2018 Annual Inspection Report

Gavin Power, LLC

Bottom Ash Complex and Stingy Run Fly Ash Reservoir

Gavin Power Plant
Cheshire, Ohio

8 January 2019

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Bottom Ash Complex and Stingy Run Fly Ash Reservoir
at the Gavin Power Plant in Cheshire, Ohio

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Acronyms and Abbreviations

BAC	Bottom Ash Complex
CCR	Coal Combustion Residual
CFR	Code of Federal Regulations
ERM	ERM Consulting & Engineering, Inc.
FAR	Fly Ash Reservoir
MSL	Mean Sea Level

1. INTRODUCTION

The Bottom Ash Complex (BAC) and Stingy Run Fly Ash Reservoir (FAR) at the Gavin Power Plant in Cheshire, Ohio are surface impoundments subject to 40 Code of Federal Regulations (CFR) Part 257, Subpart D, “Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments,” known as the Coal Combustion Residuals (CCR) Rule. The CCR Rule requires an annual inspection and reporting for surface impoundments.

This Annual Inspection Report of these two surface impoundments has been prepared by ERM Consulting & Engineering, Inc. (ERM) to comply with these requirements of the CCR Rule, 40 CFR § 257.83(b).

1.1 Summary of Conditions of Annual Inspection

Mr. James Hemme, P.E., Dr. Matt Hurst, P.E., Ph.D., and Mr. Jeremy Young, P.E. performed the annual inspection. Mr. Douglas E. Workman, Gavin Environmental Support, and Mr. Colin McKean, the Landfill Process Owner at Gavin Power, were the facility contacts and supported the inspection activities. Other members of the Gavin Power team also assisted with logistics and provided data for the completion of the inspection and report.

The inspections of the BAC and the FAR were performed on 17 October 2018. Weather on 17 October consisted of clear skies, light wind, and temperatures ranging from 50 degrees Fahrenheit (°F) to 60°F. In the seven days prior to inspection, 1.12 inches of precipitation were recorded at the rain gauge at Gavin Power Plant site.

1.2 Regulatory Cross-Reference Table

According to 40 CFR § 257.83(b)(1), annual inspections must be completed on CCR surface impoundments by a qualified Professional Engineer. As noted above, the three inspectors of the BAC and FAR were all Professional Engineers. Table 1, below, is a regulatory cross-reference table that describes the additional inspection requirements and where this report addresses these requirements.

Table 1: Federal Regulatory Requirement Cross-Reference Table

Federal Regulatory Requirement Summary	Location in the Annual Report
§ 257.83(b)—Annual inspections by a qualified professional engineer	Sections 1.1 and 1.2
§ 257.83(b)(1)(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, previous periodic structural stability assessments, the results of inspections by a qualified person, and results of previous annual inspections)	Section 6
§ 257.83(b)(1)(ii))—A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit and appurtenant structures	Sections 3 and 4; Appendix A
§ 257.83(b)(1)(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	Sections 3 and 4; Appendix A
§ 257.83(b)(2)(i))—Any changes in geometry of the impounding structure since the previous annual inspection	Sections 2.2 and 2.3.1
§ 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	Section 5; Appendix C
§ 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	Tables 2 and 3
§ 257.83(b)(2)(iv)—The storage capacity of the impounding structure at time of inspection	Tables 2 and 3
§ 257.83(b)(2)(v)—The approximate volume of the impounded water and CCR at time of the inspection	Tables 2 and 3
§ 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 and appurtenant structures	Sections 3 and 4; Appendix A
§ 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	Sections 3 and 4; Appendix A

2. GAVIN PLANT INFORMATION

2.1 Facility Overview

The Gavin Power Plant is located in Gallia County, Ohio, just south of Cheshire, Ohio, and adjacent to State Route 7, as shown on Figure 1. The Plant is also adjacent to the western shoreline of the Ohio River. Nearby towns include Addison, Ohio and Point Pleasant, West Virginia.

2.2 Bottom Ash Complex

The BAC is adjacent to Ohio State Route 7, which is immediately south of the Plant and west of the Ohio River. The BAC consists of two ponds: a larger Bottom Ash Pond and a smaller Recirculation Pond, which abuts and is located to the northwest of the Bottom Ash Pond. The location of the Bottom Ash Pond is shown on Figure 1, and the general layout of the BAC is shown on Figure 2.

The Bottom Ash Pond and the Recirculation Pond consist of continuous earthen embankments that surround the complex on all four sides. Bottom ash slurry is pumped into the Bottom Ash Pond. The water from Bottom Ash Pond is decanted through a reinforced concrete drop inlet structure into the Recirculation Pond. Within the Recirculation Pond, stored water is pumped to the Plant for reuse or discharged to the Ohio River via an overflow structure, in conformance with the facility's National Pollutant Discharge Elimination System permit. Table 2 provides current operational information and updated geometry of the BAC as required by 40 CFR § 257.83(b)(2)(iii), (iv), and (v). ERM did not observe any significant changes in geometry of the BAC based on its 2018 site visit and review of previous inspection reports.

Table 2: 2018 Operation Information for the Bottom Ash Complex

Parameter	Value
Total Surface Area[1]	84 acres
Height of Dikes	22 to 36 feet
Average Solids Elevation[2]	550 to 562 feet above Mean Sea Level (MSL)
Storage Capacity[3]	2,000 acre-feet
Lowest Crest Elevation	586 feet above MSL
Elevation of Water Bottom Ash Pond and Water Depth	Most recent: 577.5.0 feet above MSL (21.5 feet deep); Minimum: 575.8 feet above MSL (19.8 feet deep); Maximum: 578.4 feet above MSL (21.5 feet deep)
Elevation of Water Recirculation Pond and Water Depth[4]	Most recent: 575.5 feet above MSL (25.5 feet deep); Minimum: 573.5 feet above MSL (23.5 feet deep); Maximum: 575.8 feet above MSL (25.8 feet deep)
Approximate Volume of Impounded Water[5]	1,200 acre-feet
Approximate Volume of CCR[6]	462 acre-feet

2.3 Stingy Run Fly Ash Reservoir

The FAR is located about 2.5 miles northwest of the Plant. The location of the FAR is indicated on Figure 1. The outfall from the FAR drains to Stingy Run, which is a tributary to Kyger Creek. Kyger Creek flows into the Ohio River approximately 3 miles downstream and south of the Plant. The layout of the FAR is shown on Figure 3. As discussed in Section 2.3.2, the Stingy Run Fly Ash Pond has been undergoing closure, which is anticipated to be completed by 2020.

2.3.1 Stingy Run Fly Ash Dam

The Stingy Run Fly Ash Dam is an earthen embankment that was constructed to retain settled fly ash at the Stingy Fly Ash Pond. In previous reports, this area was also referred to as the Main Dam. The south end of the dam has an elevation of 731 feet and has been leveled and widened to accommodate construction traffic associated with the expansion of the Residual Waste Landfill. The elevations of the north and south groins are 735 feet.

On the downstream (east facing) slope below the crest there are additional benches near the middle and at the toe of the slope to allow access. An access road from the toe follows the northern groin of the embankment, and a construction haul road follows the southern groin providing access for routine operations and construction traffic (Figure 3). As the FAR pond closure construction progresses, the crest of the dam will be lowered to a level that is slightly below the elevation of the middle bench.

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[1] As reported in Geosyntec's 2016 Groundwater Monitoring Network Evaluation – Bottom Ash Complex Report, the BAC has a surface area of 84 acres, of which 78 acres are the Bottom Ash Pond, and 6 acres are the Recirculation Pond. This surface area is the entire complex including outer banks.

[2] The value reported above is provided in Geosyntec's 2016 Groundwater Monitoring Network Evaluation – Bottom Ash Complex Report, Geosyntec. For the purposes of these calculations, a solids elevation of 556 feet was assumed.

[3] The total storage capacity was estimated based on a maximum storage elevation of 586 feet and available surface area of about 51 acres in the Bottom Ash Pond and 4 acres in the Recirculation Pond.

[4] The estimated solids elevation in the Recirculation Pond was assumed to be 550 feet.

[5] The approximate volume of impounded water for the Bottom Ash Pond was estimated based on the depth of water at the time of inspection and an estimated surface area.

[6] The approximate volume of CCR was estimated using a bottom area of 38.5 acres and an average depth of 12 feet.

Reservoir levels were previously regulated by a 100-foot-high concrete intake tower within the principal spillway. Currently, reservoir levels are maintained in a minimized state and are regulated by an adjacent siphon pump that maintains the pool level at a constant elevation. During the inspection, the surface water elevation in the Fly Ash Pond was 665.0 feet. In the event of a large storm, sufficient pool capacity is present to store the precipitation event and the existing concrete intake tower is still operable. Specific geometric information regarding the Fly Ash Pond is shown on Table 3 in accordance with 40 CFR § 257.83(b)(2)(iii), (iv), and (v). ERM did not observe any significant changes in the geometry of the FAR based on its 2018 site visit and review of previous inspection reports.

Table 3: 2018 Operational Information for the Stingy Run Fly Ash Reservoir

Parameter	Value
Approximate Surface Area at Pool Level	6.5 acres
Minimum Embankment Crest Elevation	731 feet above MSL
Ash thickness on bottom of Pool	5 to 60 feet thickness
Storage Capacity[7]	13,800 acre-feet
Water Elevation and Depth	Most recent: 664.2 feet above MSL (1.9 feet deep); Minimum: 663.0 feet above MSL (0.8 feet deep); Maximum: 673.3 feet above MSL (11.1 feet deep)
Approximate Volume of Impounded Water at time of inspection[8]	13 acre-feet
Approximate Volume of CCR[9]	3,900 acre-feet

2.3.2 Stingy Run Fly Ash Pond

The Stingy Run Fly Ash Pond was originally constructed for settling fly ash. In 1994, the Plant ceased fly ash slurry discharges into the reservoir and since that time, only direct precipitation and storm water from upstream areas have entered the pond. A Closure Plan for the Stingy Run Fly Ash Pond was approved by the Ohio Environmental Protection Agency in 2016.

Closure of the Stingy Run Fly Ash Pond is currently in progress, and is anticipated to be completed by 2020. Fly ash located in a southern finger of the pond near the dam was covered with an engineered fill for expansion of an existing on-site landfill. The remaining fly ash is being capped incrementally as fly ash is dewatered and stabilized upstream of the dam. The general progression of the capping process will be from west (upstream) to east (downstream). A series of engineered channels will be installed across the capped fly ash areas for management of storm water. The channels will tie into Stingy Run on the downstream end.

[7] The storage capacity for the top of dam was based on a total area of 497 acres and a top of dam elevation of 731 feet. In the future, the dam may be lowered. If the elevation at the principal spillway is used (698 feet) then the storage capacity would decrease to approximately 7,000 acre-feet.

[8] The approximate volume of impounded water was estimated based on the approximate surface area of the pond covered by water at time of the annual inspection and an estimated average depth of 2 feet.

[9] The total capacity of the CCR was reported in the 2016 Annual Inspection Report (AEP, 2017) as 9,900 acre-feet. Subtracting the calculated storage capacity from the total capacity reported yields the approximate volume of CCR.

3. BOTTOM ASH COMPLEX VISUAL INSPECTION

The 2018 annual visual inspection conducted for the BAC is summarized below. Photographs referenced herein are located in Appendix A. The approximate locations where the photographs were taken are shown on Figure 4. Qualitative terms used herein to describe the inspection are summarized in Appendix B. The annual inspection report discusses each embankment section of the BAC (i.e. west, south, east, and north embankments and Recirculation Pond) separately. There were no appearances of actual or potential structural weakness of the BAC during the 2018 visit. In addition, there were no existing conditions that were disrupting or had the potential to disrupt the operation and safety of the BAC and appurtenant structures.

3.1 Western Embankment Section

The western embankment section (including crest, slope, and toe) appeared to be in satisfactory condition (i.e., appeared to be vegetated and in stable condition). There was no visible settlement, rutting, or misalignment identified. The following is a summary of the inspection:

1. The interior slope had no visual indication of settlement, rutting, or misalignment. The rip rap along the toe of the interior embankment appeared to be in satisfactory condition (Photograph 1). Vegetation on the interior of the slope was sparse and ERM recommends developing more robust vegetative cover in this area. (Photograph 1).
2. The drainage ditch along the exterior toe of the western embankment had positive drainage and was clear of vegetation. The pipe culvert at the end of the ditch to the south had some vegetation present, but no significant obstructions were identified and the culvert had positive drainage.
3. The exterior slope had no visual indication of settlement, rutting, or misalignment except for an earthen bulge noted halfway down the slope (Photograph 4), a vegetated erosion gully (Photograph 5), and minor vegetated erosion rills and gullies along the exterior of the slope in localized areas (Photograph 6). The earthen bulge and vegetated erosion gully do not appear to be active or expanding. The earthen bulge was previously noted in the 2016 and 2017 Annual Inspection Reports, and did not appear to be active during the 2016 or 2017 inspections. The bulge in this area has reportedly existed since original construction.

3.2 Southern Embankment Section

The southern embankment section was generally in satisfactory condition (i.e., appeared to be mostly vegetated and in stable condition). The following is a summary of this visual inspection:

1. The interior and exterior slope had no visual indications of misalignment or settlement (Photographs 7, 8, and 9). The riprap along the toe of the interior embankment also appeared to be in satisfactory conditions (Photograph 10).
2. To the east along the interior slope, sparse vegetation was identified that may be the result of the placement of bottom ash along the road surface (Photograph 7). The inert nature of bottom ash and the associated lack of nutrients were likely the cause of the sparse vegetation in that area. A few isolated areas to the west with sparse vegetation were also identified (Photograph 11).
3. A vegetated swale adjacent to the toe of the exterior slope had positive drainage and was vegetated. There was no sign of seepage from the embankment (Photograph 9). A pipe culvert near the center of the embankment draining to the south appeared to be functioning adequately and draining standing water from the swale.

4. There appeared to have been recent grading activities for the coal ash (Photographs 12, 15, and 16). Portions of the interior slope were buttressed by stockpiles of bottom ash. The exposed surface was contained within the embankment, and surface slopes appeared stable at time of inspection.

3.3 Eastern Embankment Section

The eastern embankment section was in satisfactory condition (i.e., appeared to be in stable condition) with some spots of sparse vegetation and minor rills/gullies. No visible indications of rutting, misalignment, or recent settlement were noted. The following is a summary of this visual inspection:

1. The interior slope appeared to be stable and portions of the interior slope were buttressed by stockpiles of bottom ash (Photographs 17 through 22). The stockpiles of bottom ash also appeared to be stable.
2. The pipe and support structures for the two slurry lines entering the pond had minor rusting in localized areas but appeared to be structurally sound and in satisfactory condition (Photographs 18 and 19).
3. The exterior slope appeared stable and the majority of the slope had established vegetative growth. Along the exterior crest, localized areas of sparse vegetation were identified from the crest and approximately 5 feet vertically down the slope (Photographs 23). Along these localized bare spots, a few isolated rills and gullies were identified (Photographs 29). There was also some evidence of past sloughing along the exterior slope; however, these areas were vegetated and appeared stable, with no recent signs of movement (Photograph 30).

3.4 Northern Embankment Section

The northern embankment section was in satisfactory condition (i.e., appeared to be in stable condition) with some spots of sparse vegetation and minor rills/gullies. No visible indications of rutting or settling were noted. The terrain was hummocky along the exterior crest with some bare spots. The following is a summary of the visual inspection:

1. The conveyor system running along the crest appeared to be functional and in satisfactory operating condition (Photograph 31).
2. The interior crest, slope, and toe was vegetated or rip rapped and stable. No settling, rutting, or misalignment of terrain was identified (Photographs 40 and 41). Along the interior embankment crest, localized bare spots were identified (Photograph 42).
3. Along the exterior crest and top of the slope, localized bare spots were identified (Photographs 34 through 36). Along the exterior slope, rills and minor gullies had formed in localized spots along the slope and crest (Photographs 37 and 38). These minor gullies and rills appear to have been the result of recent erosion that may be partially a result of runoff from the roof of the conveyor. A bare spot was identified at the toe of the slope in the general vicinity of these rills and gullies (Photograph 36).
4. A drainage ditch and grass swale adjacent to the toe of the exterior slope had positive slope and were effectively draining water into downstream inlet structures (Photograph 38).
5. A small depression, 1 foot in diameter and approximately 18 inches deep, was identified during the inspection. The depression was marked with a stake and flag to help identify it for people working in the area (Photograph 39). It did not appear from visual inspection to impact the structural stability of the embankment. ERM recommends that this area be monitored in the future for additional depressions or settlement.

3.5 Recirculation Pond

The Recirculation Pond embankment was generally in satisfactory condition. No visible indications of settlement were apparent along the embankment. There were some minor indications of rills/gullies and sparse vegetation on the interior slope of the pond. In addition, the overflow structure, mixing points, and other flow structures appeared to be functional and satisfactory. The following is a summary of this visual inspection:

1. No leakage or settlement around support structures was identified, and the support structure and associated features appeared to be in satisfactory condition. Inlet and outlet pipes were protected and functioning (Photographs 43 and 45).
2. The crest, slope, and toe along the interior were mostly vegetated or contained rip rap. The rip rap areas appeared to be in stable condition (Photographs 46 and 47).
3. A limited area of shallow sloughing was identified along the interior slope in the northwest corner of the Recirculation Pond embankment (Photograph 41). This area was noted during previous inspections. This area was vegetated, and no tension cracks or other signs of recent soil movement were identified.
4. Near the northwest corner on the interior of the pond, a small depression was noted just above the line of the rip rap (Photograph 47). The depression was approximately 1.5 feet in diameter and 2 feet deep. ERM recommends that this area be monitored in the future for additional depressions or settlement.

4. STINGY RUN FLY ASH RESERVOIR INSPECTION

This annual inspection was conducted for the FAR consisting of the Stingy Run Fly Ash Dam and the surrounding embankment sections on the Stingy Run Fly Ash Pond in accordance with 40 CFR § 257.83(b). Observations from the visual inspection are summarized below. Photographs referenced herein are located in Appendix A. The approximate locations where the photographs were taken are shown on Figure 5. Qualitative terms used herein to describe the inspection are summarized in Appendix B. There were no appearances of actual or potential structural weakness of the FAR during the 2018 visit. In addition, there were no existing conditions that were disrupting or had the potential to disrupt the operation and safety of the FAR and appurtenant structures.

4.1 Toe of Dam

The toe of the Stingy Run Fly Ash Dam was in satisfactory condition. The drainage features along the toe into Stingy Creek also were functional and appeared to be in working order. Vegetation had recently been removed from the weir area prior to the inspection. ERM recommends that additional maintenance be performed by the Plant to clear weir structures of debris and vegetation. No visual indication of settlement, misalignment, or rutting was apparent along the embankment from the toe up to the intermediate bench. The following is a summary of this visual inspection:

1. The toe ditch had a positive drainage to Stingy Creek. The ditch and three V-notched weirs (VW-1, VW-2, and VW-3) in the ditch were functioning (Photographs 48 and 49). The overflow weir and mixing point had an unobstructed flow condition and the supporting structure appeared to be in satisfactory condition (Photograph 50).
2. The slope from the toe up to the intermediate bench appeared to be in satisfactory condition. The toe and bottom portion of the slope is buttressed with rip rap nearly halfway up to the intermediate bench (Photograph 49). The rest of the slope, excluding the rip rap, was well vegetated and appeared to be stable (Photograph 52).
3. Saturated soil was observed at the base of the embankment (Photograph 48). Because there was no measurable change in discharge between the 2017 and 2018 inspection, and considering the functionality of the weirs, the observation of saturated soils would not indicate a stability or structural issue with this dam.

4.2 Intermediate Bench of Dam

The intermediate bench and upslope of the bench was in satisfactory condition (i.e., well vegetated) with no visible indication of rutting, settlement, or misalignment noted along the slope (Photograph 53). There was no excess sediment noted along access roads (which could be a sign of erosion from upslope), which had positive drainage away from the road centerline (Photograph 54).

A small puddle of standing water was noted toward the center of the bench, which had signs of concentrating water across the road and discharging down the slope during heavy periods of rain. This was likely created by a rut that was formed by use of the access road. This was a localized access road issue and did not impact the structural integrity of the dam. ERM recommends Gavin regrade this localized stretch of road.

4.3 Crest of Dam

The crest of the dam and the land immediately downslope to the east (downstream) were in satisfactory condition. No visible indication of rutting, settling, or misalignment was noted along the crest or immediately downslope of the crest. The following is a summary of this visual inspection.

1. To the inside of the dam crest (upstream) there were several localized areas of erosion and vegetated rills and gullies.
2. There was also indication of previous soil movement at multiple locations along the embankment. These areas of erosion and movement are known to the Ohio Department of Natural Resources as documented in its May 2017 inspection. Since the inspection, the soil movement has apparently continued and the slip feature has expanded (Photograph 58). Given that the pond elevation is maintained approximately 60 vertical feet below the crest, the significant volume of storage available, the inspection by the Ohio Department of Natural Resources, and the temporary status of the embankment, no action is deemed necessary for the noted areas, except for continued monitoring. The approved Closure Plan for the Fly Ash Pond referenced in Section 2.3.2 of this report indicates that this soil will be removed prior to final closure in 2020.
3. Sections of the above noted soil movement have encroached up to the access road on the crest of the embankment (Photograph 58). As noted above, this does not impact the stability or integrity of the impoundment and this situation should continue to be monitored.
4. Localized subsidence from a previous borehole was identified (Photograph 56 and 57). The local subsidence should be filled in controlled lifts and compacted. As noted above, this does not pose a safety concern, as the pond elevation is maintained well below this local subsidence and the subsidence noted is not a result of active movement on the dam.
5. There was no excess sediment identified along access roads and disturbed areas associated with the recent lowering of the embankment crest (i.e., no signs of upslope erosion).

4.4 Fly Ash Pond

The west slope towards the pond was either vegetated or consisted of rip rap that had been placed for the majority of its length. The water level in the Fly Ash Pond is no longer controlled by the spillway discharge structure and is now maintained and controlled to a limited depth and footprint by a float-controlled dewatering pump, with siphons used as needed. The following is a summary of this visual inspection:

1. The slope towards the shoreline appeared to be stable and in satisfactory condition. Riprap was visible along the surface of the slope. Areas without riprap had established vegetation along the slope. There were isolated areas of uneven terrain, but overall there was no evidence of continued instability, settling, or rutting. Slumping and soil settlement were observed along the slope in localized areas, but no active settlement was identified (Photograph 59). As noted above, the elevation where this was observed was well above the maintained pond elevation.
2. Vegetation was observed to be increasingly sparse heading west toward the shoreline (Photograph 60). However, the bench and shoreline area towards the pond appeared to be stable and in a satisfactory condition.
3. There was no excess sediment (i.e., no evidence of upslope erosion) or standing water observed along access roads, and the access roads had positive drainage toward the remaining impounded water for purposes of sedimentation (Photograph 61).

5. ASSESSMENT OF RECENT INSTRUMENTATION DATA

5.1 Bottom Ash Complex

Two piezometers, labeled BAP-1, and BAP-2, are located at the BAC as shown on Figure 2. Water level readings were obtained from piezometers BAP-1 and BAP-2 and the Bottom Ash Pond and Recirculation Pond. BAP-1 is near the drainage ditch along the western dike and BAP-2 is located near the toe of the exterior slope of the southern dike. A plot of the maximum monthly recorded readings from these piezometers and pond surfaces is shown in Appendix C in accordance with 40 CFR § 257.83(b)(2)(ii). From January 2018 through December 2018, water levels in BAP-1 and BAP-2 have average elevations of 540.8 feet above MSL, with standard deviations of 1.9 and 1.5 feet, respectively.

The water levels in the Bottom Ash Pond and Recirculation Pond have average elevations of 577.2 and 575.2 feet above MSL, with standard deviations of 0.5 and 0.3 feet, respectively. These results indicate that recorded water levels in the ponds and piezometers have been relatively constant throughout the year. This year's results are consistent with last year's average elevations of 577.3 and 575.3 feet above MSL for the Bottom Ash Pond and Recirculation Pond, respectively.

5.2 Stingy Run Fly Ash Reservoir

The current monitoring plan of Stingy Run Fly Reservoir includes four monitoring wells, three seepage weirs, 15 deformation monuments, and two slope inclinometers, as shown on Figure 6.

5.2.1 Observation Wells and Pond Surface

The present monitoring program includes four observations wells (OB-24, OB-28, OB-29, and OB-31), whose locations are shown in Figure 6. While observation well OB-24 is continuing to be monitored, historical data indicate that the well has been dry since May 2012. In addition, wells OB-28, OB-29 and OB-31 were removed in September 2018 as part of ongoing construction activities. Data for these observation wells collected in 2018 are plotted in Appendix C.

The average pond water level for this year is 665.8 feet above MSL with a standard deviation of 3.1 feet. In 2014, as part of the FAR closure, the water elevation in the pond was gradually lowered to approximately 664 feet (±1 foot). In 2017, an operational change was made such that the pond water level was no longer maintained by the spillway discharge structure, but is now maintained by a float controlled dewatering pump on the north side of the pond shoreline, with siphons as backup.

Observation Well OB-28, on the north end of the dam near the crest, has maintained relatively constant groundwater elevations between 663 and 664 feet through September 2018. Observation well OB-29, near the crest on the south end of the dam, has maintained a relatively constant elevation between 627 and 634 feet. Observation Well OB-31, on the north end of the dam near the crest, has recorded groundwater elevations between 651 and 653 feet.

5.2.2 Seepage Measurement Weirs

Three V-notched weirs, labeled VW-1, VW-2, and VW-3, measure seepage flow from the dam and are located in a 10-foot wide channel at the toe of the dam, as shown on Figure 6. The purpose of these weirs is to assess in-situ dam stability. Weir VW-3 is intended to measure seepage flow from the groin drain of the southern abutment. Weir VW-2 is intended to measure seepage flow from the clay core drain and upstream flow from VW-3. Weir VW-1 is located downstream of VW-2 and VW-3 and is intended to measure flow from the northern groin drain and upstream flow from VW-2.

The average flow rate and estimated flow rate by each contributing section to the weir for 2018 data is presented below in Table 4. The standard deviation is also presented in this table to quantify the variance

in the data. As indicated by the standard deviation in measured flow rate, base flow and precipitation events contribute to variations in the measured flow. Average 2018 flow rates in the v-notch weirs were higher when compared to 2017 flow rates. The year 2018 had a significantly higher precipitation and the increase in flow rates were very likely related with this higher precipitation and not as a result of seepage from the dam.

Table 4: 2018 Flow Measurement Data from V-Notch Weirs

Weir	Average Flow Rate Measured from Weir (gpm)	Standard Deviation	Estimated Flow Rate from Contributing Area to Weir (gpm)
VW-3	1.72	1.63	1.72
VW-2	4.35	3.59	2.63
VW-1	5.86	5.05	1.51

5.2.3 Slope Inclinometer and Deformation Monuments

Fifteen deformation monuments, labeled SM-6 through SM-20, are installed at the crest, face, middle bench, and toe of the dam. Locations of these monuments are shown on Figure 6. A review of available data from 2018 indicates that horizontal deformation in the dam is generally in the east and north direction and has been less than 0.71 inch/year, which is slightly greater than the 0.15 inch/year measured in 2017. The majority of the 2018 readings were less than 0.29 inch/year, which is slightly higher than the median value of 0.10 inch/year for 2017. Average vertical deformation at each monument for 2018 was less than 1.17 inch/year, which is slightly greater than the average deformation of 0.25 inch/year measured in 2017.

Slope inclinometers SI-1 and SI-2 are located at the lower bench at about elevation 660 feet. Slope inclinometer data measured at SI-1 for this year indicated very little profile change over depth. Slope inclinometer data at SI-2 also indicated very little profile change over depth. A maximum change of about 0.5 inches at profile depths of 5 feet or shallower was recorded this year; otherwise, very little change was noted. This is consistent with results from 2017 and indicates that between these years very little change has occurred in these shallower depths. At depths greater than 5 feet very little change was noted as compared to a baseline of 2 November 2015. Compared with historical data, this is within the expected magnitude.

6. REVIEW OF CCR OPERATING RECORD DOCUMENTS AND PREVIOUS INSPECTION ITEMS

For this inspection report, the following documents were reviewed regarding the status and condition of the Bottom Ash Pond and the Stingy Run FAR, in accordance with the requirements of 40 CFR § 257.83(b)(1)(i):

- 7-day inspection reports for the FAR and BAC for 2018;
- Monthly inspection reports for the FAR and BAC, which also include records of recent instrumentation data for 2018;
- The 2017 Annual Inspection Report for the BAC and FAR, dated January 8, 2018; and
- Other documents that contain information on the design, construction, operation, and condition of the CCR unit, including the Closure Plans, previous instrument data before 2018, and the 2015 and 2016 Annual Inspection Reports.

Based on the review of the available data, there were no past indications of potential structural weakness, slope instability, drainage or seepage issues, or other adverse conditions that would impact the stability and operation of these CCR units.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Addressing 2017 Annual Inspection Items

A review of photographs and repair items from the 2017 Annual Inspection Report included the following for the BAC: clearing excessive vegetation from pipe culvert areas, backfilling and compacting erosion gullies along the interior slope of the north dike, and backfilling the area around the decant structure at the interior slope of the north dike. For the FAR, the 2017 Annual Inspection Report included the following: repair of erosion gullies formed at the crest, and keeping channels, toe ditch, and pipe culverts downstream of the dam clear of debris and vegetation.

Based on the 2018 annual inspection and a review of weekly and monthly inspection reports, these above-mentioned repair items from the 2017 annual inspection were completed. The Plant has consistently and promptly addressed areas that require attention, as noted in the weekly and monthly inspection reports.

7.2 Recommendations for 2019

7.2.1 Bottom Ash Complex

ERM provides the following recommendations for the BAC based on the 2018 inspection:

1. The weekly and monthly inspections continue to point out any areas that require attention, which in turn have been documented and addressed in a timely fashion. It is recommended that the Plant continue this good management practice.
2. Re-seed localized bare spots along slope to reestablish vegetation. Revegetation and potential application of nutrients or pH adjustment could be used to aid in revegetating localized areas where bottom ash has been placed.
3. Repair erosion rills promptly and continue to monitor areas where rills or gullies have formed.
4. Continue to monitor for locations along the slope where subsidence or sloughing might occur. Particular attention should be given to areas identified in this report that appear to have had some movement in the historical past but have since stabilized and show no sign of continued movement.
5. Monitor the isolated area of apparent shallow soil sloughing in the northwest corner of the Recirculation Pond. The toe of this pond is buttressed with rip rap, the impacted area is isolated and small, and there was no visual evidence of tension cracks or that a slip was developing at the time of inspection. This sloughing is likely a result of regrading activities. It is recommended that this area be monitored, and appropriate corrective action should be implemented by the Plant if it appears that the area is active.

7.2.2 Stingy Run Fly Ash Reservoir

ERM provides the following recommendations for the FAR based on the 2018 inspection:

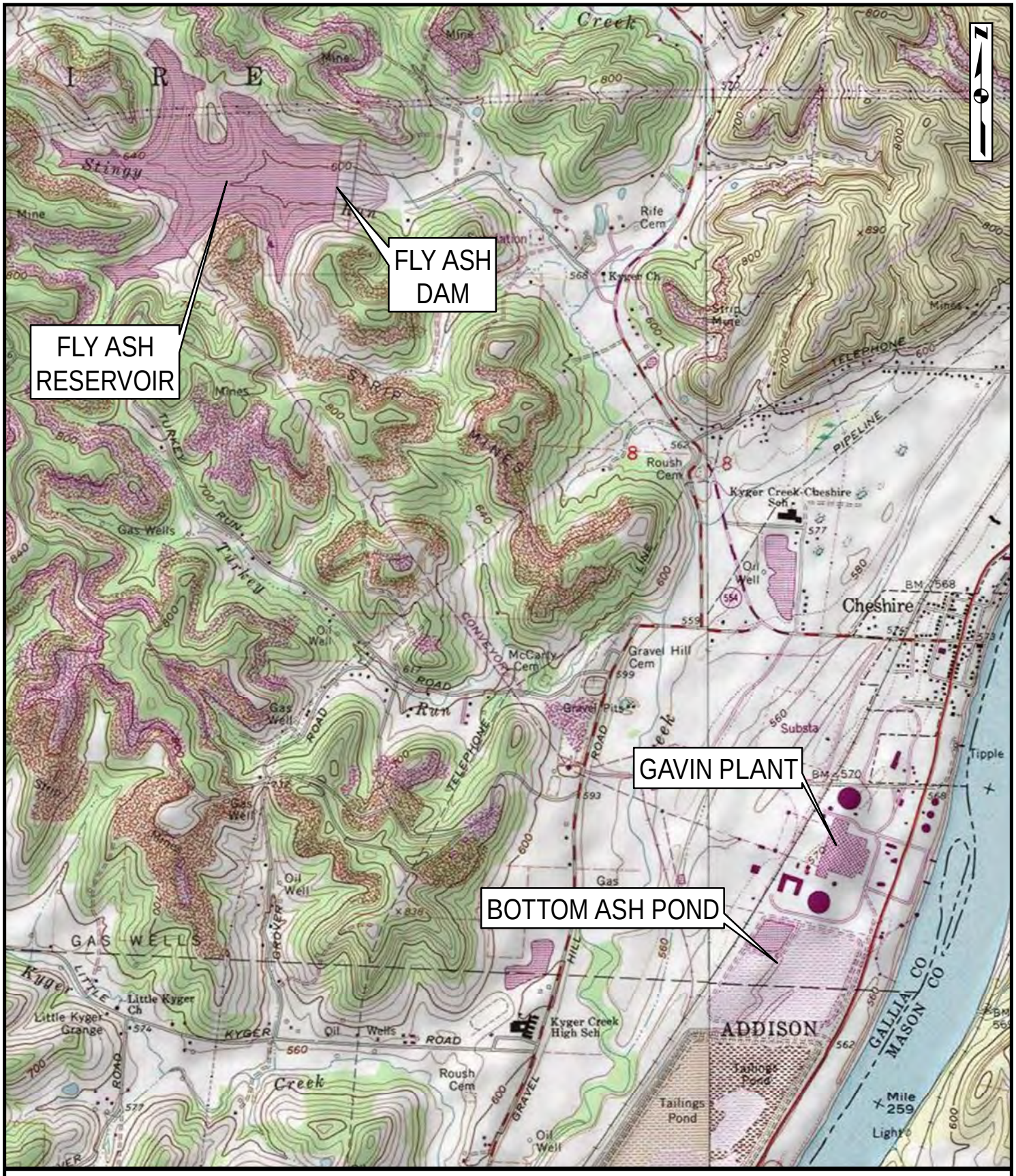
1. The weekly and monthly inspections continue to point out any deficiencies and these deficiencies are documented and addressed in a timely fashion. It is recommended that the Plant continue this good management practice.
2. Re-seed any localized bare spots along slope to help reestablish vegetation.
3. Monitor locations where rip rap was placed for any signs of activating slips or settlement.
4. Regrade the access road along the intermediate bench of the dam to properly manage storm water.

5. Maintain the channel connecting the underdrain monitoring weirs at the downstream toe of the embankment and clear the weirs of any debris.

7.3 CONCLUSIONS

Overall, the annual inspection indicated that the BAC and FAR CCR units were in satisfactory operating condition and stable. ERM has some minor recommendations regarding repair and maintenance at the CCR units, as listed above. The weekly and monthly inspections have been effective at identifying and documenting areas requiring attention, and the Plant should continue the practice of promptly implementing the required maintenance. The recommendations made above are not critical to the current stability or the safe operation of the BAC or FAR.

FIGURES



0 0.15 0.3 0.45 0.6 Miles

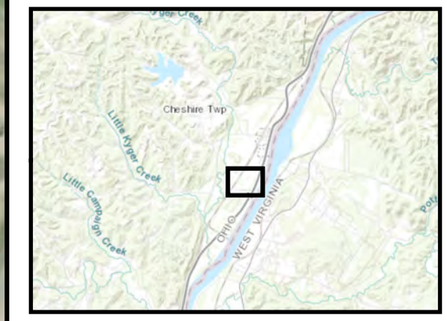
1:24,000

Figure 1: Site Location Map
Gavin Power LLC
Cheshire, Ohio

SOURCE
USGS scanned topographic quad maps provided by National Geographic Society (© 2017).

ERM

Q:\Team\DMM\Clients_F_K\Gavin\GavinPowerPlant\MXD\Combined_Groundwater_Monitoring_Plan\Figure1_SiteLocationMap.mxd - Dana.Heusinkveld - 11/27/2017



Legend

Active Piezometer Location

NOTES:
1. Locations are approximate
2. Aerial Imagery: ESRI World Imagery
   Reproduced under license in ArcGIS 10.4

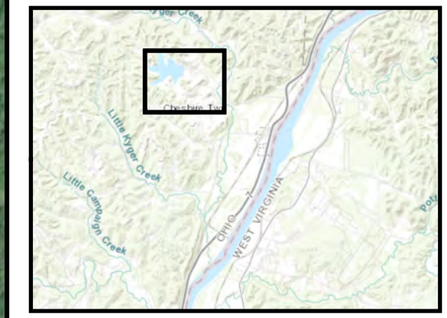
N

0 60 120 240 360 480
Feet

Figure 2: Bottom Ash Complex Site Layout
Gavin Power LLC
Cheshire, Ohio

ERM

Q:\Team\DMMV\Clients_F_K\Gavin\GavinPowerPlant\MXD\Combined_Groundwater_Monitoring_Plan\Figure2_BottomAshComplex_SiteLayout.mxd - Dana Heusinkveld - 12/21/2018



NOTES:
1. Locations are approximate
2. Aerial Imagery: ESRI World Imagery
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N

0 125 250 500 750 1,000
Feet

Figure 3: Stingy Run Fly Ash Reservoir Site Layout
Gavin Power LLC
Cheshire, Ohio

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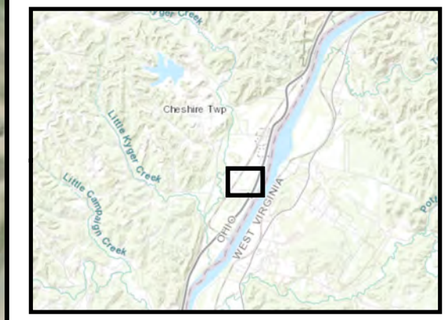


Legend

Photograph Location

NOTES:
1. Locations are approximate
2. Aerial Imagery: ESRI World Imagery
   Reproduced under license in ArcGIS 10.4

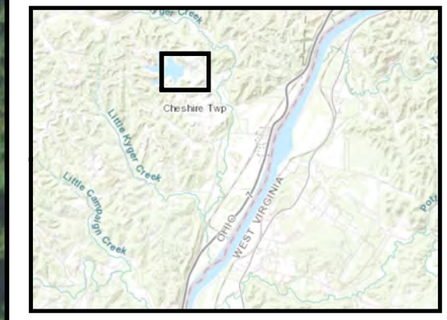
N

0 60 120 240 360 480
Feet

Figure 4: Visual Inspection Map
Bottom Ash Complex
Gavin Power LLC
Cheshire, Ohio

ERM

Q:\Team\DMMV\Clients_F_K\Gavin\GavinPowerPlant\MXD\AnnualEngineering\InspectionReport_20181\Figure4_BottomAshComplex_VisualInspectionMap_20181221.mxd - Dana.Hesselveld - 12/21/2018



Legend

#	Photograph Location

NOTES:
1. Locations are approximate
2. Aerial Imagery: ESRI World Imagery
   Reproduced under license in ArcGIS 10.4

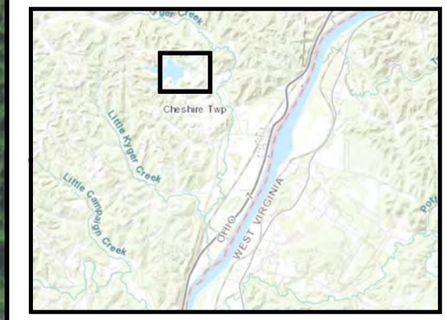
N

0 80 160 320 480 640
Feet

Figure 5: Visual Inspection Map
Stingy Run Fly Ash Reservoir
Gavin Power LLC
Cheshire, Ohio

ERM

Q:\Team\DMMV\Clients_F_K\Gavin\GavinPowerPlant\MXD\AnnualEngineering\InspectionReport_2018\Figure5_StingyRun_FlyAshReservoir_VisualInspectionMap_20181221.mxd - Dana.Heusinkveld - 12/21/2018



Legend

- Observation Well
- Settlement Monument
- Slope Inclinometer
- V-notched Weir

NOTES:
1. Locations are approximate
2. Aerial Imagery: ESRI World Imagery
   Reproduced under license in ArcGIS 10.4

N

0 80 160 320 480 640
Feet

Figure 6: Monitoring Instrument Map
Stingy Run Fly Ash Reservoir
Gavin Power LLC
Cheshire, Ohio

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APPENDIX A ANNUAL INSPECTION PHOTOGRAPHS

Bottom Ash Pond Complex

West Dike

Photograph #1 An overview view of interior slope and condition of riprap at toe (looking south).	
Photograph #2 Residual coal ash piles along inner slope of west dike (looking south).	
Photograph #3 Condition of outer bank and drainage ditch along west edge (looking north)	

Photograph #4 Slope of exterior embankment including apparent inactive earthen bulge along slope (looking north).	
Photograph #5 Slope of exterior embankment including apparent inactive earthen bulge along slope (looking north).	
Photograph #6 Slope of exterior embankment including apparent inactive earthen bulge along slope (looking south).	

South Dike

Photograph #7 View of interior embankment including crest and slope (looking west).	
Photograph #8 View of interior embankment (looking east). A few rills were noted during the inspection	
Photograph #9 View western exterior slope (looking south).	

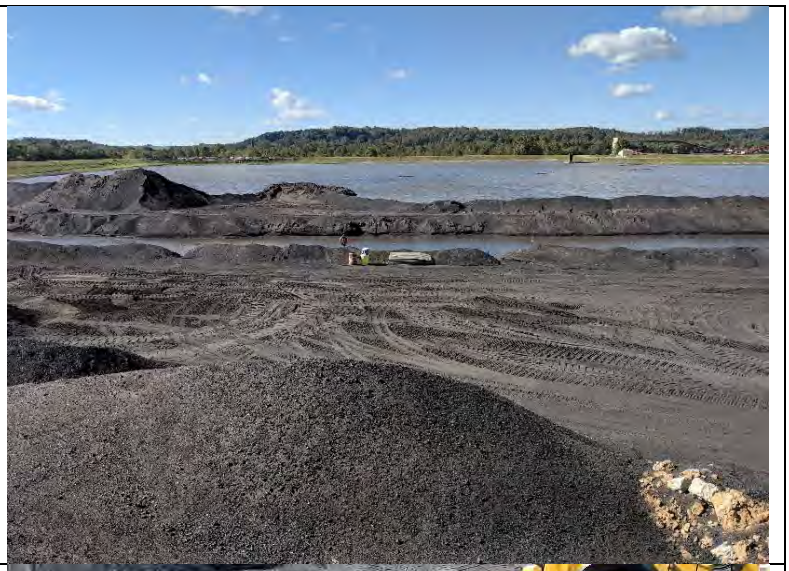
Photograph #10 View of slopes on the eastern half of interior embankment (looking west)	
Photograph #11 View of exterior slope (looking west).	
Photograph #12 View of lime stockpile adjacent to road (looking north).	

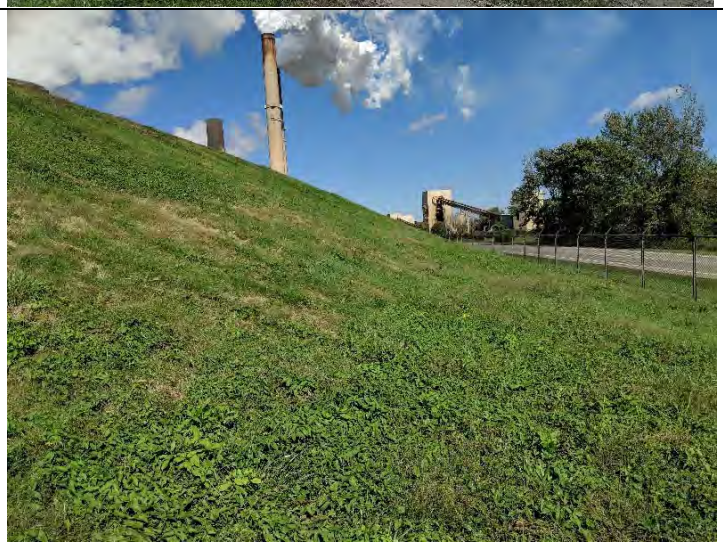
Photograph #13 View of the crest along exterior portion of embankment (looking east).	
Photograph #14 View of sparsely vegetated low area at western toe of exterior bank (looking east).	
Photograph #15 View along southeastern side (looking southeast).	

Photograph #16	
View along southeastern side (looking southwest).	

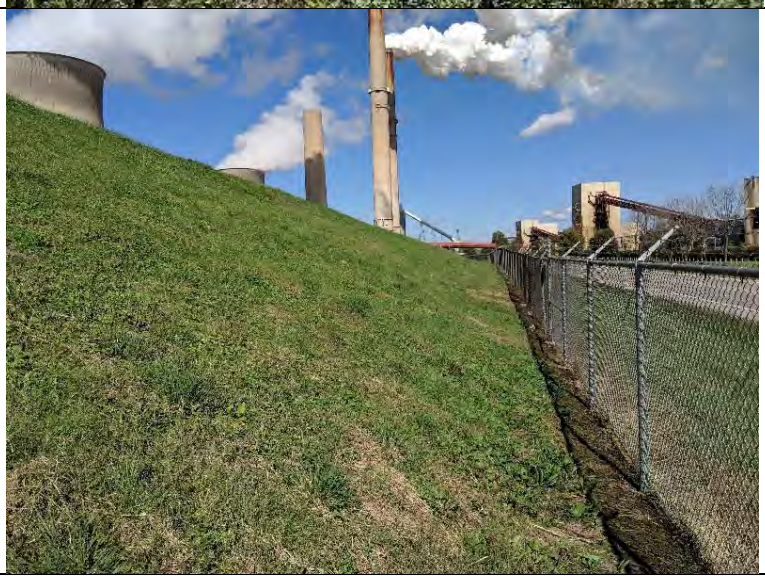
Eastern Embankment

Photograph #17 Bottom ash management area (looking south).	
Photograph #18 Ash slurry sluice pipes and support structure (looking north).	
Photograph #19 Ash slurry sluice pipes and support structure in middle of embankment (looking south).	

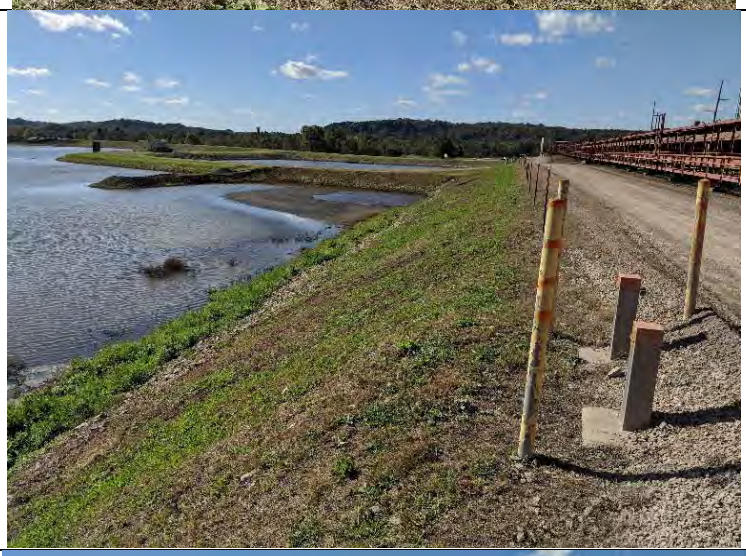
Photograph #20 Bottom ash management area (looking southwest).	
Photograph #21 Close up of earth moving activities for bottom ash management area (looking southwest).	
Photograph #22 Embankment next to bottom ash management area (looking north).	

Photograph #23 Conditions of eastern embankment and discharge pipes (looking south).	
Photograph #24 View of vegetative coverage (looking north).	
Photograph #25 View of vegetated gully along exterior slope (looking west).	

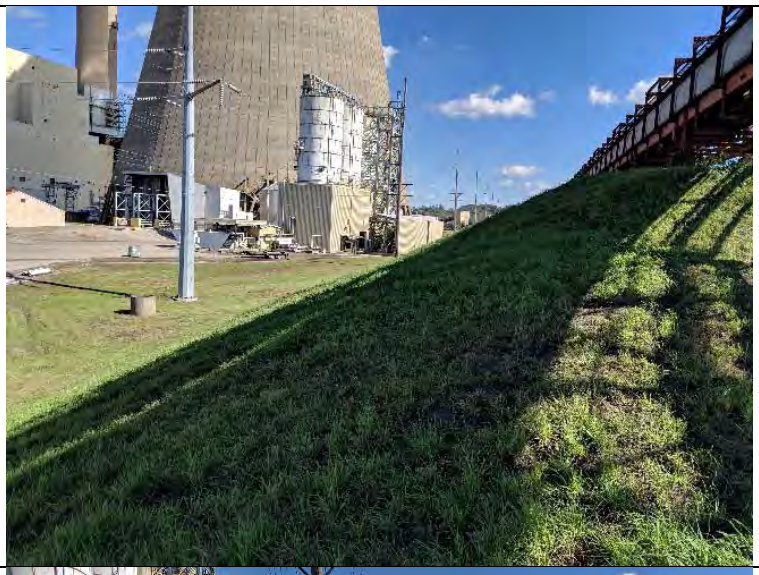
Photograph #26 View of toe and slope (looking north).	
Photograph #27 View of toe along fence line (looking south).	
Photograph #28 Close up of vegetative coverage adjacent to fence and swale.	

Photograph #29 View of localized rills along slope (looking south).	
Photograph #30 View of slope where evidence of soil subsidence (not appearing to be active) was noted (looking north).	

Northern Embankment

Photograph #31 View of discharge pipes and support structure (looking southeast).	
Photograph #32 View of embankment, groundwater monitoring well, BAC-02, and Bottom Ash Pond (looking west).	
Photograph #33 View of crest, toe, and slope (looking west).	

Photograph #34 View of exterior slope (looking south).	
Photograph #35 View of bare spot with localized wet/saturated surface on exterior slope (looking west).	
Photograph #36 View of bare spot and rill along top portion of embankment (looking west).	

Photograph #37 View of toe, slope and crest of exterior embankment on eastern side (looking east)	
Photograph #38 View of eastern slope of exterior embankment (looking east).	
Photograph #39 View of localized settlement at toe of exterior embankment.	

Photograph #40 View of BAC and interior embankment (looking south).	
Photograph #41 View of interior embankment and discharge pipes and support structure (looking east). Also in view is a localized area of sloughing that does not appear to be active.	
Photograph #42 View of localized limited vegetation along interior embankment (looking south).	

Reclaim Pond

Photograph #43 View of discharge pipe and channel (looking south)	
Photograph #44 View of interior embankment (looking south). Note, there are localized bare spots near top portion of embankment.	
Photograph #45 View of overflow structure (looking east).	

Photograph #46 View of slope along interior embankment with noticeable subsidence (looking east)	
Photograph #47 View of slope with riprap placed at toe and lower portions of slope (looking north). A small depression approximately 1.5 feet in diameter and 2 feet deep was noted. There were not visual signs that there was active settling in this area.	

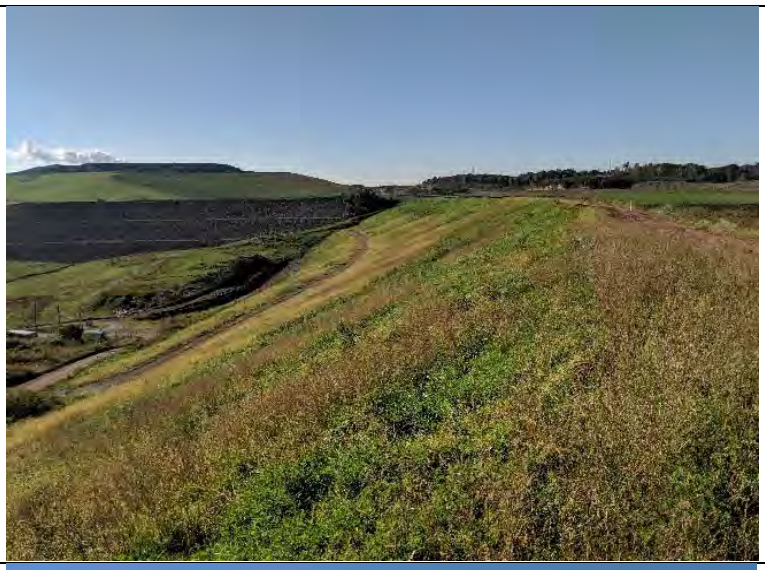
Stingy Run Fly Ash Reservoir

Toe of Dam

Photograph #48 View of discharge coming out of V-notched weir, VW-2 (looking west).	
Photograph #49 View of discharge coming out of V-noted weir, VW-3 (looking west). There was some ponding directly below this weir structure.	
Photograph #50 View of mixing point and overflow weir to Stingy Creek (looking east).	

Photograph #51 View of caustic (sodium hydroxide) addition tank and secondary containment adjacent to mixing point (looking north).	
Photograph #52 View of northern portion of dam slope from toe (looking north).	

Intermediate Bench of Dam

Photograph #53 View of crest and slope to the east of crest (looking south).	
Photograph #54 View of upslope from intermediate bench (looking north).	
Photograph #55 View of intermediate bench (looking south).	

Crest of Dam

Photograph #56 Location of borehole on crest of dam (looking east).	
Photograph #57 Close up of near borehole on crest of dam (looking east).	
Photograph #58 View of interior slope on Fly Ash Dam (looking south). Pictured here is the soil movement first noted by ODNR during the May 2017 inspection.	

Fly Ash Pond

Photograph #59 View of west slope and Fly Ash Pond (looking west). Pictured here is a localized area of settlement that does not appear to be active.	
Photograph #60 View of west slope (looking northeast).	
Photograph #61 View of west slope from outlet drain platform (looking northeast).	

Photograph #62 View of interior of drain platform (looking southeast).	
Photograph #63 View of siphon pump system used to control water level of pond (looking northeast).	

APPENDIX B QUALITATIVE INSPECTION TERMS

1.0 SUMMARY OF QUALITATIVE VISUAL INSPECTION TERMS

The terms described below are used to describe the overall condition and/or appearance of an observed embankment, structure, activity, or item. These terms are intended to give an overall qualitative judgment of the particular item. Please note, some of the terms described below were not used in this year's inspection, but are included as a comparative reference.

Satisfactory: A condition or activity that meets what would be minimally anticipated or expected from a stability, maintenance, or design viewpoint.

Poor: A condition or activity that does not meet what would be minimally anticipated or expected from a stability, maintenance, or design viewport. If a rating of "poor" is assigned, then corrective action is required in as timely a manner as possible.

Minor: A reference to an item or activity where the current maintenance condition is below what is normally desired, but does not cause concern from a stability of safety viewpoint. Generally, these conditions would be identified and could be remedied through the normal maintenance process.

Significant: A reference to an item or activity which would impact the stability or daily operating conditions of the CCR unit. Generally, significant features develop over time and would likely be a result of maintenance not occurring when minor deficiencies were first noted. If left unchecked, such conditions could eventually be a concern for the stability and safety of the CCR unit.

Excessive: A reference to an item or activity that is much worse than what is normal or desired and is of immediate concern to the stability or safety of the CCR unit. Such a condition may also impact the ability of the inspector to properly evaluate the particular item or area.

APPENDIX C RECENT INSTRUMENTATION DATA

Figure C-1. Water elevation as measured at pond surfaces and observation wells BAP-1 and BAP-2 in 2018.

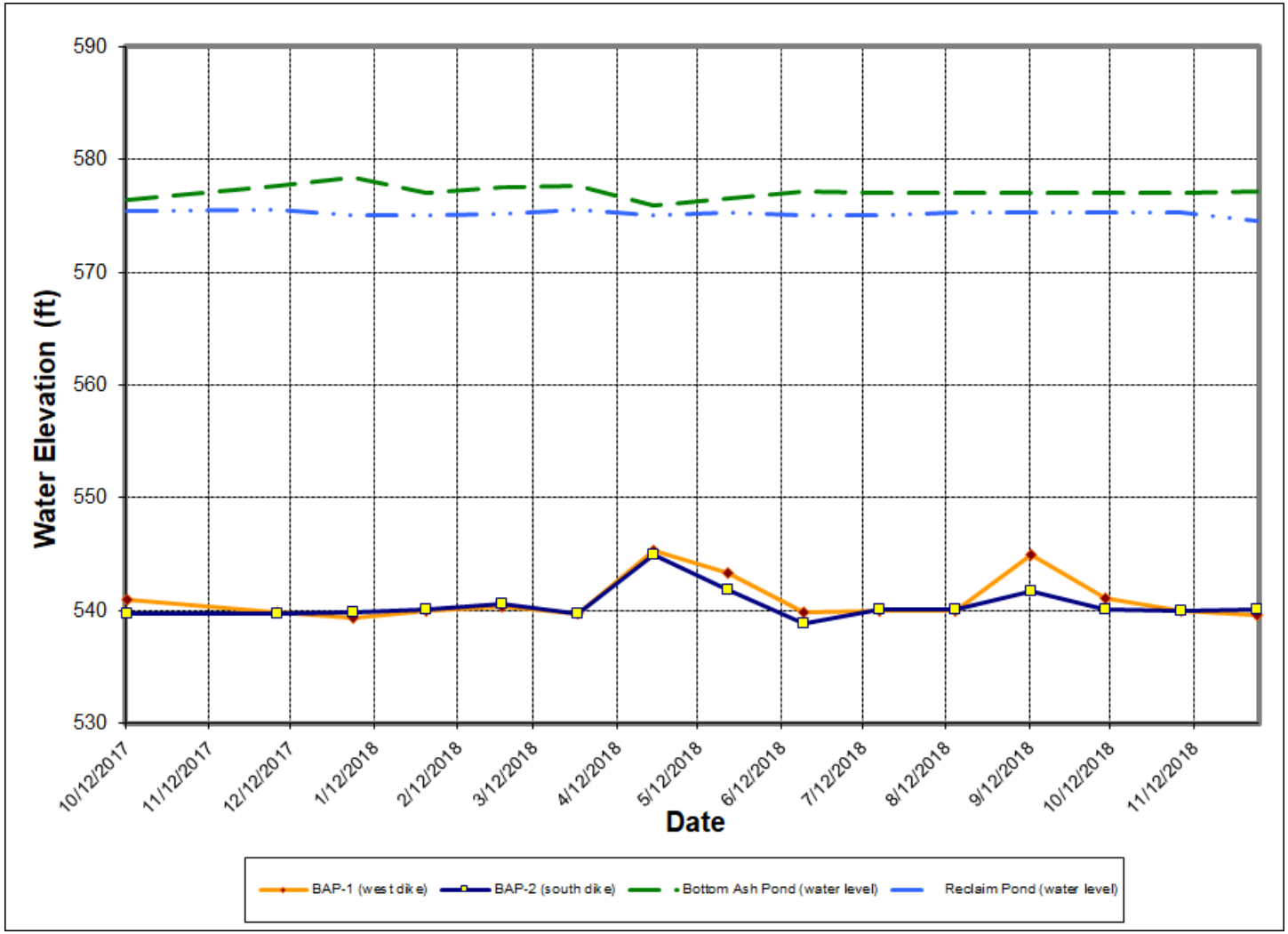
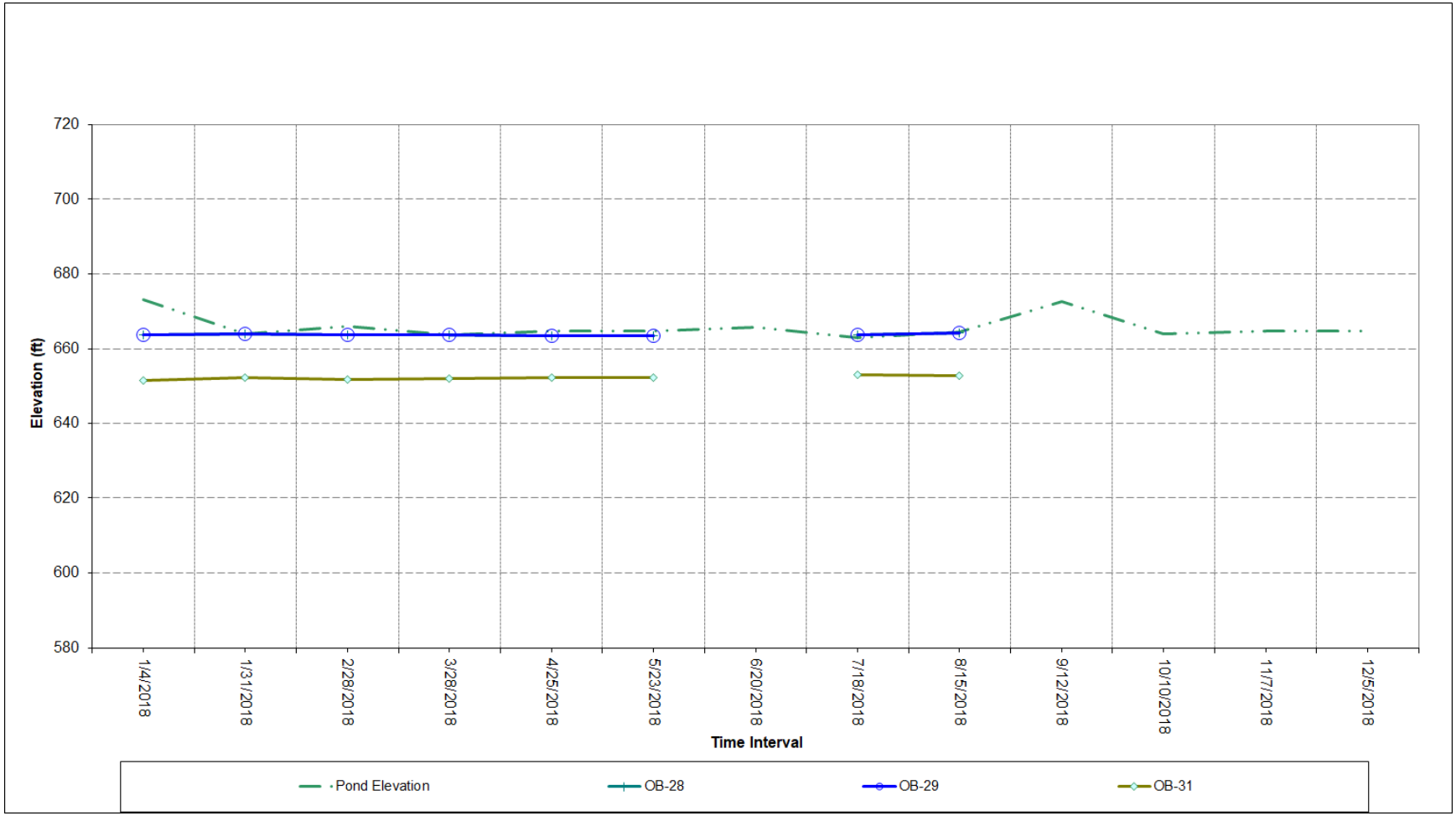


Figure C-2. Water elevation as measured at pond surface and piezometers, OB-28, OB-29, and OB-31.



Note: Data for piezometers OB-28, OB-29, and OB-31 was not available beyond August 2018 as the wells were removed after the August 2018 measurement.

APPENDIX D PROFESSIONAL ENGINEER CERTIFICATION

1.0 PROFESSIONAL ENGINEER CERTIFICATION

I hereby certify that I or an agent under my review has prepared this Annual Inspection Report for the Bottom Ash Complex and Stingy Run Fly Ash Reservoir, and am familiar with the provisions of the final rule to regulate the disposal of coal combustion residuals (CCR). I attest that this Report has been prepared in accordance with good engineering practices and meets the intent of 40 CFR 257.83(b). To the best of my knowledge, the information contained in this Report is true, complete, and accurate.

_____

James A. Hemme, P.E.
State of Ohio License No.: 72851

Date: _____1/8/2019_____

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