



# Coal Combustion Residual Annual Inspection Report

FirstEnergy Generation, LLC  
Little Blue Run Impoundment  
Greene Township, Beaver County, Pennsylvania

GAI Project Number: C180602.01, Task 003  
January 2020



Prepared by: GAI Consultants, Inc.  
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Prepared for: FirstEnergy Generation, LLC.  
800 Cabin Hill Drive  
Greensburg, Pennsylvania 15601-1650

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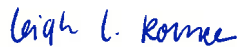
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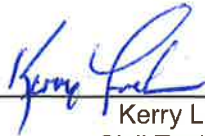
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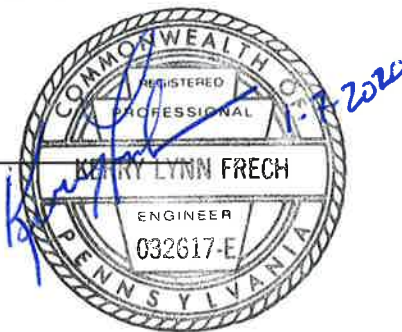
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## Certification/Statement of Professional Opinion

The Annual Inspection of Little Blue Run Impoundment was performed by GAI Consultants, Inc. (GAI) on Thursday, September 12, 2019. The Inspection was based on the information identified in Section 3 of this report that GAI has relied on but not independently verified, and the visual observations made by GAI personnel at the Site during specific site visits. Therefore, this Certification/Statement of Professional Opinion is limited to the information available to GAI at the time the Inspection was performed. On the basis of, and subject to the foregoing, it is my professional opinion as a Professional Engineer licensed in the Commonwealth of Pennsylvania that the Inspection has been performed pursuant to the agreed upon Scope of Services in accordance with good and accepted engineering practices as exercised by other engineers practicing in the same discipline(s), under similar circumstances and at the time and in the same locale. It is my professional opinion this Annual Inspection Report was prepared consistent with the requirements of the United States Environmental Protection Agency's "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments," published in the Federal Register on April 17, 2015, with an effective date of October 19, 2015.

The use of the words "certification" and/or "certify" in this document shall be interpreted and construed as a Statement of Professional Opinion and is not and shall not be interpreted or construed as a guarantee, warranty, or legal opinion.

Kerry L. Frech, P.E.



## 1.0 Purpose

Pursuant to the Federal Coal Combustion Residuals (CCR) Rule 40 of the Code of Federal Regulations (40 CFR) Part 257.83, each CCR unit is to have an annual inspection and report prepared by a qualified Professional Engineer. The inspection is to include:

- ▶ a review of available information regarding the status and condition of the CCR unit, including, but not limited to, files in the operating record;
- ▶ a visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit; and
- ▶ 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.

The inspection report is to include:

- ▶ any changes in geometry of the impounding structure since the previous annual inspection;
- ▶ the location and type of existing instrumentation and the maximum recorded readings of each instrument since the previous annual inspection;
- ▶ the approximate minimum, maximum, and present depth and elevation of the impounded water and CCR since the previous annual inspection;
- ▶ the storage capacity of the impounding structure at the time of the inspection;
- ▶ the approximate volume of the impounded water and CCR at the time of the inspection;
- ▶ 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
- ▶ any other change(s) that may have affected the stability or operation of the impounding structure since the previous annual inspection.

An annual inspection report was posted for the 2015, 2017, and 2018 calendar years. In 2016, a structural stability assessment was performed under 40 CFR 257.73(d), and in accordance with 40 CFR 257.83(b)(4)(ii), an annual inspection report was not required. This report fulfills the requirements for the 2019 annual inspection.

## 2.0 Introduction

The Little Blue Run Impoundment (Impoundment) is located in Greene Township, Beaver County, Pennsylvania (PA). The Impoundment is on Little Blue Run, a tributary to Mill Creek and to the Ohio River. The Impoundment accepted CCR from the nearby FirstEnergy Bruce Mansfield Power Plant in Shippingport, PA until December 31, 2016, at which time CCR disposal operations ceased. The facility is currently undergoing closure. When operating, CCRs were pumped overland through a pipeline system approximately eight miles in length. Little Blue Run operates under National Pollutant Discharge Elimination System (NPDES) Impoundment Permit PA0027481. The Impoundment facility consists of two embankments, the main dam and the saddle dam, which create the reservoir.

From 2004 through and ending in 2016, CCRs were deposited in the upper reaches of the reservoir behind a series of woven geotextile geotubes extending across the reservoir. The disposal was in accordance with the PA Department of Environmental Protection (PaDEP) Bureau of Waste Management Solid Waste Permit No. 300558. The permit allowed coal combustion solids to be stored to elevation 1162 feet National Geodetic Vertical Datum (NGVD) in the upper portion of the reservoir upstream of the geotubes. Disposal also occurred in the reservoir pool area adjacent to the main dam, up to elevation 1088 feet NGVD.

## 2.1 Main Dam

The Little Blue Run Dam is permitted under PaDEP Dam Permit/I.D. No. D04-049. It is a zoned, earth and rockfill dam embankment with an impermeable clay core. Underlying the core, and sloping with the core, is a two-part filter underdrain system connected to a blanket underdrain that underlies the entire dam embankment downstream of the clay core. Resistant rock protective shells exist on the upstream and downstream dam slopes, which are sloped at 2H:1V.

The dam is approximately 400 feet high with a crest elevation of 1,100 NGVD, a crest length of 2,100 feet, and a crest width of 50 feet. A roadway on the embankment crest provides access between the abutments. The normal operating pool elevation is 1,088 feet NGVD, but the pool level has been lowered in 2019 to facilitate future closure activities. The dam stores a maximum volume of approximately 107,000,000 cubic yards of CCR (135,418,900 cubic yards including the storage behind the geotubes - CEC, 2013). Approximately 1,694 acres are permitted for CCR disposal, of which approximately 1,000 acres have been used. Disposal activities ended as of December 31, 2016.

Near the downstream toe of the dam, two perforated, one-foot-diameter, polyvinyl chloride (PVC) drain pipes, embedded within the foundation filter underdrain system, extend along the toe of the embankment from both abutments. Both pipes drain the foundation blanket underdrain by gravity to a buried concrete sump located at the toe of the dam. The sump drains into a solid-wall 16-inch outside diameter (O.D.) PVC toe drain (TD) pipe extending downstream approximately 290 feet, discharging into the Stilling Basin. The 16-inch PVC TD pipe is embedded at the bottom and along the center line of an approximately 290-foot-long, redundant, trapezoidal, two-part aggregate filter system with an average cross-sectional width of 32 feet and nominal height of 12 feet. The redundant, trapezoidal filter is designed to carry flow in excess of the design flow from the dam embankment underdrain system in the event of a TD pipe failure. Water has not been observed discharging from the redundant, trapezoidal filter system. The 16-inch O.D. PVC TD pipe discharges into a Parshall Flume (TD flume), which discharges directly into the Stilling Basin.

## 2.2 Saddle Dam

An additional embankment, the Little Blue Run Saddle Dam, was constructed approximately 2,200 feet upstream of the main dam on the east side of the Little Blue Run valley. The saddle dam is permitted under PaDEP Dam Permit/I.D. No. D04-068. The dam is 13 feet in height and constructed with an internal clay core and downstream embankment toe drain system. The Saddle Dam fills a low area in the ridge line between the Little Blue Run and Mill Creek valleys. No spillways are located at the Saddle Dam.

## 3.0 Information Review

CCR Rule §257.83(b)(1)(i) states an inspection includes, “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).”

GAI Consultants, Inc. (GAI) reviewed the following available information:

- ▶ Daily Inspection Reports, including Instrumentation Readings (October 1, 2018 through September 30, 2019);
- ▶ 2015, 2017, and 2018 Annual CCR Inspection Reports;
- ▶ Closure Plan, Major Permit Modification Application, Little Blue Run Disposal Area, March 2013;
- ▶ 2016 Structural Stability and Safety Factor Assessment;

- ▶ 2019 Pre-Inspection findings;
- ▶ Surface Monument Surveys performed by Michael Baker, Jr., Inc. (December 6, 2018 and June 14, 2019);
- ▶ Site record drawings; and
- ▶ Permit documents.

The reports are listed under the References section. Conversations were held with FirstEnergy personnel before and following the inspection to obtain additional information including daily inspection records, operation and maintenance procedures, and the current state of the Impoundment. The evaluations described in this report are based on instrument monitoring data for a water year from October 1, 2018 through September 30, 2019.

## 4.0 Visual Inspection

### 4.1 General Information

The inspection was performed on September 12, 2019. Mr. Chris Mular, P.E., and Mr. Kerry L. Frech, P.E., of GAI performed the inspection. The weather was partly sunny, temperatures in the 60s (Fahrenheit), with little or no rainfall in the days preceding the inspection.

### 4.2 Inspection Strategy, Route, and Observations

The GAI team inspected the Impoundment and its facilities by making visual observations, recording site conditions and instrumentation readings, and talking to FirstEnergy personnel.

#### 4.2.1 Main Dam

The inspection started at the emergency and service spillway area. The conditions of the spillways, including approach and outlet areas, were observed. The decreased evidence of recent all-terrain vehicle paths and the placement of used high density polyethylene (HDPE) piping as access barriers suggest that former unauthorized access to the area has been addressed. The access hatch installed on the service spillway vault chamber was locked, and the vault chamber was not viewed during the inspection. The interior of the chamber was viewed in March 2019 and appeared clean and clear at that time.

The inspection proceeded to the downstream left abutment of the embankment and included observations of past surficial soil slides on the left abutment. Water levels in the left abutment open-tube well points (piezometers LA-01 through LA-07B) were recorded.

The crest, the upstream and downstream faces, and conditions within the reservoir were then observed in crossing the dam along the crest to the right abutment. No tension cracks, depressions, or significant puddle areas were observed on the crest or faces. Water levels in embankment piezometers EMB-1 and EMB-2 were also recorded. At the right abutment, the personnel inspected the secondary spillway and its approach channel.

The secondary spillway was not in operation at the time of the inspection. The pool level was read from the staff gage installed at the Secondary Spillway. Seepage conditions on the right abutment were observed at the right abutment bench, including a reading at the Right Abutment (RA) Flume 1. Observations of the right abutment and the downstream dam face were made in traversing the access road below the right abutment.

Because disposal activities have ceased in the Impoundment, observations are no longer made at the "North-South" line, which denoted the boundary where disposal was allowed above elevation 1088.0 feet NVGD in accordance with Solid Waste Permit No. 300558. Conditions at the Impoundment appear to be in accordance with the approved disposal and the closure plans. General observations of conditions at the Impoundment were made from the main dam crest and the eastern side of the Impoundment.



The signage located at the main dam, as required for the facility under CFR §257.73(a)(1), was missing from its post.

The embankment toe and downstream area were then observed. Conditions at the TD flume, the Stilling Basin, the Main Discharge Channel, the Service Spillway outlet, and the instrumentation facilities were observed, and no major issues were identified. The Main Discharge Channel below the RA weir has been re-constructed using HDPE channel sections. Readings were taken at the TD piezometers (UD-1 and UD-2). Degradation of the staff gages was noted at the RA Weir and the Stilling Basin. Readings of flow were taken at the upper and lower left abutment (ULA and LLA) weirs and the Stilling Basin. The RA weir was not operating due to the Main Discharge Channel re-construction, and no reading was taken at that weir.

The outlet of Little Blue Run at Mill Creek and the outlet of the By-pass Pipe Discharge to the Ohio River were observed to conclude the main dam inspection. The outlet of the by-pass pipe was flowing without obstruction.

#### **4.2.2 Saddle Dam**

Conditions at the Saddle Dam were observed, and water levels in piezometers SD-1 and SD-3 were recorded, with levels consistent with past levels. No animal burrows were observed, no seepage was observed from the Saddle Dam embankment toe, and no issues were identified.

### **4.3 Geometry**

Pursuant to §257.83(b)(2)(i), “any changes in the geometry of the impounding structure since the previous annual inspection” are reported. The current cumulative movements of the monuments at the dam over the life of the dam (1976 to present) are assessed by a twice-yearly survey of 22 monuments on the crest and downstream face of the main dam. The movements recorded by survey through June 2019 are considered consistent with and within the range of movements that can be expected of an embankment dam of this size.

#### **4.3.1 Main Dam**

The crest and the upstream and downstream slopes of the Little Blue Run Dam embankment were examined, and no cracking, slumping, or burrow holes were observed. No visual signs of slope instability were observed. The crest had no visual indication of lateral or vertical movement. Based on visual inspection and a comparison to the design drawings, no changes to the geometry of the embankment were observed. Assessment of the monument survey performed by Baker in June 2019 did not indicate movements out of line with past movements.

#### **4.3.2 Saddle Dam**

The crest and the upstream and downstream slopes of the Saddle Dam embankment were examined, and no cracking or slumping were observed. No visual signs of slope instability were observed. The crest had no visual indication of lateral or vertical movement. Based on the visual inspection, no changes to the geometry of the embankment were observed.

### **4.4 Instrumentation**

Pursuant to CFR §257.83(b)(2)(ii), “the location and type of existing instrumentation and the maximum recorded readings of each instrument since the previous annual inspection” are reported, presented in Table 1.

#### **4.4.1 Main Dam**

FirstEnergy personnel take daily readings of the RA-Flume, RA-Weir, ULA Weir, LLA Weir, the TD, and at the Stilling Basin. Readings are taken at the piezometers monthly (approximately) by GAI personnel. The data is evaluated on a water year (October 1 of a given year through September 30 of the following year) basis. All flumes and weirs can receive storm runoff flows,



and the RA-Weir and the Stilling Basin can also receive flows through the secondary spillway. Data for days in which significant rainfall (greater than 0.5-inch) has occurred are excluded from the seepage assessment for all weirs and flumes, and data for days in which the secondary spillway was operating are excluded from the seepage assessment for the RA Weir and the Stilling Basin.

Twelve open-tube well points (open standpipes or piezometers) have been installed on the Little Blue Run Dam and its environs. Two piezometers (UD-1, UD-2) monitor the water elevation in the embankment filter blanket/underdrain system near the downstream toe of the embankment. Two piezometers (EMB-1, EMB-2) are situated on the crest of the dam embankment to monitor potential development of a phreatic surface within the embankment should such a surface develop. EMB-1 and EMB-2 have been dry since their installation in 2010. Eight piezometers (LA-01, -02, -03, -04, -05, -06, -07a, and -07b) are situated on the downstream left abutment. Three of these piezometers (LA-01, LA-02, and LA-03) are located on the ridge line between the dam and the Emergency Spillway, and the remaining five are on the slope between the dam and the Service Spillway right-of-way. The data for the piezometers through September 2019 was reviewed for this inspection report.

Twenty-two surface monuments have been installed on Little Blue Run Dam and are monitored for vertical and horizontal movement. Nine monuments are located on the crest, and 13 are located on the downstream face of the dam. The most recent (June 2019) monument survey indicates movements consistent with past surveyed movements, and within the range of movements that can be expected of an embankment dam of this size. Damaged bolts at two monuments on the dam crest were re-set to their approximate original positions.

#### 4.4.2 Saddle Dam

Two piezometers have been installed in the Little Blue Run Saddle Dam, at the crest (SD-1), and near the downstream toe (SD-3). The data for these piezometers was last reviewed in September 2019. SD-3 has occasionally been dry since its installation in late 2014. The water level measured in SD-1 is below the water level that would affect the stability of the embankment.

**Table 1**

**Maximum Instrumentation Readings – October 2018-September 2019 – Seepage Conditions Only**

Instrumentation	Type	Maximum Recorded Readings <sup>1, 2</sup>
Pool Level	Staff Gage	1088.9 feet, NGVD
TD Parshall Flume	Flume - Seepage Only	743 gpm
RA Weir	Weir - Seepage Only	488 gpm
ULA Weir	Weir - Seepage Only	196 gpm
LLA Weir	Weir - Seepage Only	86 gpm
RA-Flume 1	Flume - Seepage Only	44 gpm
UD-1	Open-Tube Well Point - Piezometric Level	695.16 feet, NGVD
UD-2	Open-Tube Well Point - Piezometric Level	694.41 feet, NGVD
EMB-1	Open-Tube Well Point - Piezometric Level	dry
EMB-2	Open-Tube Well Point - Piezometric Level	dry
LA-01	Open-Tube Well Point - Piezometric Level	1031.57 feet, NGVD
LA-02	Open-Tube Well Point - Piezometric Level	1029.48 feet, NGVD
LA-03	Open-Tube Well Point - Piezometric Level	1028.79 feet, NGVD

Instrumentation	Type	Maximum Recorded Readings <sup>1, 2</sup>
LA-04	Open-Tube Well Point - Piezometric Level	950.07 feet, NGVD
LA-05	Open-Tube Well Point - Piezometric Level	920.47 feet, NGVD
LA-06	Open-Tube Well Point - Piezometric Level	853.28 feet, NGVD
LA-07A	Open-Tube Well Point - Piezometric Level	756.46 feet, NGVD
LA-07B	Open-Tube Well Point - Piezometric Level	803.96 feet, NGVD
SD-1	Open-Tube Well Point - Piezometric Level	1085.82 feet, NGVD
SD-3	Open-Tube Well Point - Piezometric Level	1079.82 feet, NGVD

Notes:

- The maximum observed daily readings for the weirs and flumes are based on measurements taken from October 1, 2018 through September 31, 2019. Data for days in which significant (greater than 0.5-inch) rainfall occurs, and during operation of the secondary spillway, are excluded from the presentation of the seepage flows as measured at the weirs and flumes.
- Piezometer readings are the highest elevation recorded from October 1, 2018 through September 30, 2019.

#### 4.5 Depth and Elevation of Impounded Water and CCR

Pursuant to CFR §257.83(b)(2)(iii), “the approximate minimum, maximum, and present depth and elevation of the impounded water and CCR since the previous annual inspection” are reported.

The approximate depths and elevations of the impounded water and CCR at the time of inspection, September 12, 2019, are listed below in Table 2. Changes in depth and elevation are solely due to changes in the pool level, and not CCR levels, because disposal operations ended in December 2016.

**Table 2**  
**Approximate Depths and Elevations**

Depth (feet) <sup>1</sup>			Elevation (NVGD)		
Minimum	Maximum	Present	Minimum <sup>2</sup>	Maximum <sup>2</sup>	Present <sup>3</sup>
335 (approx.)	341.3	335 (approx.)	1081.19	1088.9	1081.5

Note:

- The Impoundment depths are based on a minimum Impoundment bottom elevation of 747 feet NVGD (Drawing GN-2375-S-28).
- The Impoundment pool elevations are the minimum and maximum daily values reported from October 1, 2018 through September 30, 2019.
- The Present Impoundment pool elevation is the reported pool elevation as of September 30, 2019.

#### 4.6 Storage Capacity

Pursuant to CFR §257.83(b)(2)(iv), “the storage capacity of the impounding structure at the time of the inspection” is reported.

The total storage capacity of the Impoundment is approximately 107,000,000 cubic yards (135,418,900 cubic yards including the total storage behind the geotubes) (CEC, 2013). Disposal operations ceased as of December 31, 2016, and closure activities are underway.

#### 4.7 Volume of Impounded Water and CCR

Pursuant to CFR §257.83(b)(2)(v), “the approximate volume of the impounded water and CCR at the time of the inspection” is reported.

The approximate volume of the impounded CCR and water in the Impoundment at the time of the inspection was 129,052,000 cubic yards, including the storage behind the geotubes (CEC, 2017). Disposal operations ceased as of December 31, 2016, and closure activities are underway.

#### 4.8 Structural Appearance

Pursuant to CFR §257.83(b)(2)(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” are reported.

Based on visual inspection, the Impoundment appeared to have no structural weaknesses, and no existing conditions were observed that are disrupting or that have the potential to disrupt the operation and safety of the CCR unit at the time of inspection. The piezometric levels at the well points and the seepage flows monitored at the weirs and flumes are consistent with past values, and do not pose a risk to structural stability.

The June 2019 monument survey indicated movements consistent with past movements, and within the range of movements that can be expected for an embankment dam of this size.

#### 4.9 Unit Performance

Pursuant to CFR §257.83(b)(2)(vii), “any other change(s) which may have affected the stability or operation of the impounding structure since the previous annual inspection” are reported.

The lower section of the Main Discharge Channel downstream of the dam experienced severe erosion and loss of sections of its grouted riprap lining in late 2018. The channel was completely re-constructed in 2019 from the RA weir downstream to the Stilling Basin using high-density polyethylene channel sections. The damage to the channel section did not affect the stability or integrity of the Impoundment.

Voids in the surface of the CCR in the vicinity of the interface between the CCR and the upstream face developed starting in May 2019. The voids appeared as “holes” in the surface of the CCR, approximately 2-3 feet in diameter, into which water would flow if the pool level was higher than the CCR surface. The first void was discovered in May 2019, and subsequent voids developed near the dam-CCR interface in August 2019. GAI and FirstEnergy personnel viewed the initial void in May, and checked water levels in the piezometers, and the flows in the flumes and weirs for unusual conditions or evidence of piping. No unusual conditions were noted. FirstEnergy continues to monitor the voids as part of its daily facility inspections, and GAI has conducted periodic visits which have included observations of the voids. No significant increase in seepage flows rates or quality, or in the piezometric water levels that correspond to flow events at the voids have been observed. No correlation between the flow into the voids and changes in pool level, seepage flows, or water levels in the piezometers has been found. Flows into the voids have since ceased as the pool level has continued to be lowered. No changes in the geometry of the upstream face of the Impoundment have been observed, and the voids appear to be limited to being within the CCR material.

Based on the visual inspection, no changes were observed that would affect the stability or operation of the Impoundment.

## 5.0 Conclusions and Recommendations

During the 2019 visual inspection of the Impoundment, GAI did not find signs of distress or malfunction that would affect the structural condition of the Impoundment. No releases of CCR were observed during the 2019 inspection. Unusual conditions (damage to the Main Discharge Channel and the voids in the CCR) were investigated and determined to not affect the stability or integrity of the Impoundment.

### 5.1 Recommendations

- Continue to monitor the existing voids in the CCR, and for the development of new voids;
- Continue to monitor the instrumentation, including for changes in quality as well as quantity of the flows and water levels;
- Clean or replace degraded staff gages at the Stilling Basin and the RA Weir;
- Continue routine maintenance for vegetation control at the instrumentation sites and the Saddle Dam, and animal burrows at the Saddle Dam;
- Replace the signage for the facility as required under CFR § 257.73(a)(1); and
- Continue to maintain access controls.

## 6.0 References

- Civil and Environmental Consultants, Inc. 2017. *Annual Operations Report for the Report Year April 2016 to April 2017, Permit No. 300588*. June 2017.
- Civil and Environmental Consultants, Inc. 2016. *Structural Stability & Safety Factor Assessment; Little Blue Run Disposal Area*. October 17, 2016.
- Civil and Environmental Consultants, Inc. 2013. *Closure Plan; Major Permit Modification Application; Little Blue Run Disposal Area*. March 2013.
- Environmental Protection Agency. 2015. *40 CFR Parts 257 and 261, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities*. April 17, 2015.
- FirstEnergy Corporation, Bruce Mansfield Plant. *Daily Dam Inspection and Instrumentation Data: Little Blue Run Dam*. October 1, 2018 through September 30, 2019.
- GAI Consultants, Inc., 2019. "2019 Pre-Inspection Memo", August 2019.
- GAI Consultants, Inc., 2018. *Coal Combustion Residual Annual Inspection Report*, December 2018.
- GAI Consultants, Inc., 2017. *Coal Combustion Residual Annual Inspection Report*. October 2017.
- GAI Consultants, Inc., 2016a. *Coal Combustion Residual Annual Inspection Report*. January 2016.
- GAI Consultants, Inc., 2016b. *Inspection and Evaluation Report No. 102*. December 2018.
- GAI Consultants, Inc., 1974. *Plot Plan Impoundment, Drawing No. E-8399- (GH No. 2375-S-23)*. February 15, 1974.
- Michael Baker Jr., Inc. 2019a. *Surface Monument Survey*. June 14, 2019.

## **APPENDIX A**

### **Annual Inspection Checklist**

**CCR Surface Impoundment  
Annual Inspection Checklist**

**Project Name** Little Blue Run Impoundment  
**Project No.** C180602.01.003  
**Inspection Team** Kerry Frech & Chris Mular  
**Time** 9:00 AM - 3:00 PM

**Landfill No.** Little Blue Run Impoundment  
**Date** 9/12/2019  
**Weather Conditions** early am fog, humid, partly cloudy, trace rain on preceding 2 days  
**Temperature** 60s °F

Review of Available Information (Preamble and 257.83(b)(i))	Reviewed
Files in operating record	yes
Design and construction drawings	yes
Previous inspection forms	yes
Previous structural assessments	yes
Signage	yes
Status and condition of impoundment	yes

**Comments:**  
*Re-construction of the Main Discharger Channel (Secondary Spillway) is complete except for punchlist items.  
 No growth or discharges into the voids in the CCR within the impoundment.  
 No observed changes in the geometry of the main dam or the saddle dam.  
 Main Discharge Channel re-construction affected flows at the Toe Drain Flume due to submergence.*

Visual Inspections (Preamble and 257.83)	Comments			
<b>Weakness or malfunction of CCR or appurtenant structure?</b>	yes	<input checked="" type="radio"/> no		
<b>Hydraulic structures under base or dike of CCR unit safe and reliable?</b>	yes	no	<i>Not applicable (none)</i>	
<b>Any changes in geometry?</b>	yes	<input checked="" type="radio"/> no	<i>Monument survey indicates minor movements consistent with type and size of dam</i>	
<b>Any surface erosion detected? (257.73)</b>	yes	<input checked="" type="radio"/> no	<i>Surficial slides in left abutment area do not impact dam safety. Damaged Main Discharge Channel has been re-constructed.</i>	
<b>Depth and elevations of impounded water?</b>	<b>min</b>	335 feet deep (elevation 1082 feet)	<b>max</b>	342.3 feet deep (elevation 1089.3 feet)
<b>and of CCR?</b>	<b>min</b>	see above	<b>max</b>	see above
<b>Impoundment storage capacity (current)?</b>	107,000,000 cu. yds (135,418,900 cu. yds including behind geotubes) - no change as disposal operations ceased after December 31, 2016.			
<b>Approximate Volume of impounded water and CCR?</b>	129,052,000 cu. yds			
<b>Location of instrumentation and max. reading?</b>	See the Report text for maximum measurements for the instrumentation.			
<b>Monuments</b>	Monuments: 9 on crest, 13 on downstream face; monument survey indicates minor movements consistent with type and size of dam.			
<b>Piezometers</b>	Piezometers: 2 near downstream toe, 2 on crest, 8 on downstream left abutment between dam and service spillway; most recent readings indicate approximate same elevations as in 2018 Report, and are consistent with past readings.			
<b>Weirs &amp; Flumes</b>	Weirs and flumes: 2 on right abutment, 2 on left abutment, 1 downstream; readings are generally consistent with past readings.			