October 2016

Dynegy Zimmer, LLC
1781 US Route 52
Moscow, OH 45153

RE: History of Construction
USEPA Final CCR Rule, 40 CFR § 257.73(c)
Zimmer Power Station
Moscow, Ohio

On behalf of Dynegy Zimmer, LLC, AECOM has prepared the following history of construction for the Coal Pile Runoff Pond and D Basin at the Zimmer Power Station in accordance with 40 CFR § 257.73(c). The Gypsum Recycle Pond is an incised pond with a storage volume of less than 20 acre-feet. A history of construction is not required for Gypsum Recycle Pond as specified in § 257.73(b).

BACKGROUND

40 CFR § 257.73(c)(1) requires the owner or operator of an existing coal combustion residual (CCR) surface impoundment that either (1) has a height of five feet or more and a storage volume of 20 acre-feet or more, or (2) has a height of 20 feet or more to compile a history of construction by October 17, 2016 that contains, to the extent feasible, the information specified in 40 CFR § 257.73(c)(1)(i)–(xii).

The history of construction presented herein was compiled based on existing documentation, to the extent that it is reasonably and readily available (see 80 Fed. Reg. 21302, 21380 [April 17, 2015]), and AECOM’s site experience. AECOM’s document review included record drawings, geotechnical investigations, pipe inspection reports, etc. for the Coal Pile Runoff Pond and D Basin at the Zimmer Power Station.
HISTORY OF CONSTRUCTION

§ 257.73(c)(1)(i): The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and the identification number of the CCR unit if one has been assigned by the state.

Operator: Dynegy Zimmer, LLC
Address: 1500 Eastport Plaza Drive
Collinsville, IL 62234
CCR Units: Coal Pile Runoff Pond, ODNR Dam ID No. 8741-010, NID ID No. OH01393
D Basin

The D Basin does not have a state assigned identification number.

§ 257.73(c)(1)(ii): The location of the CCR unit identified on the most recent USGS 7\(\frac{1}{2}\) or 15 minute topographic quadrangle map or a topographic map of equivalent scale if a USGS map is not available.

The locations of the Coal Pile Runoff Pond and D Basin have been identified on an USGS 7-1/2 minute topographic quadrangle map in Appendix A.

§ 257.73(c)(1)(iii): A statement of the purpose for which the CCR unit is being used.

The following captures the purpose of the CCR unit:

- The Coal Pile Runoff Pond is being used to clarify D Basin discharge water, FGD waste streams, landfill leachate water, and other non-CCR wastewater.
- The D Basin is being used to dewater dredged CCR and non-CCR material from other ponds. The dewatered material is excavated and transported to the Zimmer landfill.

§ 257.73(c)(1)(iv): The name and size in acres of the watershed where the CCR unit is located.

The Coal Pile Runoff Pond and D Basin are located in the Little Indian Creek-Ohio River Watershed with a 12-digit Hydrologic Unit Code (HUC) of 050902011107 with a drainage area of 15,657 acres (USGS, 2016).
§ 257.73(c)(1)(v): A description of the physical and engineering properties of the foundation and abutment materials on which the CCR unit is constructed.

The foundation materials for the Coal Pile Runoff Pond and D Basin consists of, from top to bottom, fine grained alluvial soils, coarse grained soils, and bedrock. The physical properties of the fine grained alluvial soil are described as soft to stiff, moist, lean clay. The coarse grained foundation soils are described as medium dense to very dense, fine sand, silty sand, and gravelly sand. Portions of the fine grained soil and coarse grained soil are separated by a layer comprised of silty clayey sand and silt. The bedrock is described as limestone. An available summary of the engineering properties of the foundation materials is presented in Table 1 below. The engineering properties are based on previous geotechnical explorations and laboratory testing.

Table 1. Summary of Foundation Material Engineering Properties

<table>
<thead>
<tr>
<th>Material</th>
<th>Unit Weight (pcf)</th>
<th>Effective (drained) Shear Strength Parameters</th>
<th>Total (undrained) Shear Strength Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>c' (psf)</td>
<td>Φ' (°)</td>
</tr>
<tr>
<td>Alluvial Clays</td>
<td>128</td>
<td>200</td>
<td>30</td>
</tr>
<tr>
<td>Silty Clayey Sand</td>
<td>128</td>
<td>150</td>
<td>35</td>
</tr>
<tr>
<td>Fine Sand, Silty Sand, Gravelly Sand</td>
<td>120</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>Limestone</td>
<td>140</td>
<td>Impenetrable</td>
<td></td>
</tr>
</tbody>
</table>

The Coal Pile Runoff Pond and D Basin are enclosed impoundments with embankments and do not have abutments.

§ 257.73(c)(1)(vi): A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit; the method of site preparation and construction of each zone of the CCR unit; and the approximate dates of construction of each successive stage of construction of the CCR unit.

The construction of the Coal Pile Runoff Pond included a 3-foot thick compacted clay liner. The physical and engineering properties for the clay liner are not reasonably and readily available. Physical properties of the embankment materials for the Coal Pile Runoff Pond are described as very stiff to hard fine grained material typically classified as sandy lean clay. An available summary of the engineering properties of the embankment construction materials is presented in Table 2 below. The engineering properties are based on previous geotechnical explorations and laboratory testing.

D Basin was constructed over a portion of the historical coal storage area. The historical coal storage area was originally constructed as an enclosed impoundment with embankments and lined with a 3-foot thick compacted clay liner. Common fill was placed at a variable thickness over the historical clay liner to raise the subbase elevation for D Basin construction.
Construction of the D Basin typical liner section consisted of (from bottom to top) a 1-foot thick new clay liner layer with a designed permeability of \(1 \times 10^{-7}\) cm/s, a geotextile fabric, a 1-foot thick granular material underdrain layer with 6-inch diameter (dia.) high density polyethylene (HDPE) underdrain piping, a second geotextile fabric, and a 2-foot thick bottom ash protection layer. Physical properties of the embankment materials for D Basin are described as medium dense to very dense coarse grained material typically classified as silty clayey sand with gravel and silty sand with gravel. An available summary of the engineering properties of the embankment construction materials is presented in Table 2 below. The engineering properties are based on previous geotechnical explorations and laboratory testing. The physical and engineering properties for the other above-mentioned liner materials are not reasonably and readily available.

| Table 2. Summary of Embankment Construction Material Engineering Properties |

<table>
<thead>
<tr>
<th>Material</th>
<th>Unit Weight (pcf)</th>
<th>Effective (drained) Shear Strength Parameters</th>
<th>Total (undrained) Shear Strength Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandy Lean Clay (CL)</td>
<td>128</td>
<td>50</td>
<td>225</td>
</tr>
<tr>
<td>Silty Clayey Sand with Gravel</td>
<td>127</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The method of site preparation and construction for the Coal Pile Runoff Pond is not reasonably and readily available. Site preparation and construction of the D Basin were completed in accordance with the Dewatering Basin “D” record drawings (presented in Appendix B).

The approximate dates of construction of each successive stage of construction of the Coal Pile Runoff Pond and D Basin are provided in Table 3 below.

| Table 3. Approximate dates of construction of each successive stage of construction. |

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior to 1985</td>
<td>Development of historical impoundment</td>
</tr>
<tr>
<td>1986-1987</td>
<td>Conversion of historical impoundment to coal pile storage area</td>
</tr>
<tr>
<td>1987</td>
<td>Construction of Coal Pile Runoff Pond</td>
</tr>
<tr>
<td>2003</td>
<td>Construction of D Basin over portion of coal pile storage area</td>
</tr>
</tbody>
</table>

§ 257.73(c)(1)(vii): At a scale that details engineering structures and appurtenances relevant to the design, construction, operation, and maintenance of the CCR unit, detailed dimensional drawings of the CCR unit, including a plan view and cross sections of the length and width of the CCR unit, showing all zones, foundation improvements, drainage provisions, spillways, diversion ditches, outlets, instrument locations, and slope protection, in addition to the
normal operating pool surface elevation and the maximum pool surface elevation following peak discharge from the inflow design flood, the expected maximum depth of CCR within the CCR surface impoundment, and any identifiable natural or manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation.

Drawings that contain items pertaining to the requested information for the Coal Pile Runoff Pond and D Basin are listed in Table 4 below. Items marked as “Not Available” are items not found during a review of the reasonably and readily available record documentation.

Table 4. List of drawings containing items pertaining to the information requested in § 257.73(c)(1)(vii).

<table>
<thead>
<tr>
<th>Item</th>
<th>Coal Pile Runoff Pond</th>
<th>D Basin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensional plan view (all zones)</td>
<td>1-30250</td>
<td>1-30250B, 1-30250E</td>
</tr>
<tr>
<td>Dimensional cross sections</td>
<td>1-30253</td>
<td>1-30250C, 1-30250D</td>
</tr>
<tr>
<td>Foundation Improvements</td>
<td>1-30253</td>
<td>1-30250C, 1-30250D, 1-30250H</td>
</tr>
<tr>
<td>Drainage Provisions</td>
<td>Not Applicable</td>
<td>1-30250C to 1-30250E, 1-5434-01 to 1-5434-03</td>
</tr>
<tr>
<td>Spillways and Outlets</td>
<td>Not Available</td>
<td>1-30250B, 1-30250F, 1-30250G, 1-5434-01 to 1-5434-03</td>
</tr>
<tr>
<td>Diversion Ditches</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Instrument Locations</td>
<td>Plate 2</td>
<td>Fig. No. 2A</td>
</tr>
<tr>
<td>Slope Protection</td>
<td>Not Available</td>
<td>1-30250C, 1-30250D, 1-30250H</td>
</tr>
<tr>
<td>Normal Operating Pool Elevation</td>
<td>1-30253</td>
<td>1-30250G</td>
</tr>
<tr>
<td>Maximum Pool Elevation</td>
<td>Not Available</td>
<td>1-30250G</td>
</tr>
<tr>
<td>Approximate Maximum Depth of CCR in 2016</td>
<td>16 feet</td>
<td>8 feet</td>
</tr>
</tbody>
</table>

All drawings referenced in Table 4 above can be found in Appendix B and Appendix C.
Based on the review of the drawings listed above, no natural or manmade features that could adversely affect operation of these CCR units due to malfunction or mis-operation were identified.

§ 257.73(c)(1)(viii): A description of the type, purpose, and location of existing instrumentation.

Existing instrumentation within the Coal Pile Runoff Pond includes a vibrating-wire piezometer installed in 2014. The purpose of the piezometer is to measure the pore water pressure within the embankment. A location map of the existing piezometer instrumentation (B-WW-1401) is shown on Plate 2 presented in Appendix C.

Existing instrumentation within the D Basin include open-standpipe piezometers installed in 2015 near the western embankment. The purpose of the piezometers is to measure the pore water pressures at the crest and toe of the outer embankment. There are two (2) piezometers adjacent to D Basin. A location map of the existing piezometer instrumentation is shown on Figure 2A presented in Appendix C.

§ 257.73(c)(1)(ix): Area-capacity curves for the CCR unit.

Area-capacity curves for the Coal Pile Runoff Pond and D Basin are not reasonably and readily available.

§ 257.73(c)(1)(x): A description of each spillway and diversion design features and capacities and calculations used in their determination.

The Coal Pile Runoff Pond contains two (2) 15-inch diameter (dia.) high density polyethylene (HDPE) pipe culverts located in the northeast corner of the impoundment. The pipe culverts drain into the adjacent Wastewater Pond. In 2016, the discharge capacity of the Coal Pile Runoff Pond was evaluated using HydroCAD 10 software modeling a 1,000-year, 24-hour rainfall event. The model results indicate that the Coal Pile Runoff Pond spillway has enough water storage capacity and will not overtop the embankment during the 1,000-year, 24-hour storm event. The results of the HydroCAD 10 analysis are presented below in Table 5.

D Basin drains into a reinforced concrete sump structure that contains two sump pumps. The lead pump activates when the sump liquid level reaches El. 485.2 feet and the lag pump activates when the sump fluid level reaches El. 486.7 feet. The minimum pump liquid level, or shut-off level, is at El. 481.7 feet. Both pumps drain into separate 6-inch dia. HDPE pipes that discharge into the Coal Pile Runoff Pond. D Basin also contains a 10-foot-wide emergency overflow spillway with an invert elevation of 504 feet. The overflow spillway drains into the adjacent C Basin. Unless otherwise mentioned, all elevations in this report are on datum NAVD88.

In 2016, the discharge capacity of D Basin was evaluated using HydroCAD 10 software modeling a 1,000-year, 24-hour rainfall event. During the modeled event, the Ohio River flood pool would back up into the D Basin through the outfall structures from the Clearwater Pond and from emergency outfall structures for the A, B, and C Basins. During this scenario,
the Wastewater Pond Complex would be flooded to an elevation of 506 feet, and the D Basin would be part of a continuous pool that is also comprised of the A, B, and C Basin. The model results indicated that the Wastewater Pond Complex had enough storage capacity above the Ohio River flood pool level and will not overtop the perimeter embankment during the 1,000-year, 24-hour storm event. The results of the HydroCAD 10 analysis are presented below in Table 5.

Table 5. Results of HydroCAD 10 analysis

<table>
<thead>
<tr>
<th></th>
<th>Coal Pile Runoff Pond</th>
<th>Combined Basins (A, B, C &amp; D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximate Minimum Berm Elevation¹ (ft)</td>
<td>509.2</td>
<td>509.0</td>
</tr>
<tr>
<td>Approximate Emergency Spillway Elevation¹ (ft)</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Starting Pool Elevation¹ (ft)</td>
<td>507.9</td>
<td>506.0</td>
</tr>
<tr>
<td>Peak Elevation¹ (ft)</td>
<td>509.0</td>
<td>506.8</td>
</tr>
<tr>
<td>Time to Peak (hr)</td>
<td>12.2</td>
<td>13.0</td>
</tr>
<tr>
<td>Surface Area (ac)</td>
<td>2.5</td>
<td>27.3</td>
</tr>
<tr>
<td>Storage² (ac-ft)</td>
<td>2.8</td>
<td>20.8</td>
</tr>
</tbody>
</table>

Note: 1. Elevations are based on NAVD88 datum  
2. Storage given is from Starting Pool Elevation to Peak Elevation.

§ 257.73(c)(1)(xi): The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit.

The construction specifications for the Coal Pile Runoff Pond are not reasonably and readily available. Available construction specifications for D Basin are outlined on Drawing 1-30250H presented in Appendix B.

The operations and maintenance plans for Coal Pile Runoff Pond and D Basin are currently being prepared by Dynegy Zimmer, LLC.
§ 257.73(c)(1)(xii): Any record or knowledge of structural instability of the CCR unit.

There is no record or knowledge of structural instability of the Coal Pile Runoff Pond and D Basin at Zimmer Power Station.

LIMITATIONS

The signature of AECOM's authorized representative on this document represents that to the best of AECOM's knowledge, information and belief in the exercise of its professional judgment, it is AECOM's professional opinion that the aforementioned information is accurate as of the date of such signature. Any recommendation, opinion or decisions by AECOM are made on the basis of AECOM's experience, qualifications and professional judgment and are not to be construed as warranties or guaranties. In addition, opinions relating to environmental, geologic, and geotechnical conditions or other estimates are based on available data and that actual conditions may vary from those encountered at the times and locations where data are obtained, despite the use of due care.

Sincerely,

Claudia Prado
Project Manager

Victor Modeer, P.E., D.GE
Senior Project Manager

REFERENCES


APPENDICES

Appendix A: History of Construction Vicinity Map
Appendix B: Zimmer Power Station Drawings
Appendix C: Zimmer Power Station Boring and Piezometer Location
Appendix A: History of Construction Vicinity Map
Appendix B: Zimmer Power Station Drawings


INCHES
WORK THIS DRAWING WITH DRAWING NO'S. 1-30250B
OF G
10'-0"
20
6
1'-9"
3'-6"
B
2
2
33'-0"
H
1
30
3'-3"
4
N
IN.
40'-0"
PLANT NORTH
HOLD FOR CERTIFIED
4-10" NEW GRANULAR
MATERIAL
GRANULAR
LAYER
ASH PROTECTION
2'-0" NEW BOTTOM
PUMP STRUCTURE
FABRIC
GEOTEXTILE
NEW CLAY LINER MATERIAL.
REESTABLISH EXISTING
LAYER
SUBGRADE
FOR BID
SIGNATURE
01-7796
REGISTRATION NO. E-60212
SEAN R. MARSHALL, P.E.
OAK BROOK  TOLEDO  CHARLESTON, WV  BIRMINGHAM
PITTSBURGH  CHICAGO  CLEVELAND  PHILADELPHIA
02/27/03
E&C
DATE:
CHK'D:
JOB NO.
STA.NO.
W.C.  WZ438AB-S
RECEIVED BY:
E & C
ENGINEER:
APPROVED BY:
REV'D. BY
DES.
SRM
03/20/03
DATE:
01-2796
GENERAL ENGINEERING DEPARTMENT
STATION WM.H.ZIMMER
THE CINCINNATI GAS & ELECTRIC CO.
REVISION
PREPARED BY:
CHECKED BY:
E & C 14-2796
G.A. OF PUMP PIT
FOR BID
DRAFTED BY:
CHECKED:
ENGINEER:
PREPARED:
DATE:
SIGNATURE:
CHECKED:
JOB NO.:
STA. NO.:
REV.
DATE:
CHECKED:
ENGINEER:
...
1. Inert Bottom Ash (Protection Layer)

2. Storm, waste and infiltration water shall be removed and treated.

3. All granular material shall be supplied from offsite sources by the Contractor.

4. Temporary ditches, berms, grading, sump and pumps required for temporary dewatering shall be provided by the Contractor.

5. The Contractor shall perform all excavations in accordance with OSHA 29 CFR part 1926.

6. The Contractor shall be responsible for control of all water from the working areas. Storm

7. At no time shall the Contractor place fill materials overtop of organic material, vegetation

8. When a density or moisture content test is not in compliance with the

9. Inactive stockpile or onsite borrow areas shall be temporarily seeded in accordance with the

10. All elevations are Geodetic and are given in feet.

11. The Contractor shall provide all vegetation specifications.

1. All excavated organic material and topsoil shall be segregated from other common material

2. Inert Bottom Ash (Protection Layer)

3. Figured dimensions take precedence over scaled measurements.

4. Prior to placement of a successive lift, the underlying material shall be scarified to a

5. No soil material shall be placed or compacted during weather conditions which

6. The Contractor shall be responsible for control of all water from the working areas. Storm
Appendix C: Zimmer Power Station Boring and Piezometer Locations