

approximately 2.5 horizontal to 1 vertical (2.5H:1V). The Fly Ash Pond has not been expanded or raised since its original construction.

The Fly Ash Pond has one discharge point. The decant structure is located near the southwest corner of the Fly Ash Pond and conveys water to the final outfall point identified as "Outfall 001" in the 2009 NDPES permit (refer to **Figure 3** for locations). The decant structure is comprised of a 17-foot by 18-foot rectangular reinforced concrete overflow structure where water from the Fly Ash Pond enters through a 26-inch sluice gate. Once inside the overflow structure, water is conveyed through a 42-inch sluice gate and a 10-foot long, 42-inch diameter reinforced concrete pipe to a 4-foot by 4-foot square reinforced concrete standpipe with a height of 61 feet[8]. From the base of the standpipe, water flow is conveyed from the Fly Ash Pond to the outfall ("Outfall 001") by one 36-inch diameter ductile iron pipe which is encased in a 72-inch diameter corrugated metal pipe with an open annulus.

According to DP&L Drawing 400-12-1082 provided by the Owner, the 72-inch diameter pipe exits the standpipe at an invert elevation of 513.5 feet, extends through the embankment and discharges to an energy dissipater where the water then flows through a Parshall Flume into Ditch B and ultimately into the Ohio River. Four seepage collars are shown along the pipeline at even spacing.

As discussed in Section 1.2.4, two drainage ditches, Ditch A and Ditch B, were constructed around the perimeter of the Bottom Ash Pond and the Fly Ash Pond, beyond the toe of the embankments. The purpose of the ditches is to divert runoff from the exterior slopes and several T-drains located on the embankments and direct it away from the embankments and ultimately to the Ohio River. Refer to **Figure 3 and 4** for the approximate locations of Ditch A and Ditch B.

Instrumentation at the Fly Ash Pond includes eight survey monuments (SM1 and SM4 through SM-10) installed on the top of the embankment (at the edge of the exterior slope) and six piezometers (W-3 through W-8) installed at the toe of the exterior slope. Refer to **Figures 3 and 4** for the locations of the survey monuments and piezometers. Additional information on the construction and performance history of the Fly Ash Pond is provided in Sections 1.3.7 and 1.3.8 of this report. Additional information on the construction and performance history of the Fly Ash Pond is provided in Section 1.3.7 of this report.

1.2.6 Operations and Maintenance of the Bottom Ash Pond

The Bottom Ash Pond operates under Ohio Department of Natural Resources (ODNR) Permit No. 76-092. 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 Bottom Ash Pond is regulated by the EPA, ODNR and the OEPA (NPDES Permit). Monitoring requirements under the NPDES permit are discussed below in Section 1.2.7.

[8] Based on review of DP&L Drawing 400-12-1082 provided by Mr. John Hendrix of DP&L on June 7, 2011.

The Bottom Ash Pond and the surrounding area are operated and maintained by DP&L personnel. A summary of the inspection and maintenance items listed in DP&L's OMI (as provided to GZA) is provided below.

- After heavy rainfall events (such as 2-inches in a 24-hour period) based on monitoring of rainfall totals at NOAA and the National Weather Service, inspection of flow through overflow pipe and inspection of water level in ponds;
- Monitoring of the items associated with the NPDES Permit in accordance with the permitted frequencies, which range from daily to quarterly (refer to Section 1.2.7);
- Monthly inspections of flow through overflow pipe, flow through overflow structure between ponds, water level in ponds, presence of seepage and/or wet areas, presence of slides and crack, presence of rodent activity and evidence of vandalism;
- Semi-annual vegetation management including mowing grass on embankments and cutting woody growth and inspection and lubrication of the pond drain valve mechanism;
- Annual vegetation management including mowing grass on embankments and cutting woody growth. Additionally, inspection of the condition of the embankments, slope protection, outfall discharge area, visual inspection of the condition of the vertical riser and culvert and inspection of the area surrounding the embankments for evidence of erosion;
- Periodic (every 5 years) inspection of slope protection, conditions of the embankments, outfall discharge to the plunge pool area, visual inspection of the condition of the vertical riser and culvert and inspection of the area surrounding the embankments for evidence of erosion;
- Periodic (every 5 years) safety inspection performed by ODNR;
- Periodic monitoring of the survey monuments for movement of the surface and subsurface [no frequency provided by DP&L]; and,
- On an as needed basis prompt repair of eroded areas, rodent damage and vegetative cover.

Inspection reports produced by ODNR are provided to DP&L. If necessary, these reports may include required remedial measures or other discussion items that require action and/or response by DP&L. The most recent ODNR report is dated July 30, 2008 and describes conditions and observations noted on April 7, 2008. In order to maintain their permit, DP&L 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 DP&L personnel and a review of the July 30, 2008 ONDR inspection report (refer to Section 1.3.9), it appears that progress toward completing the required remedial measures listed in the July 30, 2008 ODNR report is being made.

1.2.7 Operations and Maintenance of the Fly Ash Pond

Operations and maintenance of the Fly Ash Pond is regulated by the EPA and the OEPA under the same NPDES Permit as the Bottom Ash Pond. According to the NPDES permit, DP&L is required to submit a monthly report to the OEPA that includes NPDES monitoring data. Specifically, at Outfall 001, DP&L is required to record the flow and precipitation daily, collect grab samples for pH, total dissolved residue, total suspended solids, oil and grease, total chloride and total residual chlorine weekly, collect grab samples for dissolved hexavalent chromium monthly and collect grab samples for mercury on a quarterly basis.

The operation and maintenance of the Fly Ash Pond is performed in conjunction with the operation and maintenance of the Bottom Ash Pond. As such, the operation and maintenance activities described in Section 1.2.6 also apply to the Fly Ash Pond and are not repeated in this section.

1.2.8 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 1,000 and 50,000 acre-feet and/or a height between 40 and 100 feet are classified as Intermediate sized structures. Based on the maximum height of 58 feet and a storage volume of approximately 2,090 acre-feet (at the maximum elevation of approximately 573 feet), the Bottom Ash Pond is classified as an **Intermediate** sized structure.

Based on the maximum height of 77 feet and a storage volume of approximately 11,350 acre-feet (at the maximum elevation of approximately 573 feet), the Fly Ash Pond is classified as an **Intermediate** sized structure.

The ODNR considers the Bottom Ash Pond and Fly Ash Pond to be one unit and has assigned a classification of "Class I" based on height (greater than 60 feet) and storage capacity (greater than 5,000 acre-feet).

1.2.9 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 both the Bottom Ash Pond and Fly Ash Pond would be considered as having a **High** hazard potential. In addition to the potential for economic loss, environmental damage, damage of lifeline facilities (power plant, US 52 etc.) and impact to other concerns including the Ohio River, the hazard potential rating was assigned based on the possibility that loss of human life would occur as a result of failure or misoperation of the ponds, particularly given the proximity of the ponds to the power plant. The overall site plan is shown on **Figure 3** and an inundation map is shown on **Figure 4**.

The ODNR considers the Bottom Ash Pond and Fly Ash Pond to be one unit and has assigned a hazard classification of "Class II" but has assigned an overall (combined size, storage and hazard) "Class I" designation to the ponds.

1.3 Pertinent Engineering Data

1.3.1 Drainage Area

The Bottom 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 39 acres.

The Fly Ash Pond is an enclosed embankment built up from the natural ground surface. As such, the primary contributory drainage area is the surface area of the impoundment, approximately 191 acres. The Fly Ash Pond also receives surface stormwater runoff pumped from the coal storage area as well as surface stormwater runoff when the on-Site stormwater collection ponds reach capacity during a significant rain event. The coal storage area and stormwater collection ponds were not visited by GZA during the Fly Ash Pond inspection, and the associated drainage area acreage of these areas was not provided.

1.3.2 Bottom Ash Pond

The Bottom Ash Pond is located adjacent to the Ohio River and is bordered by US-52 to the north-northeast, a low lying field to the southeast, the Ohio River to the southwest, and KEGS to the northwest. The Bottom Ash Pond is separated from the Fly Ash Pond by an interior dike.

The Bottom Ash Pond consists of an earthfill embankment with an impervious fill core and a crest length of approximately 5,075 feet. The maximum crest height (from the lowest toe elevation to the top of embankment) is approximately 58 feet. A road along the top of the crest has a width of approximately 10 feet and a design elevation of approximately 573 feet NGVD 29. Actual crest elevations reportedly range from 572.1 to 573 feet. The Bottom Ash Pond base was reportedly keyed into the existing natural grade (bottom of excavation elevation of 492 feet) which consisted of existing clays and silts. The low permeability of the underlying clays and silts minimizes the potential for wastewater to migrate into the surrounding groundwater. In addition, the pond base was supplemented with a 6 foot thick impervious fill layer to form the pond liner with a top of liner elevation of 498 feet. A 6-foot thick layer of impervious fill was also placed on a portion of the interior slope to tie into the existing natural clay materials. Both the inner and outer slopes of the embankment have a slope of approximately 2.5 horizontal to 1 vertical (2.5H:1V). The Bottom Ash Pond has not been expanded since its original construction.

Based on record drawings provided by DP&L, the soil within the embankment consists of an impervious core surrounded by random fill. The hydraulic conductivity of the impervious core and random fill materials was not available. At the crest elevation of 573 feet, the Bottom Ash Pond is estimated to have a surface area of approximately 39 acres and a storage volume of approximately 2,090 acre-feet.

1.3.3 Fly Ash Pond

The Fly Ash Pond is located adjacent to the Ohio River and is bordered by US-52 to the north-northeast, a low lying field to the southeast, the Ohio River to the southwest, and KEGS to the northwest. The Fly Ash Pond is separated from the Bottom Ash Pond by an interior dike.

The Fly Ash Pond consists of an earthfill embankment with an impervious fill core and a crest length of approximately 11,200 feet. The maximum crest height (from the lowest toe elevation to the top of embankment) is approximately 77 feet, according to DP&L's draft Operation, Maintenance and Inspection (OMI) Manual dated May 5, 2010. However, conflicting information is presented in the April 7, 2008 Dam Safety Inspection Report prepared by the Ohio Department of Natural Resources (ODNR), which indicates a dam height of 84 feet. A road along the top of the crest has a width of approximately 10 feet and a design elevation of approximately 573 feet. Actual crest elevations reportedly range from 572 to 573 feet. The Fly Ash Pond base was reportedly keyed into the existing natural grade (bottom of excavation elevation of 498 feet) and supplemented with a layer of impervious fill to form a pond liner with a thickness ranging from 2 feet near the center of the pond to 6 feet at the toe of the interior slope. The Fly Ash Pond liner was designed with a top of liner elevation ranging from 500 feet near the center of the pond to 504 feet at the toe of the interior slope. A 6-foot thick layer of impervious fill was also placed on a portion of the interior slope to tie into the existing natural clay materials. Both the inner and outer slopes of the embankment have a slope of approximately 2.5 horizontal to 1 vertical (2.5H:1V). The Fly Ash Pond has not been expanded since its original construction

Based on record drawings provided by DP&L, the soil within the embankment consists of an impervious core surrounded by random fill. The hydraulic conductivity of the impervious core and random fill materials was not available. At the crest elevation of 573 feet, the Fly Ash Pond is estimated to have a surface area of approximately 191 acres and a storage volume of approximately 11,350 acre-feet.

1.3.4 Discharges at the Site

Discharges at the Site are regulated under the previously noted NPDES Permit. Under normal operating conditions, wastewater outflow from the Bottom Ash Pond to the Fly Ash Pond is discharged at an average rate of 4.66 MGD. Under normal operating conditions, wastewater outflow from the Fly Ash Pond to Outfall 001 and thence to the Ohio River is discharged at an average rate of 7.2 MGD. Values were based on data provided on DP&L's water balance diagram.

1.3.5 General Elevations

Bottom Ash Pond elevations presented in this report are taken from design drawings, reports, and survey monument monitoring data provided by DP&L. Elevations are based upon the NGVD 29 vertical datum. Actual elevations may be lower than design elevations.

A. Top of Embankment	± 573.0 feet
B. Normal Operating Pool	± 569.5 feet
C. Top of Pump Station Intake	± 568.3 feet
D. Maximum Elevation of Stop Logs	

in Overflow Structure	± 572.75 feet

Fly Ash Pond elevations presented in this report are taken from design drawings, reports, and survey monument monitoring data provided by DP&L. Elevations are based upon the NGVD 29 vertical datum.

A. Top of Embankment	± 573.0 feet
B. Normal Operating Pool	± 568.5 feet
C. Top of Decant Structure	± 571.74 feet

1.3.6 Design and Construction Records and History of the Bottom Ash Pond

According to the information provided by DP&L, the Bottom Ash Pond was designed by Ebasco Services, Inc. (Ebasco) of Atlanta, Georgia. Construction of the Bottom Ash Pond was completed in 1982. The embankment was constructed to its full height prior to filling it with coal ash wastewater. The origin of the materials comprising the impervious core of the embankments and the impervious blanket of fill over the base of the pond was not specified. Given the reported depth of excavation into the existing grade, it is possible that some portion of the fill material used in construction of the embankments was taken from the native soils. A number of record drawings prepared by Ebasco were provided to GZA for review including drawings, 400-12-1083 and 400-12-1092, which provide details pertaining to the pump station inlet and overflow structures.

1.3.7 Design and Construction Records and History of the Fly Ash Pond

Similar to the Bottom Ash Pond, the Fly Ash Pond was designed by Ebasco. Construction of the Fly Ash Pond was completed in 1982. The embankment was constructed to its full height prior to filling it with coal ash wastewater. The origin of the materials comprising the impervious core of the embankments and the impervious blanket of fill over the base of the pond was not specified. Given the reported depth of excavation into the existing grade, it is possible that some portion of the fill material used in construction of the embankments was taken from the native soils. A number of record drawings prepared by Ebasco were provided to GZA for review including drawing 400-12-1082 which provides details pertaining to the decant structure.

1.3.8 Operating Records

According to a 2009 report[9] prepared by Maysville Survey and Engineering KY LLC (Maysville), ten survey monuments installed around the perimeter of the embankment crest were surveyed to evaluate settlement. The ten survey monuments were surveyed on November 7, 1996 and more recently on February 16, 2009 to monitor horizontal and vertical movement in the top of the embankment. Over the 12 year and 3 month year period, the horizontal movement varied at the survey monuments from approximately 1.8 to 2.4 inches and the vertical movement varied at the survey monuments from approximately 0.05 to 1.0 inches. A table summarizing the horizontal and vertical movement of the survey monuments is provided in **Appendix D**.

[9] Surveyor's Report, Killen Electric Generating Station Ash Pond Settlement, Monument Survey Project, Maysville Survey and Engineering KY LLC, March 4, 2009.

Maysville included a note on Sheet 1 of 2 in their report stating the following: "It is unlikely that the north coordinate values for each monument would all shift to the north in this manner. It is possible that the Coal 1 monument used as the base station for the observation has itself shifted over the last 12 years, or the mark placed on the brass disk by DPL is different from the original survey". GZA did not observe any visible indications of significant horizontal displacement of the embankments. The Owner indicated that the embankments have never overtopped or experienced any slope failures.

No other operating records were provided by DP&L.

1.3.9 Previous Inspection Reports

Various types of visual inspections of the Bottom Ash Pond and Fly Ash Pond are conducted by DP&L on a monthly, annual and five-year basis. Informal inspections by the Owner are performed as needed during and after heavy rainfall events, defined by DP&L as two inches or more in a 24 hour period. Records of these inspections are maintained internally. In addition, DP&L contracts with a Registered Professional Engineer to perform an inspection every five years. According to a March 27, 2009 letter from DP&L to USEPA, an inspection of the safety (i.e., structural integrity) of the embankments was conducted by Civil & Environmental Consultants, Inc. (CEC) in February 2009. A copy of this report was not provided for review.

The ODNR performs an inspection every five years and prepares a report including remedial measures that is provided to DP&L. A representative from ODNR was on-site during a portion of the assessment but was not available to stay for the entire day. The most recent ODNR inspection was performed on April 7, 2008. Key observations and recommendations resulting from this inspection included:

1. Remove the brush and saplings from (1) the lower portion of the north exterior slope of the Bottom Ash Pond, (2) the north interior slope of the Bottom Ash Pond, and (3) the "T" drains that are located around both ponds. Seed all disturbed areas to establish a proper grass cover.

2. Replenish the displaced riprap and repair erosion along the west interior slope of the Bottom Ash Pond and the south interior slope of the Fly Ash Pond. It appears that the size of the riprap on these slopes should be increased. Monitor the interior slopes for erosion.

3. Repair the erosion gullies located along the toe areas of both east embankments, and repair the "T: drain located on the benches of both ponds.

4. Repair the ruts in the west embankment crest of the Bottom Ash Pond.

5. Investigate the condition of the low-level sluice gate in the overflow structure of the Fly Ash Cell and make repairs as needed.

6. Install a staff gauge in each cell to allow better monitoring of the water levels.

7. Revise and update the operation, maintenance and inspection manual (OMI) and prepare an emergency action plan (EAP) including an inundation map.

8. Monitor the vertical alignment of the crest of the north embankment of the Bottom Ash Pond yearly for movement or signs of embankment instability. In the event that the settlement monuments are surveyed in the future, survey measurements should be taken along the crest of the north embankment to ensure that the crest elevation is uniform.

2.0 INSPECTION

2.1 Visual Inspection

The KEGS Bottom Ash Pond and Fly Ash Pond were inspected on June 7, 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 E**. 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 GZA's professional opinion, the KEGS Bottom Ash Pond and Fly Ash Pond embankments appear to be sound and no immediate remedial action appears to be necessary. However, based on EPA's inspection criteria, both the Bottom Ash Pond and the Fly Ash Pond impoundments have been given a **POOR** Condition Rating, because no geotechnical computations were made available to GZA for review. Thus, the stability of the embankments could not be independently verified. Specific concerns are identified in more detail in the sections below.

2.1.2 Bottom Ash Pond (Photos 1, 2, 3, 4, 7, 8, 9, 10)

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

2.1.2.1 Outer Embankment Slope (Photos 4, 7, 8)

The outer embankment slope generally appeared to be in good condition. Most portions of the slopes had been mowed recently. Mowing in those areas not completed before GZA's site visit was reportedly scheduled to be completed in the near future. The trees and brush on the slope near Station 3+00 were cut and being removed during GZA's site visit. Stumps resulting from this area that are 4-inch in diameter or larger should also be removed. No unusual movement or sloughing was observed in the slope.

2.1.2.2 Crest (Photos 3, 4, 9)

The crest of the Bottom Ash Pond has a gravel cover that serves as an access road around the entire perimeter of the pond. The alignment of the top of the embankment appeared generally level, with no depressions or irregularities observed. 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.

2.1.2.3 Interior of Embankment (Photos 2, 3, 9, 10)

The interior embankment slope generally appeared to be in good condition. As a result of the bottom ash filling operations near the Bottom Ash Inlet (**Figure 3**), the area in vicinity of Station 3+00 to 5+00 was observed to have limited freeboard (Photo 9). As of December 31, 2008, DP&L reported that approximately 1,036,074 tons of material was stored in the Bottom Ash Pond, which has an estimated capacity of 3,729,321 tons.

2.1.2.4 Appurtenant Structures (Photos 1, 2, 5, 6, 7, 8)

There are two discharge structures in the Bottom Ash Pond, the pump station inlet structure (Photo 2) and the overflow structure (Photos 5 and 6). Both of these structures were observed to be in good condition and clear of debris. The concrete visible above the water surface in both structures appeared intact. The interior of the pump station inlet structure could not be observed to evaluate sluice gates, piping or other features. The transfer pipes associated with the pump station inlet structure are sub-grade and could not be visually inspected during the assessment. However, DP&L reportedly has never had an issue with any of the discharge pipes since the Bottom Ash Pond was originally constructed. The stoplogs on the overflow structure appeared to be in good condition.

2.1.3 Fly Ash Pond (Photos 11 through 21, 23, 24, 25, 27, 28)

A Site plan showing the key features of the Fly Ash Pond, including the location and orientation of photographs provided in **Appendix E**, is provided as **Figure 3**.

2.1.3.1 Outer Embankment Slope (Photos 11, 18, 21, 22, 26, 28)

The outer embankment slope generally appeared to be in good condition. The upper 20 to 30 feet of the outer embankment slope had been mowed recently. Mowing in those areas not completed before GZA's site visit was reportedly scheduled to be completed in the near future. Three areas at or near the toe of the embankment were observed to be wet. One area, near Station 88+00 (Photo 18), occupied an area measuring approximately 30 feet by 15 feet and according to DP&L personnel, is typically present in the fall. The second area, near Station 80+00 (Photo 27), was obscured by un-mowed vegetation but according to DP&L personnel, this area is typically wet in the fall and is partly due to ruts caused by mowing activities that allow precipitation to collect. The third wet area, observed between Stations 36+00 and 39+00 (Photo 28), had standing water in a rut that was presumably created during a previous mowing operation. No unusual movement or sloughing was observed in the slope.

Some established vegetation in the form of trees and brush was observed on the lower portion and toe of the outer embankment slope near the outfall structure (Photo 26).

2.1.3.2 Crest (Photos 15, 16, 19, 20, 21)

The crest of the Bottom Ash Pond has a gravel cover that serves as an access road around the entire perimeter of the pond. The alignment of the top of the embankment appeared generally level, with no depressions or irregularities observed. 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.

2.1.3.3 Interior of Embankment (Photos 15, 16, 17, 19, 20, 21)

The overall condition of the interior embankment slope generally appeared to be in good condition. However, multiple areas were observed to have vegetation of less than 1-inch in diameter (Photos 15, 16, 17, 19, 20 and 21). The rip rap present along portions of the interior slope appears to vary in size and is undersized in some locations as noted in the most recent ODNR report (Photos 19 and 20). Additionally, sloughing and apparent benching of the rip rap in the vicinity of Station 60+00 was observed (Photo 20). As of December 31, 2008 DP&L reported that approximately 4,144,298 tons of material was stored in the Bottom Ash Pond, which has an estimated capacity of 21,566,007 tons.

2.1.3.4 Appurtenant Structures (Photos 23, 24, 25, 26)

The decant structure is the only discharge structure located within the Fly Ash Pond (Photos 23, 24, and 25). This structure was observed to be in good condition and clear of debris, and the concrete visible above the water surface appeared intact. A staff gauge (Photos 23 and 24) was present on the exterior portion of the decant structure and was observed to be clean and in good condition. The interior of the decant structure could not be observed to evaluate sluice gates, piping or other features. The transfer pipes associated with the pump station inlet structure are below grade and could not be visually inspected during the assessment. However, DP&L reportedly has never had an issue with any of the discharge pipes since the Fly Ash Pond was originally constructed. Water from the decant structure is ultimately discharged to an energy dissipater (Photo 26) and Parshall flume that ultimately discharges to the Ohio River in accordance with DP&L's existing NPDES permit. The energy dissipater and Parshall flume were observed to be in good condition.

2.2 Caretaker Interview

Maintenance of the Bottom Ash and Fly Ash Ponds is the responsibility of DP&L personnel. As detailed in previous sections, GZA met with DP&L personnel and discussed the current operations and maintenance procedures, regulatory requirements, and the history of the Bottom Ash and Fly Ash Ponds since they were constructed.

2.3 Operation and Maintenance Procedures

As discussed in Sections 1.2.6 and 1.2.7, DP&L personnel are responsible for the regular operation and maintenance of the Bottom Ash Pond and Fly Ash Pond. DP&L has developed internal inspection forms that are to be completed upon completion of the various inspections that are scheduled to be performed each month, year or five-year period. Forms listed in DP&L's draft operation, maintenance and inspection plan include rainfall monitoring, monthly monitoring, annual monitoring, dam maintenance record, dam structure in-depth monitoring and ONDR's dam inspection checklist.

Routine maintenance procedures also include monitoring and sampling of the outfall from the Fly Ash Pond in accordance with the existing NPDES permit.

2.4 Emergency Action Plan

In accordance with Rule 1501:21-21-04 of the Ohio Administrative Code (OAC), owners of 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". At the time of GZA's site visit, DP&L was currently in the process of revising their EAP as evidenced by the draft document dated May 15, 2011 and the inundation map provided to GZA by DP&L. Select components of the inundation map produced by Buckeye Engineering, LTD. And dated June 10, 2010 have been overlain on an aerial photo for reference on **Figure 4**.

Review of DP&L's draft revised 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 Bottom Ash and Fly Ash Ponds.

According to an as-built drawing provided by DP&L, the design crest elevation of both the Bottom Ash and Fly Ash Ponds is 573 feet. The normal pool elevation for the Bottom Ash Pond is 569.5 feet and the normal pool elevation for the Fly Ash Pond is 568.5 feet. Subtracting the normal pool elevations from the design crest elevation results in a freeboard of 3.5 feet for the Bottom Ash Pond and 4.5 feet for the Fly Ash Pond. Actual crest elevations vary, as discussed in Sections 1.3.2 and 1.3.3, and have been reported as low as 572.1 feet for the Bottom Ash Pond, which results in a freeboard of 2.6 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 DP&L and ONDR representatives, DP&L has filed for a variance to this rule which would decrease the minimum freeboard at this dam from 5 feet to 3 feet.

2.6 Structural and Seepage Stability

The original structural and seepage stability analyses, if any, were not available to GZA at the time of inspection. Slope stability analyses, seepage analyses, foundation liquefaction analyses, and settlement analyses reports were not available.

3.0 ASSESSMENTS AND RECOMMENDATIONS

3.1 Assessments

In GZA's professional opinion, the KEGS Bottom Ash Pond and Fly Ash Pond embankments appear to be sound and no immediate remedial action appears to be necessary, based upon the information provided and our observations. However, based on EPA's inspection criteria, the overall condition of both the KEGS Bottom Ash Pond and Fly Ash Pond is judged to be **POOR** because no geotechnical computations were made available to GZA for review. Thus, the stability of the embankments could not be independently verified**.**

The Bottom Ash Pond was found to have the following deficiencies:

1. Portions of the outer embankment slopes had not been mowed recently;
2. No instrumentation (i.e., staff gauge) to observe the elevation of the water within the pond/impoundment;
3. Presence of undersized rip rap on portions of the interior embankment;
4. Presence of vegetation on the interior slope of the embankment;
5. Timber from recent vegetation clearing near Station 3+00 remains on the outer embankments slope;
6. DP&L personnel was unsure if the discharge pipes from the pump station inlet structure to the ash water pumps have been inspected internally since they were installed;
7. Limited freeboard in the vicinity of Station 3+00 to 5+00; and,
8. Reported crest and normal pool elevations indicate potential for non-compliance with state freeboard requirement of five feet for Class I dams.

The Fly Ash Pond was found to have the following deficiencies:

1. With the exception of the upper 20 to 30 feet, a majority of the outer embankment slopes had not been mowed recently;
2. Presence of undersized rip rap on portions of the interior embankment;
3. Apparent benching of the interior embankments slopes in the vicinity of Station 60+00;
4. Presence of vegetation on the interior slope of the embankment;
5. Presence of wet areas at or near the toe of the outer embankment slopes between Stations 36+00 to 39+00 and in the vicinity of Stations 80+00 and 88+00;
6. DP&L personnel was unsure if the discharge pipes from the decant structure to the outfall have been inspected internally since they were installed;
7. Reported crest and normal pool elevations indicate potential for non-compliance with state freeboard requirement of five feet for Class I dams; and,
8. Presence of established vegetation near the lower portion and toe of the outer embankment slopes near the outfall structure.

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.

3.2 Studies and Analyses

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. Install piezometers/observation wells in the noted wet areas (between Stations 36+00 to 39+00 and in the vicinity of Stations 80+00 and 88+00) to evaluate water levels, and possibly water chemistry, in these areas. This activity may require consultation and/or design by a licensed Professional Engineer;
3. Based on data from piezometers/observation wells, perform a seepage an analysis and assess need for subsurface toe drainage in wet locations and make improvements as needed;
4. Resolve pending variance with ODNR regarding reducing the minimum freeboard requirement from five feet to three feet;
5. Provide or perform spillway analysis to demonstrate capacity of discharge structures to accommodate the regulatory Spillway Design Flood with the proposed normal pool freeboard; and,
6. Provide or perform a slope stability analysis for the embankments. Analysis should include assessment of upstream slope stability in light of observed movement of riprap. Analysis may require a subsurface exploration program to develop appropriate input data. Most recent inspection should be provided to the EPA for review.

3.3 Recurrent Operation & Maintenance Recommendations

GZA recommends the following operation and maintenance level activities:

1. Clear vegetation from the interior embankment slopes of both ponds;
2. Remove stumps that are 4-inches or more in diameter resulting from the removal of trees and brush on the outer embankment near Station 3+00;
3. Install a staff gauge on or near the pump station inlet structure in order to take periodic measurements of the Bottom Ash Pond water surface elevation;
4. Inspect each of the piezometers around the toe of the pond embankments and ensure each piezometers has a cap, lockable protective cover/casing and is visible during mowing operations;
5. Ensure each survey monument is protected and is visible during mowing operations;
6. If DP&L has the opportunity to stop discharging from the Bottom Ash Pond for a limited time period, inspect the discharge pipes from the pump station inlet structure to the ash water pumps to verify that they are operating correctly and are in good condition. This may be performed by video photography; and,
7. If DP&L has the opportunity to stop discharging from the Fly Ash Pond for a limited time period, inspect the discharge pipes from the decant structure to the outfall structure to verify that they are operating correctly and are 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 Bottom 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. Clear the area of established vegetation near the lower portion and toe of the outer embankment slopes near the outfall structure; and,
2. Restore riprap in sections where displacement has occurred.

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 Killen Electric Generating Station Bottom Ash Pond and Fly Ash Pond, have been assessed to be in **POOR** condition, based on EPA's inspection criteria, on June 7, 2011.

Frank Vetere, P.E.
Senior Project Manager

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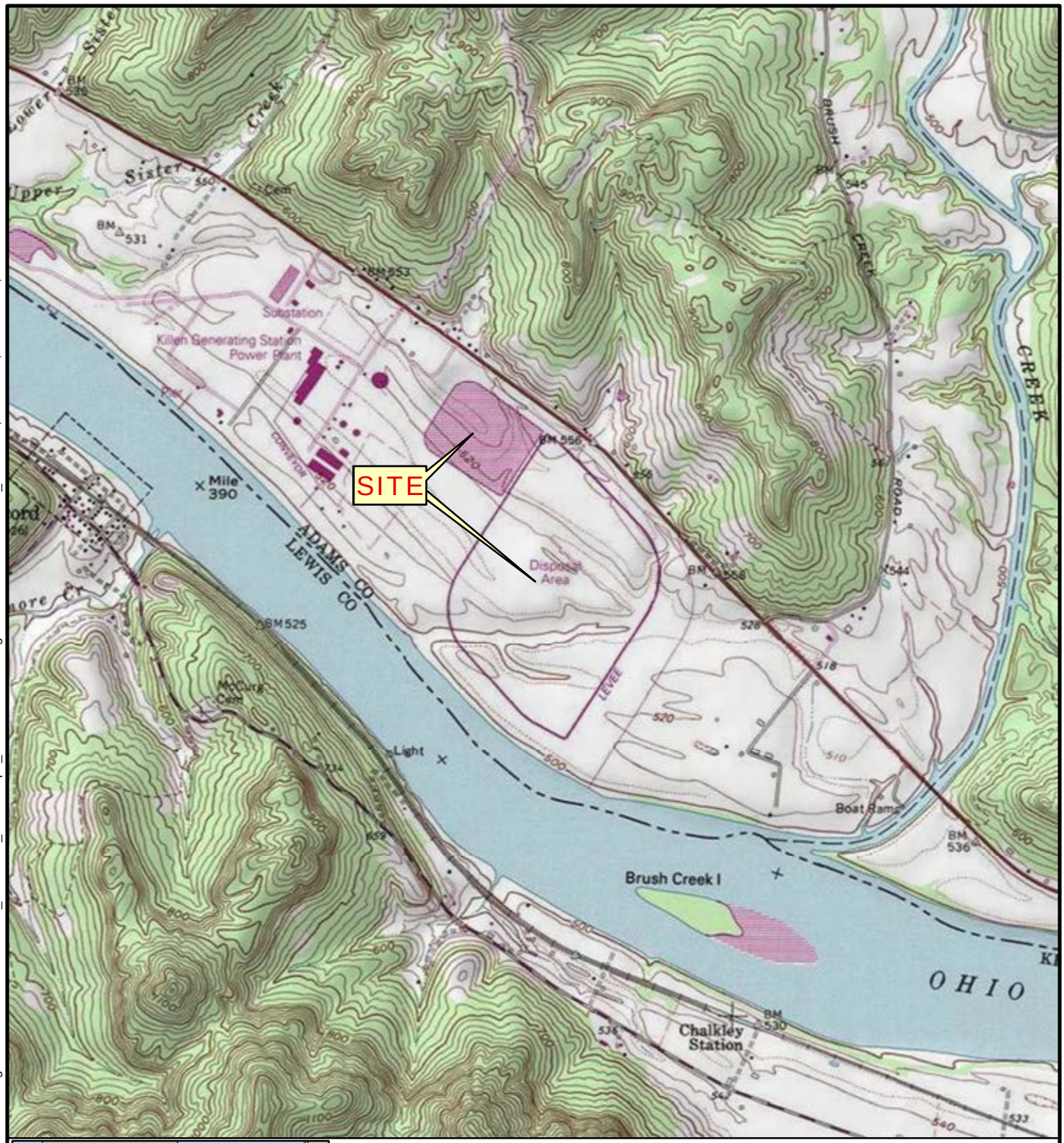
Figures



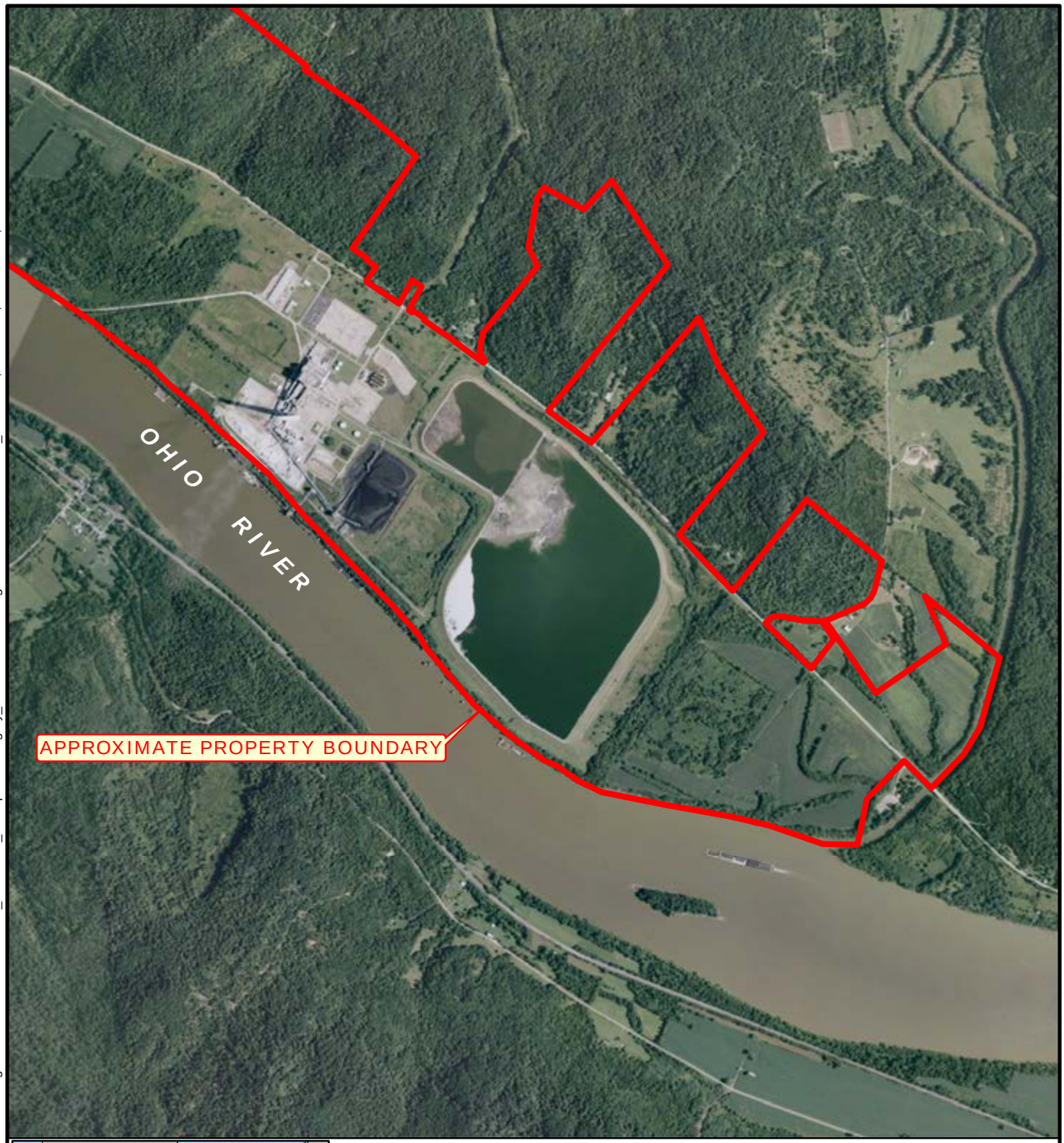
SOURCE : This map contains the ESRI ArcGIS Online World Topographic Map service, published February 2011 by ESRI ARCIMS Services. The service was compiled to uniform cartography using a variety of best available sources from several data providers.

Data Supplied by : esri

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

N W E S

GZA	PROJ. MGR.: TRB DESIGNED BY: MVE REVIEWED BY: PHB OPERATOR: EMD DATE: 08-31-2011	LOCUS PLAN (USGS TOPOGRAPHIC QUAD) KILLEN ELECTRIC GENERATING STATION 14869 U.S. 52 MANCHESTER, OHIO	JOB NO. 01.0170142.30 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 : esri

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

N W E S

DRAFT

GZA	PROJ. MGR.: TRB DESIGNED BY: MVE REVIEWED BY: PHB OPERATOR: EMD DATE: 08-31-2011	LOCUS PLAN (DIGITAL ORTHOPHOTO/AERIAL IMAGERY) KILLEN ELECTRIC GENERATING STATION 14869 U.S. 52 MANCHESTER, OHIO	JOB NO. 01.0170142.30 FIGURE NO. 2

LEGEND

- PHOTO LOCATION / DIRECTION
- SURVEY MONUMENT
- WET AREA
- T-DRAIN

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 : esri

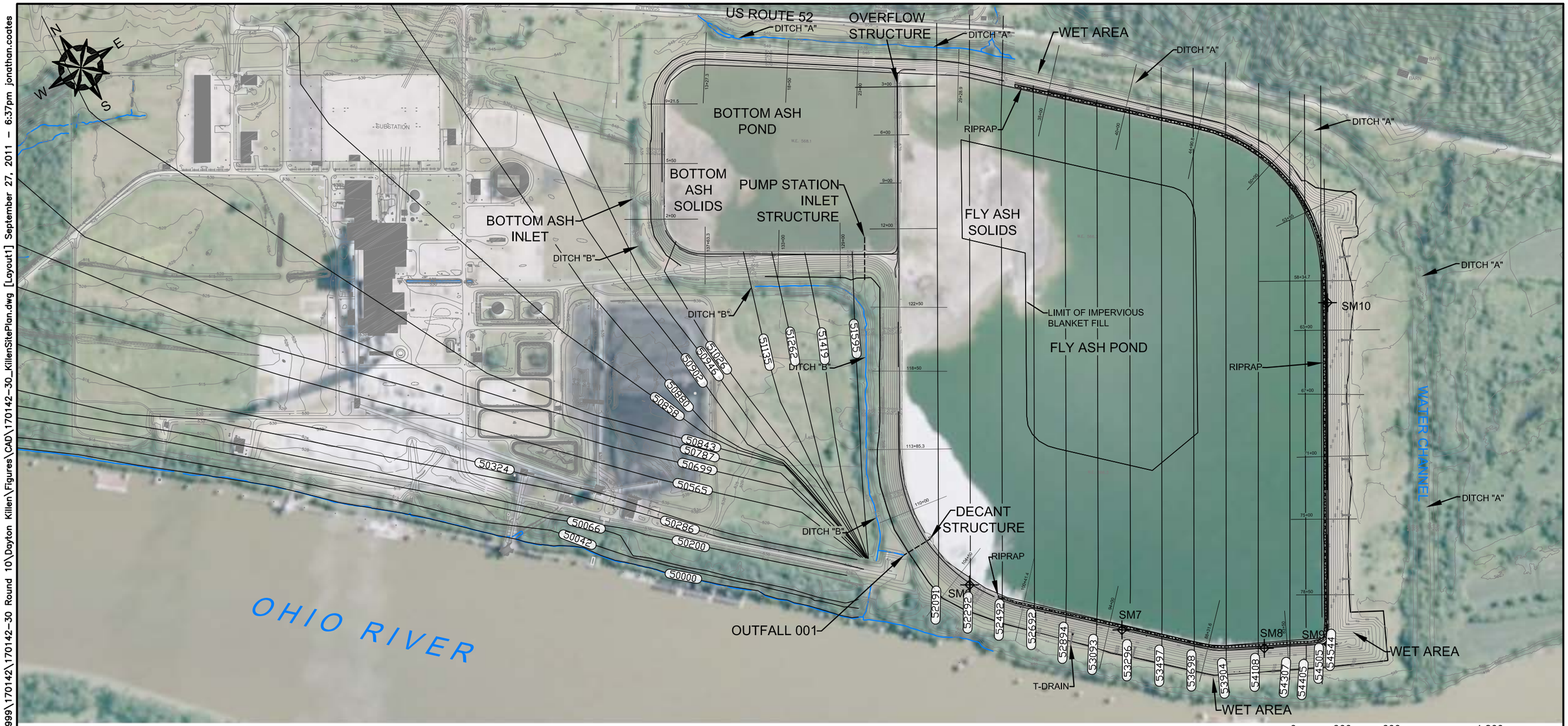
0 150 300 600 900

SCALE IN FEET

KILLEN ELECTRIC GENERATING STATION
14869 U.S. 52
MANCHESTER, OHIO

SITE PLAN AND PHOTOLOG

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR:	
PROJ MGR: TRB	REVIEWED BY: PHB	CHECKED BY: TRB	FIGURE 3
DESIGNED BY: MVE	DRAWN BY: GAS / EMD	SCALE: 1 in = 500 ft	
DATE: 09/28/2011	PROJECT NO. 01.0170142.30	REVISION NO.	



0 300 600 1,200

SCALE IN FEET

LEGEND:

SM10 SURVEY MONUMENT

T-DRAIN

SOURCE:

1. THE BASE PLAN WAS DEVELOPED FROM ELECTRONIC FILES PROVIDED BY DP&L INC. ENTITLED "INUNDATION MAP AND IMPOUNDMENT DYKE" DATED JUNE 10, 2010.

2. 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 WAS OBTAINED ON SEPTEMBER 7, 2011.

KILLEN ELECTRIC GENERATING STATION
14869 U.S. 52
MANCHESTER, OHIO

INUNDATION MAP

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:

PROJ MGR: TRB	REVIEWED BY: PHB	CHECKED BY: TRB	FIGURE 4
DESIGNED BY: MVE	DRAWN BY: JRC	SCALE: 1" - 600'	
DATE: SEPT 2011	PROJECT NO. 170142.30	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

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name:	Killen Electric Generating Station	Date:	June 7, 2011
Unit Name:	Bottom Ash Pond	Operator's Name:	Dayton Power and Light Company
Unit I.D.:	Ohio 8533-001; National # OH01127	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?	Semi-Annual		18. Sloughing or bulging on slopes?		✓
2. Pool elevation (operator records)?	569.5 feet		19. Major erosion or slope deterioration?		✓
3. Decant inlet elevation (operator records)?	569.5 feet*		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	565.0 feet		Is water entering inlet, but not exiting outlet?		✓
5. Lowest dam crest elevation (operator records)?	572.1 feet		Is water exiting outlet, but not entering inlet?		✓
6. If instrumentation is present, are readings recorded (operator records)?	✓		Is water exiting outlet flowing clear?	✓	
7. Is the embankment currently under construction?		✓	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	✓		From underdrain?	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

3) Decant inlet is open channel spillway leading to fly ash pond. Bottom elevation of stop logs is reported at 565.0 feet, top of stop logs reported at an elevation of 569.5 feet.
8) According to construction drawings, foundation preparation was performed
9) Some minor vegetation (<1-inch diameter) observed on upstream slopes; maintenance addresses periodically. Some trees (>6-inch diameter) on southwestern downstream slope, near out fall structure.
23) Southeastern berm is dividing dike between fly ash pond and bottom ash pond.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # OH0060046

INSPECTOR Frank Vetere, P.E.
Matt Vander Eide, P.G.

Date June 7, 2011

Impoundment Name Killen Electric Generating Station Bottom Ash Pond
Impoundment Company Dayton Power and Light Company
EPA Region 5
State Agency (Field Office) Addresss 2045 Morse Road, Bldg. B-2
Columbus, Ohio 43229
Name of Impoundment Killen Station Bottom Ash Pond
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New X Update _____

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

IMPOUNDMENT FUNCTION: Storage of bottom ash sluice

Nearest Downstream Town : Name Concord, KY
Distance from the impoundment 0.98 miles
Impoundment Location: Longitude 83 Degrees 28 Minutes 5 Seconds
Latitude 38 Degrees 41 Minutes 22 Seconds
State OH County Adams

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

If So Which State Agency? Ohio DNR Division of Water I.D. 8533-001

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.

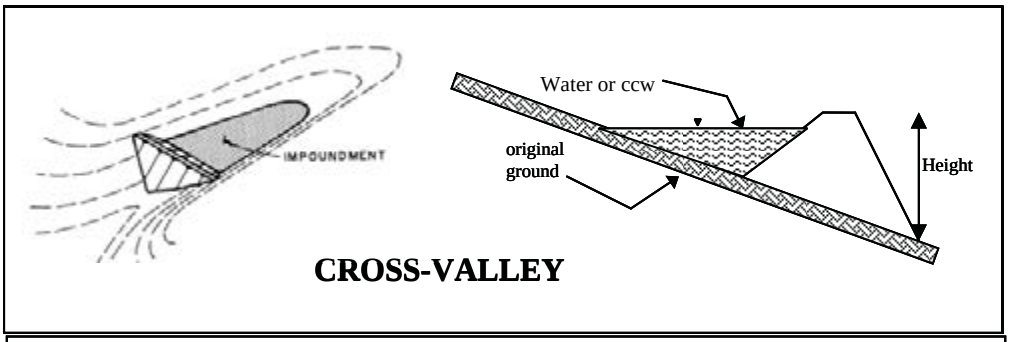
_____ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.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

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

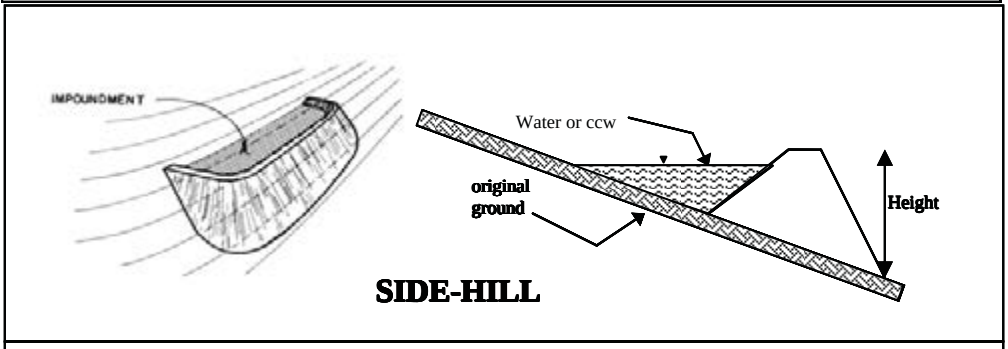
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

In addition to the potential for economic loss, environmental damage, damage of lifeline facilities (plant, US 52) and impact to other concerns including the Ohio River, it is possible that loss of human life would occur as a result of failure of misoperation of the dam. The losses would be primarily limited to the owner's property, but the Ohio River is located less than 500 feet from the southern dike and could receive water and/or ash from the impoundment. Further, the Ohio DNR has classified the impoundment as "Class I" based on height and storage capacity.

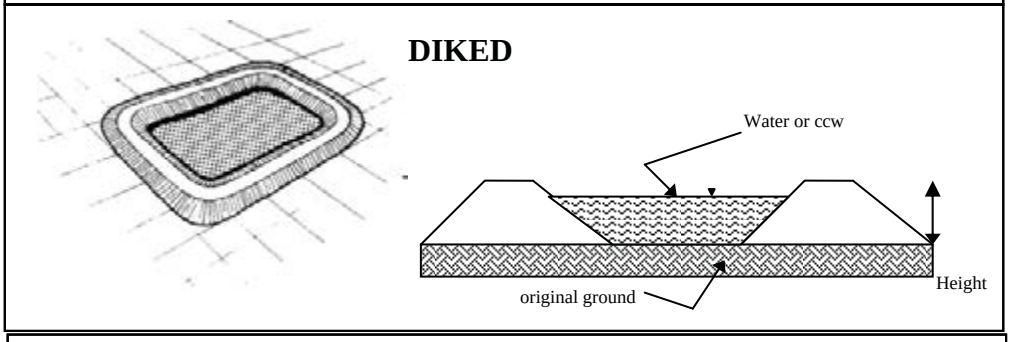
CONFIGURATION:



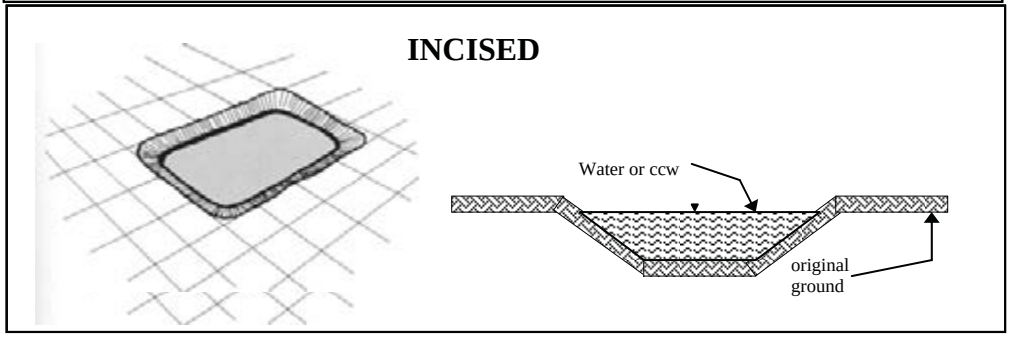
CROSS-VALLEY



SIDE-HILL



DIKED



INCISED

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

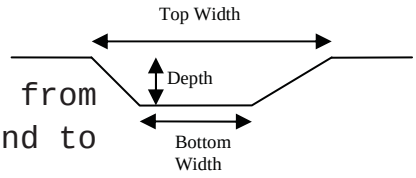
Embankment Height 84 feet Embankment Material Compacted clay
Pool Area 39.2 acres Liner Compacted clay
Current Freeboard 2.6 feet Liner Permeability unknown

* Minimum freeboard is 5 feet according to ODNR; plant is seeking a variance to decrease minimum freeboard to 3 feet. Current freeboard based on top of stop log elevation 569.5 feet and reported lowest crest elevation of crest 572.1 feet.

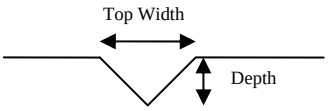
TYPE OF OUTLET (Mark all that apply)

_____ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
__X__ Rectangular (conveys water from bottom ash pond to fly ash pond)
_____ Irregular

TRAPEZOIDAL

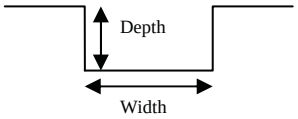


TRIANGULAR

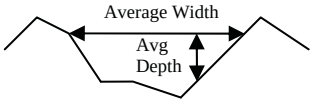


7.75 ft depth
10 ft bottom (or average) width
10 ft top width

RECTANGULAR

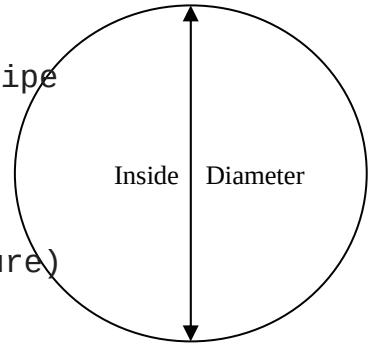


IRREGULAR



__X__ **Outlet** (Provides make-up water to plant)

72 in inside diameter (36-inch ductile iron pipe present inside 72-inch CMP)



Material
__X__ corrugated metal (At base of 58.5 foot concrete drop structure)
_____ welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
__X__ other (specify) ductile iron pipe

Is water flowing through the outlet? YES __X__ NO _____

_____ **No Outlet**

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

The Impoundment was Designed By Ebasco Services, Inc, Atlanta, GA

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

If So When? _____

If So Please Describe : _____

Has there ever been significant seepages at this site? YES _____ NO __X__

If So When? _____

IF So Please Describe: _____

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES _____ NO ___X___

If so, which method (e.g., piezometers, gw pumping,...)? _____

If so Please Describe : No past seepages or breeches.

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name:	Killen Electric Generating Station	Date:	June 7, 2011
Unit Name:	Fly Ash Pond	Operator's Name:	Dayton Power and Light Company
Unit I.D.:	Ohio 8533-001; National # OH01127	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?	Semi-Annual		18. Sloughing or bulging on slopes?	✓	
2. Pool elevation (operator records)?	566.24* feet		19. Major erosion or slope deterioration?		✓
3. Decant inlet elevation (operator records)?	Variable		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		✓
5. Lowest dam crest elevation (operator records)?	572.0 feet		Is water exiting outlet, but not entering inlet?		✓
6. If instrumentation is present, are readings recorded (operator records)?	✓		Is water exiting outlet flowing clear?	✓	
7. Is the embankment currently under construction?		✓	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	✓		From underdrain?	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

2) Staff gauge present on outflow structure indicated an approximate elevation of 566.24 feet during site visit (top of outflow structure = 571.74 feet, staff gauge reading = approximately 5.5 feet below top of outflow structure). Design "normal pool" elevation is reported as 568.5 feet.
3) Pool elevation is set by a weir with top of concrete elevation of 567.25 feet. An adjustable steel plate is present to vary pool elevation.
8) According to construction drawings, foundation preparation was performed.
9) Some minor vegetation (<1-inch diameter) observed on upstream slopes; maintenance addresses periodically. Some trees (>6-inch diameter) on southwestern downstream slope, near out fall structure.
18) Benching from rip rap sloughing observed in multiple areas of upstream slopes.
19) Rip rap on upstream slopes is under sized in some areas.
21) Three isolated areas of surface water ponding were observed: one at toe of southern downstream slope between stations 85+00 and 90+00, one on eastern downstream slope between stations 65+00 and 80+00 and one at toe of northern downstream slope between stations 35+00 and 40+00. Owner was aware of these areas and stated that some areas are wet in spring and fall. Some of the water seems to be collecting in ruts caused by mowing operations and could be due, in part, to recent excessive rainfall.
23) Water was observed against the downstream toe in three areas during the inspection (see comment no. 21) as a result, in part, of recent heavy precipitation. Two areas observed are reportedly present during both spring and fall inspections performed by the Owner. Northwestern berm is dividing dike between fly ash pond and bottom ash pond.

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # OH0060046

INSPECTOR Frank Vetere, P.E.
Matt Vander Eide, P.G.

Date June 7, 2011

Impoundment Name Killen Electric Generating Station Fly Ash Pond
Impoundment Company Dayton Power and Light Company
EPA Region 5
State Agency (Field Office) Addresss 2045 Morse Road, Bldg. B-2
Columbus, Ohio 43229
Name of Impoundment Killen Station Fly Ash Pond
(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New X Update _____

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

IMPOUNDMENT FUNCTION: Storage of fly ash sluice

Nearest Downstream Town : Name Concord, KY
Distance from the impoundment 0.98 miles
Impoundment Location: Longitude 83 Degrees 28 Minutes 5 Seconds
Latitude 38 Degrees 41 Minutes 22 Seconds
State OH County Adams

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

If So Which State Agency? Ohio DNR Division of Water I.D. 8533-001

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.

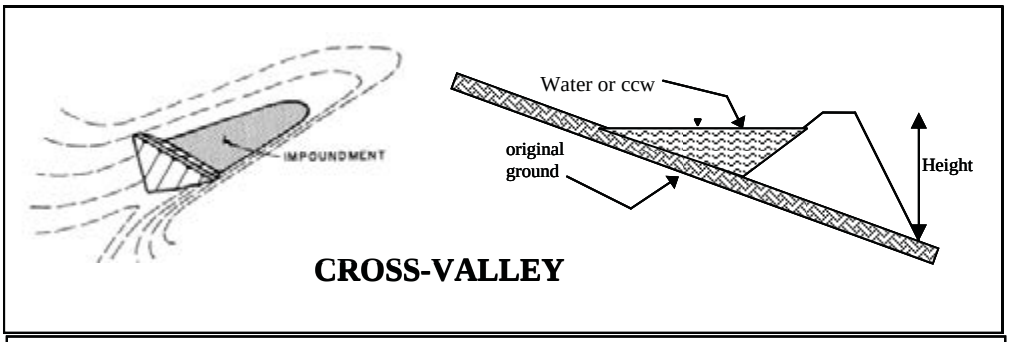
_____ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns.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

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

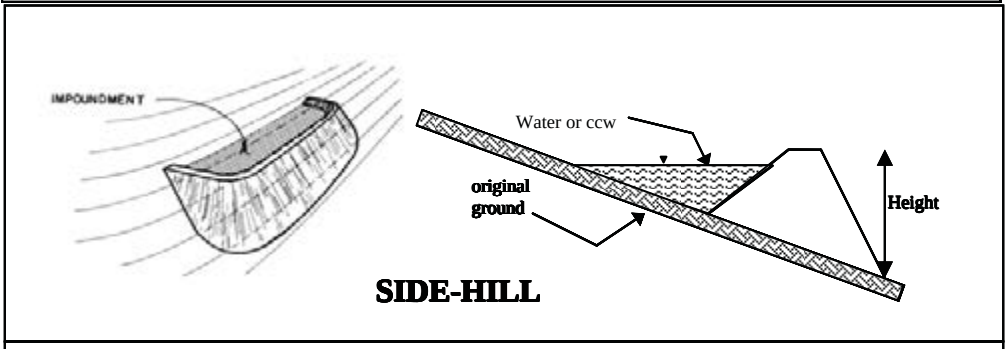
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

In addition to the potential for economic loss, environmental damage, damage of lifeline facilities (plant, US 52) and impact to other concerns including the Ohio River, it is possible that loss of human life would occur as a result of failure of misoperation of the dam. The losses would be primarily limited to the owner's property, but the Ohio River is located less than 500 feet from the southern dike and could receive water and/or ash from the impoundment. Further, the Ohio DNR has classified the impoundment as "Class I" based on height and storage capacity.

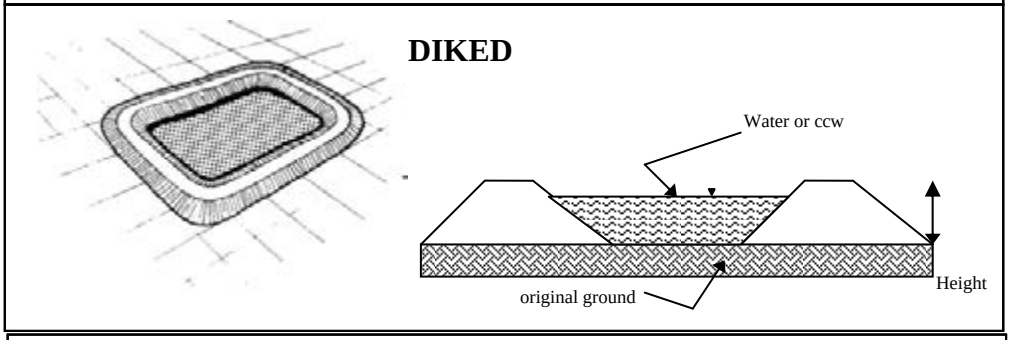
CONFIGURATION:

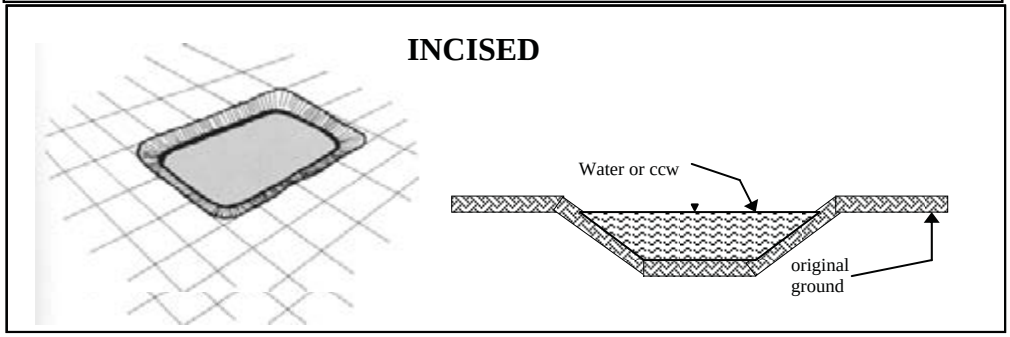


CROSS-VALLEY



SIDE-HILL





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

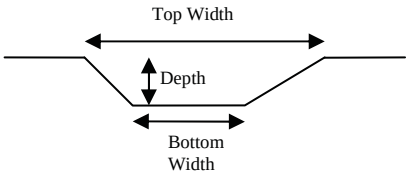
Embankment Height 84 feet Embankment Material Compacted clay
Pool Area 191.4 acres Liner Compacted
Current Freeboard approx. 5.76* feet Liner Permeability unknown

* Minimum freeboard is 5 feet according to ODNR; plant is seeking a variance to decrease minimum freeboard to 3 feet. Current freeboard based on approximate reading of staff gauge at outflow structure and reported elevation of top of outflow structure of 571.74 feet.

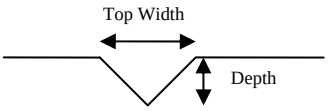
TYPE OF OUTLET (Mark all that apply)

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

TRAPEZOIDAL

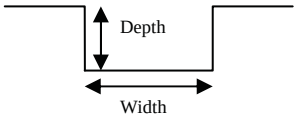


TRIANGULAR

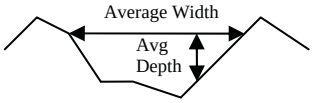


_____ depth
_____ bottom (or average) width
_____ top width

RECTANGULAR

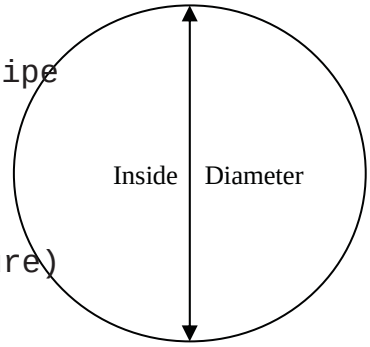


IRREGULAR



__X__ **Outlet**

72 in inside diameter (36-inch ductile iron pipe present inside 72-inch CMP)



Material
__X__ corrugated metal (At base of 61 foot concrete drop structure)
_____ welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
__X__ other (specify) ductile iron pipe

Is water flowing through the outlet? YES __X__ NO _____

_____ **No Outlet**

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

The Impoundment was Designed By Ebasco Services, Inc, Atlanta, GA

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

If So When? _____

If So Please Describe : _____

Has there ever been significant seepages at this site? YES _____ NO __X__

If So When? _____

IF So Please Describe: _____

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES _____ NO ___X___

If so, which method (e.g., piezometers, gw pumping,...)? _____

If so Please Describe : No past seepages or breeches.

Appendix D

Survey Monument Settlement Measurements

APPENDIX D

SURVEY MONUMENT SETTLEMENT MEASUREMENTS
DAYTON POWER AND LIGHT COMPANY
KILLEN ELECTRIC GENERATING STATION
MANCHESTER, OHIO

Survey Monument ID	Settlement/Movement Between November 7, 1996 and February 16, 2009		
	East Δ	North Δ	Elevation Δ
SM1	-0.016	0.197	0.004
SM2	-0.065	0.148	-0.032
SM3	-0.153	0.102	-0.084
SM4	-0.034	0.023	-0.014
SM5	-0.070	0.131	-0.047
SM6	-0.081	0.104	-0.077
SM7	0.038	0.108	-0.051
SM8	-0.017	0.180	-0.044
SM9	-0.059	0.142	-0.062
SM10	-0.005	0.147	-0.040

Notes:

1. Data shown above was obtained by GZA GeoEnvironmental, Inc. from a report prepared by Maysville Surveying & Engineering KY, LLC entitled "Killen Electric Generating Station Ash Pond Settlement Monument Survey Project" and dated February 23, 2009.
2. The values shown for the change in north coordinates were accompanied by the following note in the above referenced report: "It is unlikely that the north coordinate values for each monument would all shift to the north in this manner. It is possible that the Coal 1 monument used as the base station for the observation has itself shifted over the last 12 years, or the mark placed on the brass disk by DPL is different from the original survey."
3. All values shown in feet.

Appendix E

Photographs

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Dayton Power & Light Company Killen Electric Generating Station Manchester, Ohio	Project No. 01.0170142.30

Photo No.	Date:
1	06/07/11

Direction Photo Taken:
Southwest

Description:
Discharge into Bottom Ash Pond. Blue pipes carry bottom ash, cooling tower blow down is seen below the pipes.

Photo No.	Date:
2	06/07/11

Direction Photo Taken:
Northwest

Description:
View of Bottom Ash Pond and pump station intake structure. Killen Generating Station shown in the background.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Dayton Power & Light Company Killen Electric Generating Station Manchester, Ohio	Project No. 01.0170142.30

Photo No.	Date:
3	06/07/11

Direction Photo Taken:
Northeast

Description:
Interior berm separating the Bottom Ash Pond and Fly Ash Pond. Blue pipes at right carry liquids for discharge into the Fly Ash Pond.

Photo No.	Date:
4	06/07/11

Direction Photo Taken:
Northwest

Description:
View of typical exterior slope of Bottom Ash Pond.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Dayton Power & Light Company Killen Electric Generating Station Manchester, Ohio	Project No. 01.0170142.30

Photo No.	Date:
5	06/07/11

Direction Photo Taken:
Northeast

Description:
View of overflow structure between the Bottom Ash Pond and Fly Ash Pond. Structure contains stop logs to control Bottom Ash Pond water level. Pipe shown in picture carries liquids from the Plant Drain to the Fly Ash Pond.

Photo No.	Date:
6	06/07/11

Direction Photo Taken:
Northwest

Description:
View looking at Bottom Ash Pond through (beneath) overflow structure between the Bottom Ash Pond and Fly Ash Pond. Structure contains stop logs to control Bottom Ash Pond water level. Pipe shown in picture carries liquids from the Plant Drain to the Fly Ash Pond.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Dayton Power & Light Company Killen Electric Generating Station Manchester, Ohio	Project No. 01.0170142.30

Photo No.	Date:
7	06/07/11

Direction Photo Taken:
West-Northwest

Description:
Inspection of T-Drain at toe of exterior slope of Bottom Ash Pond in the vicinity of Station 4+50.

Photo No.	Date:
8	06/07/11

Direction Photo Taken:
West-Northwest

Description:
T-Drain at toe of exterior slope of Bottom Ash Pond in the vicinity of Station 4+50.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Dayton Power & Light Company Killen Electric Generating Station Manchester, Ohio	Project No. 01.0170142.30

Photo No.	Date:
9	06/07/11

Direction Photo Taken:
Northeast

Description:
View of interior slope of the west-northwest dike of Bottom Ash Pond in the vicinity of Station 3+00.

Photo No.	Date:
10	06/07/11

Direction Photo Taken:
West

Description:
View of interior slope of the west-northwest dike of Bottom Ash Pond in the vicinity of Station 11+00.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Dayton Power & Light Company Killen Electric Generating Station Manchester, Ohio	Project No. 01.0170142.30

Photo No.	Date:
11	06/07/11

Direction Photo Taken:
Southwest

Description:
View of typical survey monument (beneath white protective cover).

Photo No.	Date:
12	06/07/11

Direction Photo Taken:
Northwest

Description:
View of typical monitoring well at toe of exterior slope.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Dayton Power & Light Company Killen Electric Generating Station Manchester, Ohio	Project No. 01.0170142.30

Photo No.	Date:
13	06/07/11

Direction Photo Taken:
Southeast

Description:
Discharge into the Fly Ash Pond.

Photo No.	Date:
14	06/07/11

Direction Photo Taken:
West

Description:
Discharge of Plant Drain into the Fly Ash Pond.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Dayton Power & Light Company Killen Electric Generating Station Manchester, Ohio	Project No. 01.0170142.30

Photo No.	Date:
15	06/07/11

Direction Photo Taken:
Southwest

Description:
View of interior slope of Fly Ash Pond in the vicinity of Station 119+00

Photo No.	Date:
16	06/07/11

Direction Photo Taken:
South- Southwest

Description:
View of vegetation growth on interior slope of Fly Ash Pond in the vicinity of Station 110+00

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Dayton Power & Light Company Killen Electric Generating Station Manchester, Ohio	Project No. 01.0170142.30

Photo No.	Date:
17	06/07/11

Direction Photo Taken:
North-Northwest

Description:
Vegetation growth on interior slope of Fly Ash Pond in the vicinity of Station 105+00.

Photo No.	Date:
18	06/07/11

Direction Photo Taken:
East

Description:
View of wet area at toe of exterior slope of Fly Ash Pond in the vicinity of Station 88+00.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Dayton Power & Light Company Killen Electric Generating Station Manchester, Ohio	Project No. 01.0170142.30

Photo No.	Date:
19	06/07/11

Direction Photo Taken:
East

Description:
View of rip rap on the interior slope of the Fly Ash Pond in the vicinity of Station 81+00. Note the variable size of stone.

Photo No.	Date:
20	06/07/11

Direction Photo Taken:
Southwest

Description:
View of rip rap on the interior slope of the Fly Ash Pond in the vicinity of Station 60+00. Note the variable size of stone and apparent benching of the slope.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Dayton Power & Light Company Killen Electric Generating Station Manchester, Ohio	Project No. 01.0170142.30

Photo No.	Date:
21	06/07/11

Direction Photo Taken:
Northwest

Description:
View of exterior slope of Fly Ash Pond in the vicinity of Station 40+00.

Photo No.	Date:
22	06/07/11

Direction Photo Taken:
Northeast

Description:
View of residential properties located on the northern sided of US-52

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Dayton Power & Light Company Killen Electric Generating Station Manchester, Ohio	Project No. 01.0170142.30

Photo No.	Date:
23	06/07/11

Direction Photo Taken:
Southwest

Description:
View of decant structure in the Fly Ash Pond.

Photo No.	Date:
24	06/07/11

Direction Photo Taken:
Southwest

Description:
View of decant structure in the Fly Ash Pond.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Dayton Power & Light Company Killen Electric Generating Station Manchester, Ohio	Project No. 01.0170142.30

Photo No.	Date:
25	06/07/11

Direction Photo Taken:
Southwest

Description:
View of water from Fly Ash Pond entering the decant structure.

Photo No.	Date:
26	06/07/11

Direction Photo Taken:
East

Description:
View of outfall from Fly Ash Pond through energy dissipater and Parshall flume. Note presence of tree and brush growth on lower portion and toe of exterior slope of Fly Ash Pond in the background.

GZA GeoEnvironmental, Inc.

PHOTOGRAPHIC LOG

Client Name: U.S. Environmental Protection Agency	Site Location: Dayton Power & Light Company Killen Electric Generating Station Manchester, Ohio	Project No. 01.0170142.30

Photo No.	Date:
27	06/07/11

Direction Photo Taken:
Southwest

Description:
View of a portion of the wet area observed midway between the crest and toe of the exterior slope of the Fly Ash pond in the in the vicinity of Station 80+00. Wet area occurs at the junction of the southeastern berm and the southwestern berm.

Photo No.	Date:
28	06/07/11

Direction Photo Taken:
Northeast, towards US-52

Description:
View of a wet spot, with standing water, at the toe of the exterior slope of the Fly Ash Pond in the vicinity of Station 38+00. Stormwater ditch with tree growth is in visible in the background.

Appendix F

Selected Engineering Drawings Provided by DP&L

400-12-1082

PLAN - BLOWDOWN DRAIN

SECTION A

PLAN - OVERFLOW STRUCTURE

SECTION B

BELL WALL FITTING DETAIL

SPIGOT WALL FITTING DETAIL

PLAN - OVERFLOW STRUCTURE FOOTING

ELEVATION C

SECTION D

SECTION U

SECTION K

SECTION G

DETAIL Q

CONC PIPE COLLAR EXPANSION JOINT DETAIL R

DETAIL L

DETAIL

PLAN - STANDPIPE

DETAIL M

PLAN - STANDPIPE FOOTING

QUANTITIES

REFERENCE DRAWINGS

	400-3-300
	400-3-309-A
	400-3-1030
	400-3-1041
	400-3-1060
	400-3-332
	400-3-333
	400-3-1050

LESSER REFERENCE NUMBER: DAY 38486 12-1082 R-4

LESSER SERVICES INCORPORATED

ASH HANDLING SYSTEM
MISC STRUCTURES, SECT 2 SEE VDR-541

KILLEN ELECTRIC GENERATING STATION

THE DAYTON POWER AND LIGHT COMPANY
THE CINCINNATI GAS & ELECTRIC COMPANY

400-12-1082

400-12-1083

PLAN - OVERFLOW DRAIN

STOP LOG GUIDE DET (L4)

STOP LOG DET (L3)

SECT A

SECT B

SECT C

SECT D

SECT E

SECT F

SECT L

SECT M

OVERFLOW PIPE ANCHOR DET

OVERFLOW PIPE EMBEDMENT DET

PLAN - INTAKE CHUTE

PLAN - BOX CULVERT

PLAN - DISCHARGE CHUTE

SECT G

ELEV H

SECT J

SECT K

ELEV E

QUANTITIES (NET BY FIELD UNLESS NOTED)

CONCRETE CLASS 'A' (3500 PSI)	85 CU YD
FOR REINF STEEL SEE BAR SCHEDULES SHT 400-12-1082 & 1083	
6"ø PVC W5	170 LIN FT
10"ø PVC W5	15 LIN FT
DOWELL (PE-A5)	95 EA
1" PREMOLDED JOINT FILLER	85 SQ FT
STOP LOG GUIDE ANCHOR (SEE ANCHOR DWG)	2 REQD
STOP LOG (AS PER DET L3)	4 REQD
SLOPED WALL RIP RAP (SEE 400-12-1081 SHT 2)	29 CU YD
BACKFILL AROUND STRUCTURES (SEE EMBED SPEC 400-12-1081 SHT 3)	
OR APPROVED ALTERNATE	15 CU YD
GRAVEL (3000 lbs AS PER 400-12-1081 SHT 3) OR APPROVED ALTERNATE	1 CU YD

NOTES

FOR GENERAL NOTES SEE DWG 400-12-1081

REFERENCE DRAWINGS

LIST OF DRAWINGS	400-12-1082
BAR BEND & SCHEDULE	400-12-1082 SHT 1
ASH HANDLING SYSTEM NOTES	
STRUCTURES, SECT & DET MAIN SHT	400-12-1082
ASH POND WORK SITES	400-12-1081
ASH HANDLING SYSTEM	
SYS SECTIONS & DETAILS - SHT	400-12-1081
FOR ADDITIONAL REFERENCE DWG SEE DWG	400-12-1082

WORKING DWG (T.V.A. DWG 400-12-1082)

SERVICE REFERENCE NUMBER		
DAY 38486	12-1083	R-0

EVASCO STEEL CO. INCORPORATED

TITLE: ASH HANDLING SYSTEM
M 30 STRUCTURES SECTIONS & DETAILS MAIN SHT

FOR: MILLER STEAM PLANT NO. STATION
MONTGOMERY COUNTY, OHIO
TENNESSEE VALLEY AUTHORITY

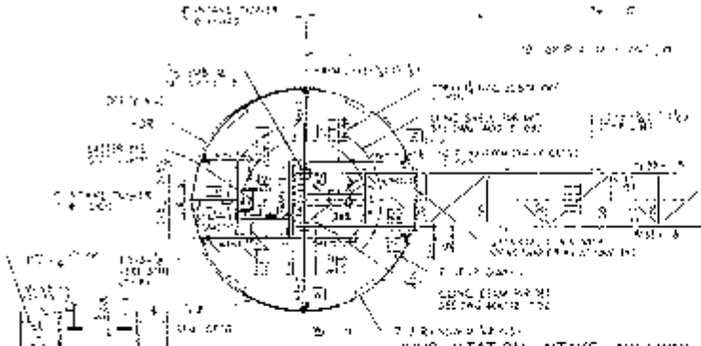
SCALE AS NOTED ON DRAWING		
DRAWN	1-13-83	
DESIGN	6-12-83	
CHECKED		
APPROVED		

THE DAYTON POWER AND LIGHT COMPANY
THE CINCINNATI GAS & ELECTRIC COMPANY

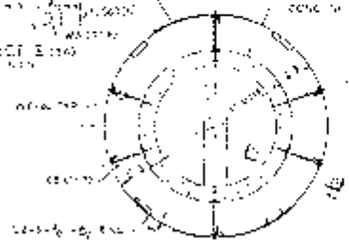
400-12-1083

400-12-2167

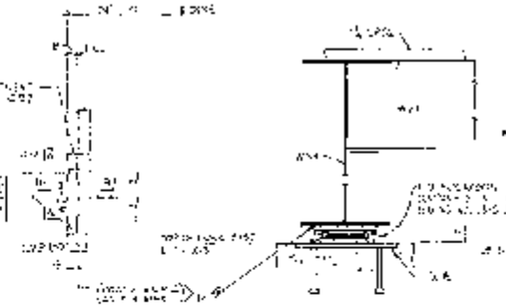
N



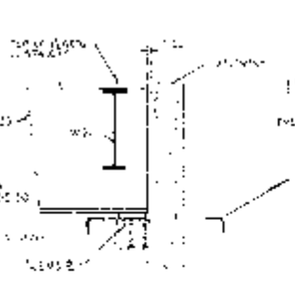
PUMP STATION INTAKE WALKWAY
PLAN EL 574.00



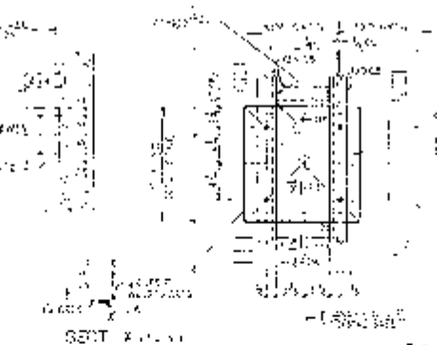
PLAN EL 583.00



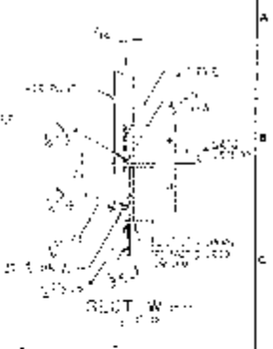
SECT A



SECT B



SECT X



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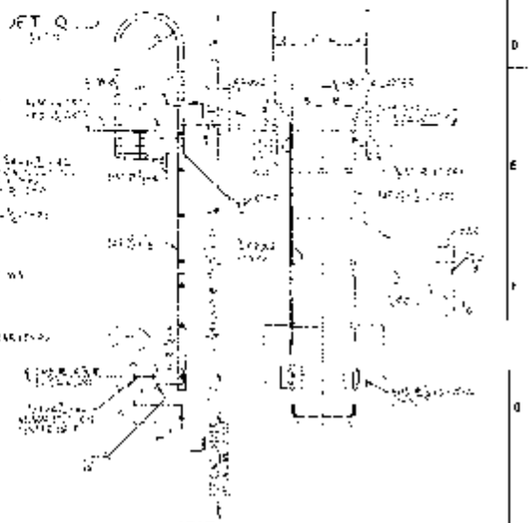
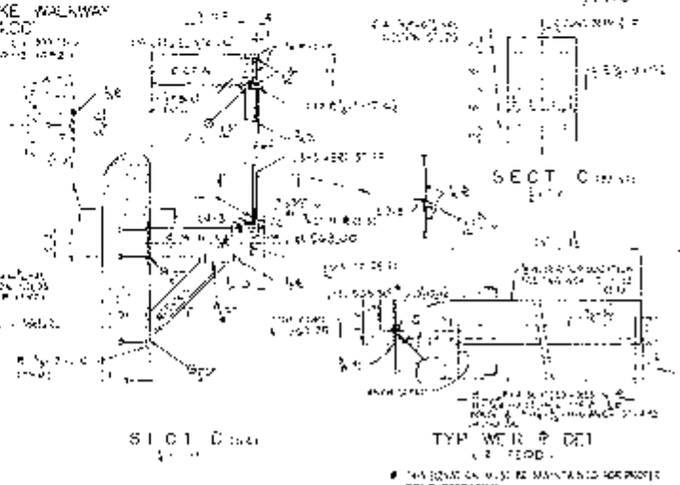


SECT Q



SECT C

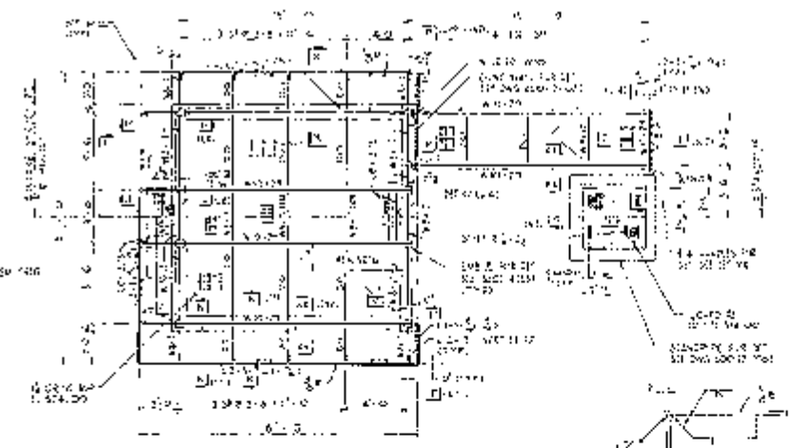
TYP WEIR & DET

SECT D

SECT F

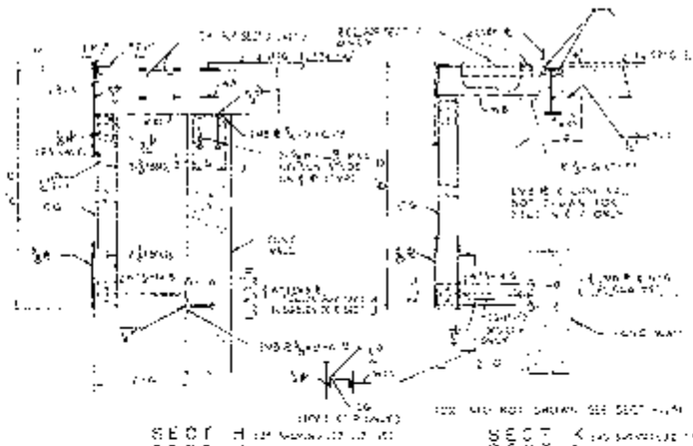
SECT G

SECT U



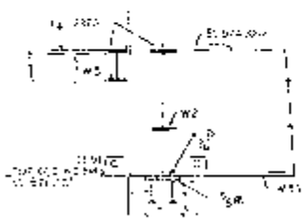
BLOWDOWN DRAIN WALKWAY
PLAN EL 574.00

DET M



SECT H
SECT J
SECT K
SECT P

SECT L



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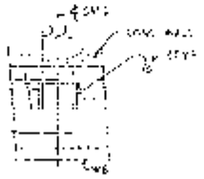

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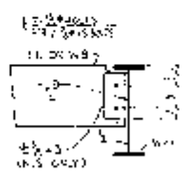
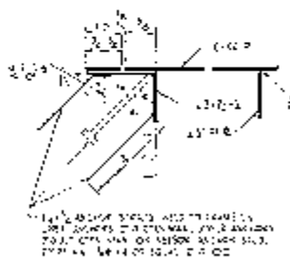
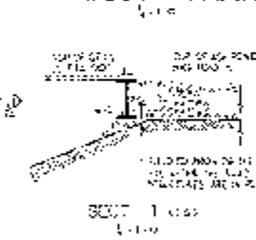


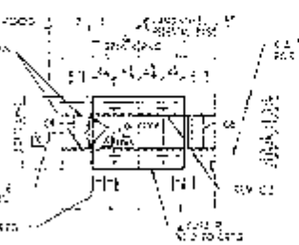
TYP REM BEAM CONN DET



SECT S



SECT T



DET Y

NOTES:

REFERENCE DRAWINGS:

DAY 38480 12-2167 R-1

EBASCO SERVICES INCORPORATED

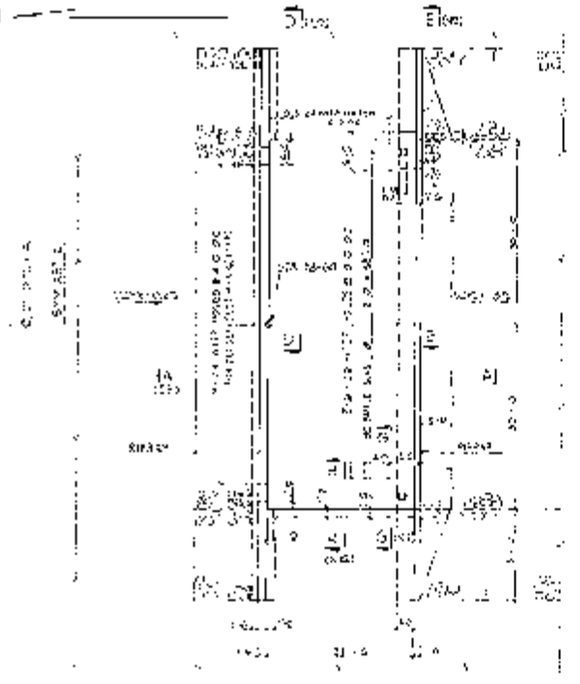
TITLE: ASH POND HDS STEEL

FOR: KILLEN ELECTRIC GENERATING STATION
BOOSTER STATION UNIT NO.2
CONDENSATE POLISHING STATION UNIT NO.1

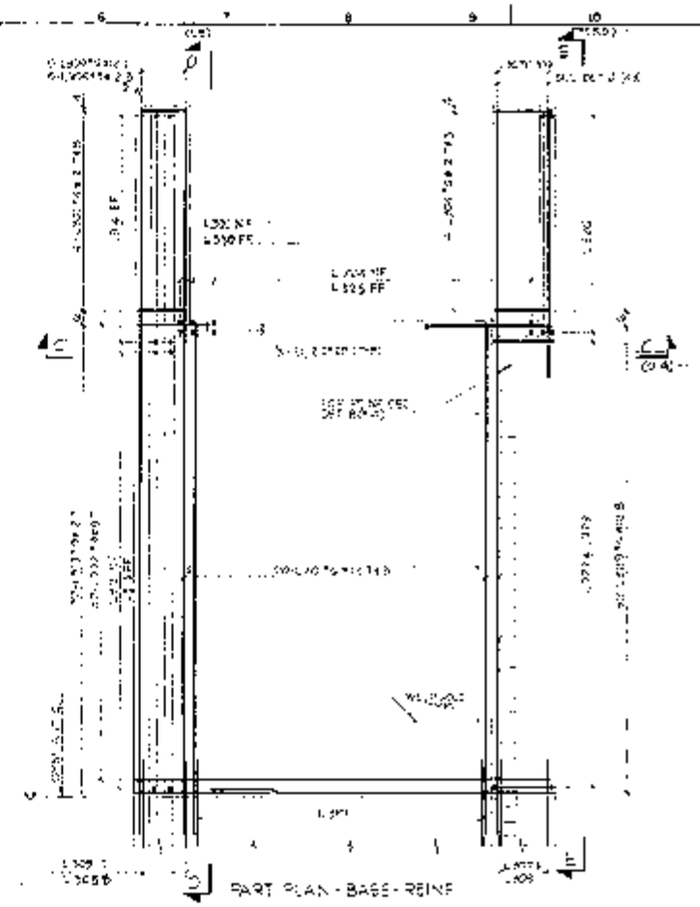
THE DAYTON POWER AND LIGHT COMPANY
THE CINCINNATI GAS & ELECTRIC CO.

400-12-2167

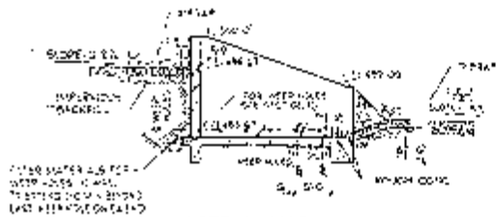
400-12-1093



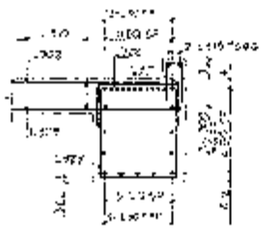
PLAN - MAS — CONC OUTFALL STRUCTURE NO 1



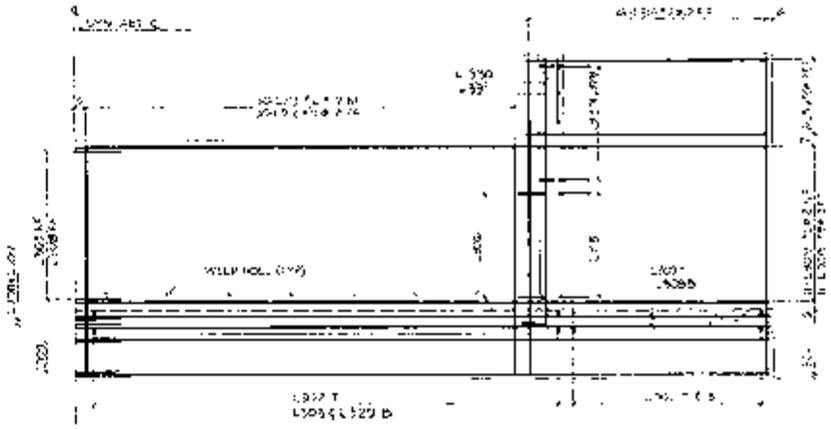
PART PLAN - BASE REINF



SECT A - MAS (S2)

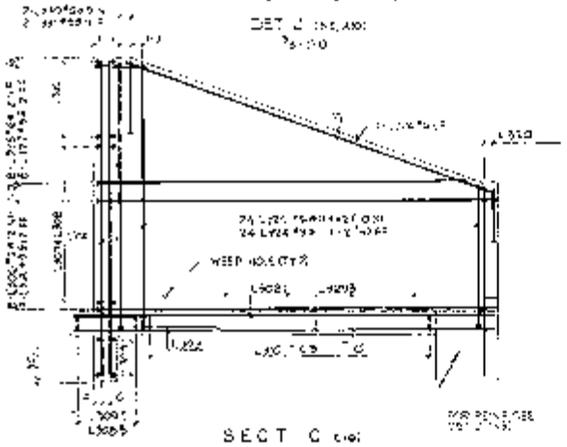


DET J (S2, A30)

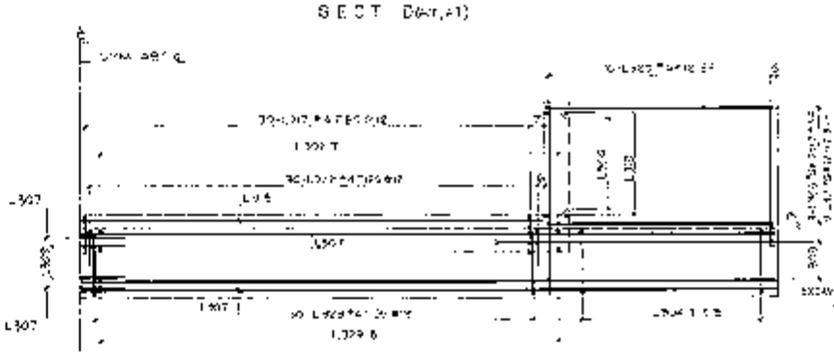


SECT D(A1, A1)

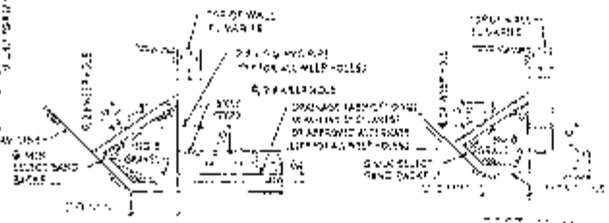
DET S (S3)



SECT C (S6)



SECT E (S4 & S5)



SECT G (S5)

SECT F (S6)

QUANTITIES

NOTES
FOR REPAIR DETAILS SEE DWG 400-12-1092
FOR ADDITIONAL NOTES SEE DWG 400-12-1087

REFERENCE DRAWINGS

	400-12-1090
	400-12-1091-00
	400-12-1092
	400-12-1086

WORK THIS DWG
DAY 3848G - 12-1093 R-0

ASH HANDLING SYSTEM
MISC STRUCTURES, SECT & DET-MISC-S14

JOLLEY BOILER - GENERATING STATION

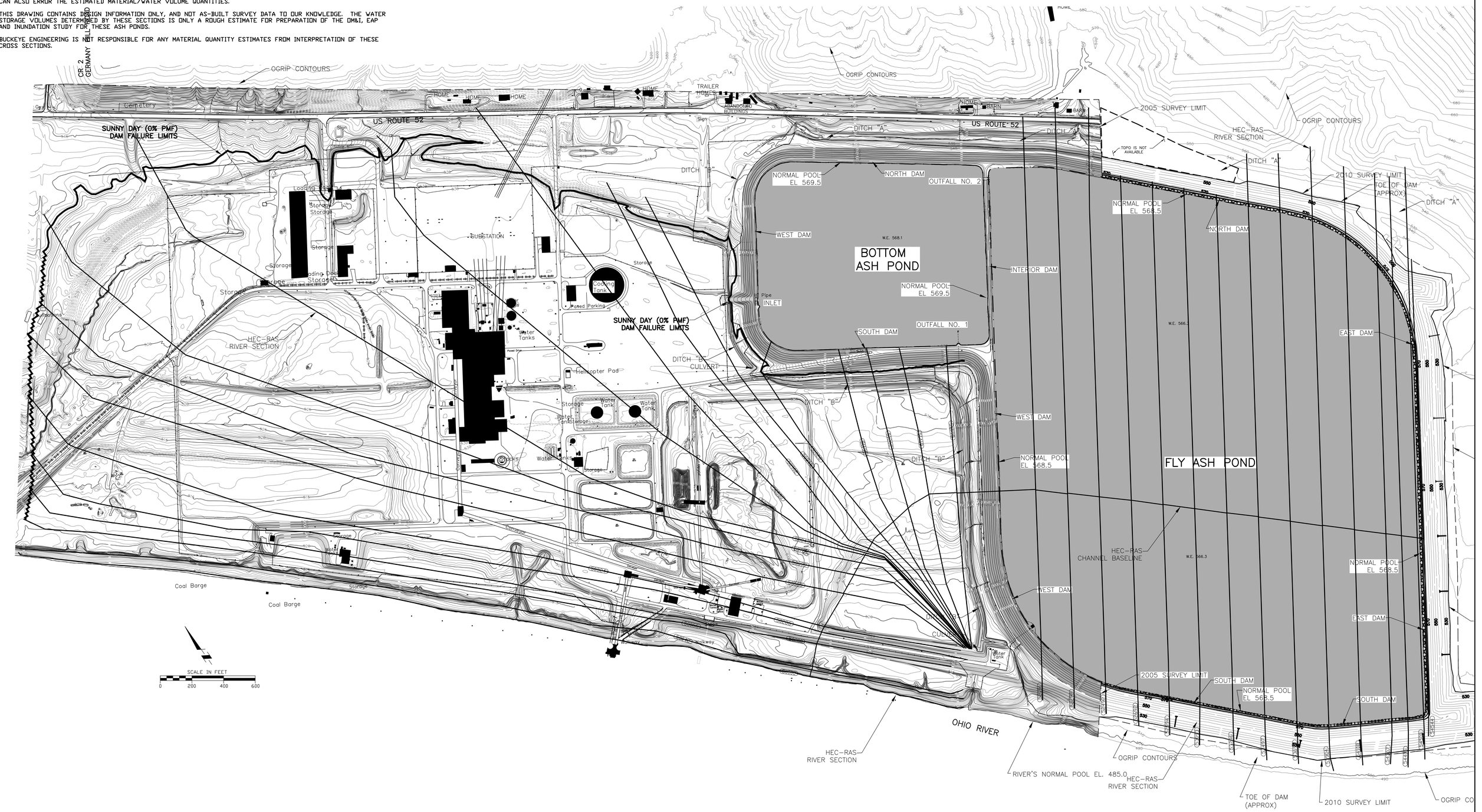
THE DAYTON POWER AND LIGHT COMPANY
400-12-1093

DISCLAIMER:

THE DIKE CROSS SECTIONS (400-12-1081, 1088, 1089, 1090 & 1091) WERE USED TO DETERMINE THE APPROXIMATE INSIDE AND OUTSIDE ORIGINAL TOE (WHERE FILL MEETS THE ORIGINAL GRADE) AND BOTTOM LIMITS OF POND. THOSE DRAWING WERE A DIGITAL TIF IMAGE THAT HAS BEEN SLIGHTLY DISTORTED BY OTHERS DURING REPRODUCTION. THE APPROXIMATE TOE OF DIKE AND BOTTOM OF POND LIMITS WERE PLOTTED ON THE SITE PLAN. THE LIMITS WERE THEN SHIFTED SLIGHTLY TO MATCH THE SURROUNDING EXISTING GRADE. THE BOTTOM ASH AND FLY ASH PONDS HAVE A 6-FOOT CLAY LINER PLACED, BUT THERE WERE NO ORIGINAL PLAN DRAWINGS THAT DEPICT THE FINAL LIMITS. THE LINER VOLUME CAN ALSO ERROR THE ESTIMATED MATERIAL/WATER VOLUME QUANTITIES.

THIS DRAWING CONTAINS DESIGN INFORMATION ONLY, AND NOT AS-BUILT SURVEY DATA TO OUR KNOWLEDGE. THE WATER STORAGE VOLUMES DETERMINED BY THESE SECTIONS IS ONLY A ROUGH ESTIMATE FOR PREPARATION OF THE OM&I, EAP AND INUNDATION STUDY FOR THESE ASH PONDS.

BUCKEYE ENGINEERING IS NOT RESPONSIBLE FOR ANY MATERIAL QUANTITY ESTIMATES FROM INTERPRETATION OF THESE CROSS SECTIONS.



NOTES:

1. DP&L PROVIDED THE TOPOGRAPHIC MAPPING DATED APRIL 2005. CAD FILES INCLUDE KIL1_STATE PLANE&NAVD88 DATUM.DWG TO KIL15_STATE PLANE&NAVD88 DATUM.DWG.
2. THE INSIDE SLOPE OF DAM BELOW THE NORMAL POOL ELEVATION WAS MEASURED AT BE 2.5H:1V.
3. THE BOTTOM OF POND ELEVATION WAS OBTAINED FROM DRAWING 300-12-1080 TITLED "ASH HANDLING SYSTEM, ASH POND AREA GENERAL PLAN, REVISED MAY 27, 1982, PREPARED BY EBASCO SERVICES INC.
4. THE TOPOGRAPHIC INFORMATION ON THE EAST SIDE OF THE IMPOUNDMENT WAS OBTAINED FROM CAD FILE "KILLEN POND TOPO 2010R" DATED JUNE 10, 2010, PREPARED BY MAYSVILLE SURVEY & ENGINEERING KY LLC.

Disclaimer:
Many assumptions were made in preparing the mapping. Actual conditions during a failure may be different than those assumed in preparing the mapping. The limits of flooding shown on the maps and the tabular data presented should be used only as a guideline for establishing areas needing evacuation. Actual areas inundated will depend on actual flooding and failure conditions and may differ, perhaps substantially, from the areas shown on the maps.

REVISIONS	DATE

PROJECT TITLE:
KILLEN ELECTRIC GENERATING STATION
ODNR FILE NO. 8533-001
MONROE TOWNSHIP, ADAMS COUNTY, OHIO

SHEET TITLE:
INUNDATION MAP
ASH IMPOUNDMENT DIKE

DES:	JFS
DR:	GLF
CHK:	
APP:	JFS

BUCKEYE ENGINEERING, LTD.
P.O. BOX 643
LEWIS CENTER, OH 43035
(740) 548-8252

JOB NO.:	09-071
SCALE:	AS SHOWN
DATE:	JUNE 10, 2010
FIGURE:	7.1