2015

Killen Station
Ash Pond Annual Inspection

ODNR File No.: 8533-001

The Dayton Power & Light Company

Prepared by:
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The Dayton Power & Light Company

Date: December 21, 2015

Purpose

I have conducted the following annual inspection in compliance of the Federal CCR Rule, 40 CFR Part 257 and Ohio Department of Natural Resources ORC 1501.062.

Statement of Qualifications

I am a practicing Civil/Geotechnical Engineer registered with the State of Ohio employed by the Dayton Power & Light Company. I am experienced in the design, maintenance and operation of earthen dams and impoundments.

Review of Impoundment Documentation [§ 257.83(b)(1)(i)]

Design, History, and Operation of the Facility

The Killen Ash Impoundment is an off-stream, partially-incised, upland reservoir designed and constructed for the storage of coal combustion ash from the Killen Station generating unit and treatment of other plant waste waters. It is bordered on the north by U.S. Route 52, west by the cooling tower, switchyard, and coal storage area, south by the Ohio River and east by agricultural lands. The dam has an overall length of 14,009.6 feet. The height of earthen dam ranges from 21.0 to 77.0 feet, based on the lowest elevation point on the downstream toe. The crest is 15 feet along the north, west and south dams. Both upstream and downstream slopes are 2.5 horizontal to 1 vertical (2.5H:1V). The original design bottom of pond is at elevation 498 feet and the crest at elevation 573 feet. This pond is divided into two basins one primarily for the containment of bottom ash and one primarily for the settlement of fly ash. The upper portion of the upstream slopes of the dam is protected from erosion with filter fabric and riprap.

The bottom ash portion flows into the fly ash portion through a concrete channel equipped with steel channel stop logs to control water elevation. There is a second outlet from the bottom ash basin which returns water to the plant for process use. This is as an 8-foot diameter riser (pump station intake tower) by 58.5-foot high reinforced concrete overflow structure with a 36-inch diameter ductile iron pipe inside of a 72-inch corrugated metal pipe (CMP) outlet with invert at elevation 511.0 feet. The elevation of the overflow section cannot be adjusted and remains at 569.5 feet. A 36-inch stainless steel sluice gate at the concrete overflow structure is provided to shut off flow from this impoundment to the plant when necessary. The primary discharge structure from the fly ash portion of the pond is a concrete weir with a metal underflow baffle which discharges through a four-foot square vertical riser connected to a 36-inch ductile iron pipe which outlets into a concrete energy dissipation structure. This outlet structure also is equipped with a sluice gate which can be used to lower the pond level but cannot be used to drain the pond.

Periodic Inspections

A thorough review of monthly and weekly facility inspections was conducted. Monthly inspections were conducted through September 2015. Weekly inspections were conducted from October 2015 through the present. These periodic inspections do not indicate any structural weakness or concerns.

Previous Structural Assessments

Original design calculations and documents were reviewed from the Final Engineering Report prepared by Ebasco Services. An assessment prepared by Civil Environmental Consultants in 2009 and 5-year inspection report from the Ohio Department of Natural Resources, Division of Water Resources, Dam Safety Program in 2008 was also reviewed. The 2013 ODNR report for Killen Station has not yet been issued.

Visual Inspection of Impoundment [§ 257.83(b)(1)(ii)]

The ash pond dam is in good structural condition based on the visual inspection. Maintenance items were noted during the field inspection. Rodent holes were found near station 110 along the fence on the bench. The protective erosion blanket was damaged where the bench drain at station 132+50 crosses under the fence. Some erosion was also noted along bench drains at station 1 and station 4+50. Noted seep areas were monitored but have not shown any change from previous inspections.

Changes in Geometry [§ 257.83(b)(2)(i)]

There were no changes to the upstream face of the dam. Rock erosion protection is in place and in good condition around the perimeter of the pond. There were no changes to the geometry of the downstream face of the dam pond or other indications of structural weakness. Slopes have no indication of deformation or other indicators of instability.

Instrumentation [§ 257.83(b)(2)(ii)]

These ponds are equipped with a staff gauge mounted on the primary outlet and eight piezometers around the perimeter. Review of data collected from piezometers does not indicate any problems.

Structural Weakness [§ 257.83(b)(2)(vi)]

No indication was found of an actual or potential structural weakness of the CCR unit or any existing condition that was disrupting or had the potential to disrupt the operation and safety of the CCR unit and appurtenant structures.

Other Changes [§ 257.83(b)(2)(vii)]

No changes were found to the CCR unit which could affect the stability or operation of the impounding structure since the previous annual inspection.

Visual Inspection of Hydraulic Structures [§ 257.83(b)(1)(iii)]

This pond contains three hydraulic structures. All three structures were found to be in good condition with no indication of deterioration. Outlet pipes for the two structures which discharge water show no signs of leaking or problems.

Design drawings indicate that there was a temporary drain from the impoundment during construction which was grouted closed. No seepage or soft ground was discovered at or around the discharge point for this pipe.

Water and Material Depths and Volumes

[§ 257.83(b)(2)(iii), § 257.83(b)(2)(iv), § 257.83(b)(2)(v)]

Physical Parameters of Impoundment		
Depth of water	70.5	Feet
Minimum depth of water	63.0	Feet
Maximum depth of water	570.0	Feet
Elevation of water	568.5	Feet (review of weekly inspection reports show normal fluctuation of the depth/water level)
Storage Capacity	21,600,000	Cubic Yards ,Crest Full Volume
Volume of water	13,200,000	Cubic Yards
Volume of CCR	6,800,000	Cubic Yards

Appendix A
CCR Rule Requirements for Impoundment Annual Inspections

257.83 (b) Annual inspections by a qualified professional engineer.

(1) If the existing or new CCR surface impoundment or any lateral expansion of the CCR surface impoundment is subject to the periodic structural stability assessment requirements under § 257.73(d) or § 257.74(d), the CCR unit must additionally be inspected on a periodic basis by a qualified professional engineer to ensure that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards. The inspection must, at a minimum, include:

(i) A review of available information regarding the status and condition of the CCR unit, including, but not limited to,
files available in the operating record (e.g., CCR unit design and construction information required by §§ 257.73(c)(1) and 257.74(c)(1),
previous periodic structural stability assessments required under §§ 257.73(d) and 257.74(d),
the results of inspections by a qualified person, and
results of previous annual inspections);

(ii) A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit and appurtenant structures; and

(iii) A visual inspection of any hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit for structural integrity and continued safe and reliable operation.

(2) Inspection report. The qualified professional engineer must prepare a report following each inspection that addresses the following:

(i) Any changes in geometry of the impounding structure since the previous annual inspection;

(ii) The location and type of existing instrumentation and the maximum recorded readings of each instrument since the previous annual inspection;

(iii) The approximate minimum, maximum, and present depth and elevation of the impounded water and CCR since the previous annual inspection;

(iv) The storage capacity of the impounding structure at the time of the inspection;

(v) The approximate volume of the impounded water and CCR at the time of the inspection;

(vi) Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit and appurtenant structures; and

(vii) Any other change(s) which may have affected the stability or operation of the impounding structure since the previous annual inspection.

Appendix B
Reference Documents Reviewed

- Operation Maintenance and Inspection Manual
- Emergency Action Plan
- Pond Design Manual
- Previous inspections reports
  - Weekly/monthly
  - ODNR 2008, 2013 Inspection not yet available from ODNR
  - GZA 2011
  - CEC 2009
  - Pullman Outlet Structure Inspection 2013
- Drawings
  - 400-12-1021
  - 400-12-1022
  - 400-12-1080
  - 400-12-1081
  - 400-12-1082
  - 400-12-1083
  - 400-12-1084
  - 400-12-1085
  - 400-12-2167
  - SK 3848 CH-192

Appendix C
Inspection Check List

Dam Field Inspection Report

DAM/IMPOUNDMENT ANNUAL FIELD INSPECTION FORM
Unit Name: Killen Ash Pond
ODNR File No.: 8533-001 ☒ CCR Unit
ODNR Hazard Classification: ☒ I ☐ II ☐ III ☐ IV ☐ N/A
Impoundment Type: ☐ Incised ☒ Upland ☐ Lake
Inspection Date(s): Dec. 2015
Weather/Surface Conditions During Inspection: mostly cool and dry.
Freeboard: 5.5 feet

	ACTION			
	NONE	MONITOR	MAINTENANCE	ENGINEER
UPSTREAM SLOPE Gradient: Horizontal: 2.5 Vertical: 1 (est. meas.)				
VEGETATION				
Trees:	☒	☐	☐	☐
DESCRIPTION AND LOCATION:				
Brush:	☒	☐	☐	☐
DESCRIPTION AND LOCATION:				
Ground Cover:	☒	☐	☐	☐
DESCRIPTION: stone shoreline protection				
CONDITION: good				
SLOPE PROTECTION	☒	☐	☐	☐
TYPE or NONE: riprap				
DESCRIPTION: C/D size stone near the water line. No 2 stone above this level in some areas.				
CONDITION:				
EROSION:	☒	☐	☐	☐
DESCRIPTION AND LOCATION:				
INSTABILITIES: (SLIDES, CRACKS, BULGES, etc.)				
SLIDES/SLOUGHS:	☒	☐	☐	☐
DESCRIPTION AND LOCATION:				
CRACKS:	☒	☐	☐	☐
DESCRIPTION AND LOCATION:				
BULGES	☒	☐	☐	☐
DESCRIPTION AND LOCATION:				
OTHER	☒	☐	☐	☐
DESCRIPTION AND LOCATION:				
OTHER (rodent burrows, ruts, etc.)				
DESCRIPTION AND LOCATION:	☐	☐	☐	☐
DESCRIPTION AND LOCATION:	☐	☐	☐	☐
DESCRIPTION AND LOCATION:	☐	☐	☐	☐
DESCRIPTION AND LOCATION:	☐	☐	☐	☐
CREST Length: 10' Width: 14,009.6' (est. meas.)				
GROUND COVER:	☐	☐	☒	☐
DESCRIPTION: Stone aggregate				
CONDITION: Good in most areas; however large pothole from traffice at station 126				
EROSION	☒	☐	☐	☐
DESCRIPTION AND LOCATION:				
INSTABILITIES: (SLIDES, CRACKS, BULGES, etc.)				
CRACKS:	☒	☐	☐	☐
DESCRIPTION AND LOCATION:				
RUTS	☒	☐	☐	☐
DESCRIPTION AND LOCATION:				

	ACTION			
	NONE	MONITOR	MAINTENANCE	ENGINEER
POT HOLES:	☐	☐	☒	☐
DESCRIPTION AND LOCATION: Large pot hole area at the south end of the division dam between the bottom ash and flyash basins (station 126).				
OTHER	☒	☐	☐	☐
DESCRIPTION AND LOCATION:				
MONITORING INSTRUMENTATION:	☒	☐	☐	☐
DESCRIPTION: Settlement monuments located along the crest.				
CONDITION: Monuments in good condition but some damage to bollards.				
☐ ALIGNMENT:				
CONDITION: compared recent monument survey with previous surveys.	☒	☐	☐	☐
OTHER (rodent burrows, ruts, etc.)				
DESCRIPTION AND LOCATION:	☐	☐	☐	☐
DESCRIPTION AND LOCATION:	☐	☐	☐	☐
DESCRIPTION AND LOCATION:	☐	☐	☐	☐
DESCRIPTION AND LOCATION:	☐	☐	☐	☐
DOWNSTREAM SLOPE Gradient: Horizontal: 2.5 Vertical: 1 (est. meas.)				
VEGETATION				
Trees:	☐	☒	☐	☐
DESCRIPTION AND LOCATION:				
Brush:	☐	☒	☐	☐
DESCRIPTION AND LOCATION:				
Ground Cover:	☐	☒	☐	☐
DESCRIPTION: Grass				
CONDITION: Cover is sparse in some areas and dominated by crown vetch or broadleaf weeds.				
one small bare spot was found between sta 53 and 54 as indicated in weekly reports.				
Area outside the fence needs to be maintained equal to that inside the fence.				
Area near toe between stations 103 and 107 has brush on the slope out side of the fence line and must be maintained				
EROSION	☐	☒	☒	☐
DESCRIPTION AND LOCATION:				
Erosion found at old style bench drains at stations 1 and 4+50. Appears to be stable.				
monitor/repair				
Eroded bench drain at station 132+50 should be repaired where the drain crosses under the fence				
INSTABILITIES: (SLIDES, CRACKS, BULGES, etc.)				
SLIDES/SLOUGHS:	☒	☐	☐	☐
DESCRIPTION AND LOCATION:				
CRACKS:	☒	☐	☐	☐
DESCRIPTION AND LOCATION:				
BULGES	☒	☐	☐	☐
DESCRIPTION AND LOCATION:				
OTHER	☒	☐	☐	☐
DESCRIPTION AND LOCATION:				
SEEPAGE/WET AREA	☐	☒	☐	☐
DESCRIPTION AND LOCATION:				
many areas on the north sid continue to be damp and saturated.				
Station 56 to 59 at the toe is damp with wet indicative vegetation as observed previously				
station 80 in the V was saturated as seen in previous inspections				
station 88 at the toe had standing clear water. No change from previous inspections				
EMBANKMENT DRAINS:	☐	☐	☐	☐

	ACTION			
	NONE	MONITOR	MAINTENANCE	ENGINEER
DESCRIPTION: None present. CONDITION:				
MONITORING INSTRUMENTATION:	☒	☐	☐	☐
DESCRIPTION: 8 Piezometers are located arount the perimeter of the dam. CONDITION: Piezometers are in good condition with new metal protective covers and locked.				
OTHER: (rodent burrows, ruts, etc.)				
DESCRIPTION AND LOCATION: Rodent burrows found near station 110 in the fence line	☐	☐	☒	☐
DESCRIPTION AND LOCATION:	☐	☐	☐	☐
DESCRIPTION AND LOCATION:	☐	☐	☐	☐
DESCRIPTION AND LOCATION:	☐	☐	☐	☐
HYDRAULIC STRUCTURES				
STRUCTURE: Bottom Ash inlet to plant DESCRIPTION: Concrete riser with ductile iron discharge pipeing. Metal Grating walk bridge to structure				
INLET	☒	☐	☐	☐
DESCRIPTION: 8' diameter structure with anti -vortex plate and sluice gate shut-off valve. CONDITION: structure is in good condition OBSTRUCTION NOTED: (☐ YES ☒ NO) DESCRIBE IF YES:				
CONDUIT	☒	☐	☐	☐
DESCRIPTION: Ductile iron pipe inside corrudaget metal pipe with access way for inspection CONDITION: pipe is in good condition with no evidence of leaks. SEEPAGE NOTED: (☐ YES ☒ NO) DESCRIBE IF YES:				
OUTLET	☒	☐	☐	☐
DESCRIPTION: pipeing carries water to various locations in the plant and was not inspected. CONDITION: Good condition with little deterioration EROSION NOTED: (☐ YES ☒ NO) DESCRIBE IF YES:				
STRUCTURE: Overflow structure from bottom ash basin to flyash basin DESCRIPTION: Concrete channel with steel channel stop-logs.				
INLET	☒	☐	☐	☐
DESCRIPTION: Concrete bottom and wing walls CONDITION: Good condition with little deterioration OBSTRUCTION NOTED: (☐ YES ☒ NO) DESCRIBE IF YES: Alarge pipe has been run through the structure but is not impacting flow.				
CONDUIT	☒	☐	☐	☐
DESCRIPTION: Concrete channel. CONDITION: Good condition with little deterioration SEEPAGE NOTED: (☐ YES ☒ NO) DESCRIBE IF YES:				
OUTLET	☒	☐	☐	☐
DESCRIPTION: Concrete bottom and wing walls CONDITION: Good condition with little deterioration EROSION NOTED: (☐ YES ☒ NO) DESCRIBE IF YES:				
STRUCTURE: Principal Outlet from fly ash basin DESCRIPTION: Concrete weir box with vertical riser and ductile iron outlet pipe to concrete outlet structure.				
INLET	☒	☐	☐	☐
DESCRIPTION: Concrete weir with metal underflow baffle. Contains a sluice gate valve to by-pass weir and lower pond level and a discharge valve. Discharge valve is locked in the open position CONDITION: Good condition with little deterioration				

	ACTION			
	NONE	MONITOR	MAINTENANCE	ENGINEER
OBSTRUCTION NOTED: (☐ YES ☒ NO) DESCRIBE IF YES:				
CONDUIT	☒	☐	☐	☐
DESCRIPTION: Verticle concrete riser connected to 3' dia. ductile iron pipe. Ductile pipe is inside a 6' corrugated metal pipe to allow for inspection.				
CONDITION: Good condition with no visible deterioration.				
SEEPAGE NOTED: (☐ YES ☒ NO) DESCRIBE IF YES:				
OUTLET	☒	☐	☐	☐
DESCRIPTION: Large concrete enery dissipation structure.				
CONDITION:				
EROSION NOTED: (☐ YES ☐ NO) DESCRIBE IF YES:				
STRUCTURE:				
DESCRIPTION: Construction drain - Pressure grouted with cement sand grout and abandoned				
INLET	☒	☐	☐	☐
DESCRIPTION: 30" CMP riser				
CONDITION:				
OBSTRUCTION NOTED: (☒ YES ☐ NO) DESCRIBE IF YES:				
CONDUIT	☒	☐	☐	☐
DESCRIPTION: 24" CMP				
CONDITION:				
SEEPAGE NOTED: (☐ YES ☒ NO) DESCRIBE IF YES:				
OUTLET	☒	☐	☐	☐
DESCRIPTION: Outlet is burried beneath river deposits. There is no indication of seepage or erosion in the area.				
CONDITION:				
EROSION NOTED: (☐ YES ☒ NO) DESCRIBE IF YES:				

Appendix D
CCR Unit Maintenance Recommendations

1. Grout rodent holes discovered near station 110.
2. Repair erosion at bench drains at station 1, 4+50, and 132+50.
3. Repair road/pothole at station 126.
4. Ensure vegetation is maintained. Periodic reports indicated that grass cover was sometimes too tall.

Continued Monitoring

1. Seepage at mid slope at station 80 and at the toe at stations 88.
2. Damp areas along the toe of the north dam.
3. Monitor for beaver activity. Weekly reports indicated that they were present in the area.