December 11, 2015 390/265831

Mr. Benjamin Wilburn, P.E.
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835 Hamilton Street, Suite 150
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Subject: 2015 Annual USEPA CCR Surface Impoundment
Initial Annual Inspection Report for Brunner Island Ash Basin No. 6

Dear Mr. Wilburn:

This letter report presents the findings of the 2015 Initial Annual inspection for the Brunner Island Ash Basin No. 6 facility. This inspection was performed by HDR Engineering, Inc. (HDR) in accordance with Contract 619843-C, Release No. 6, dated August 14, 2015. This annual inspection was conducted in accordance with the requirements of the United States Environmental Protection Agency (USEPA) 40 CFR Parts 257 and 261 Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, April 17, 2015 (CCR Final Rule).

1.0 Executive Summary

Brunner Island Ash Basin No. 6 is an operating Coal Combustion Residual (CCR) surface impoundment, referred to as an ash basin, which is owned and operated by Brunner Island LLC, a division of Talen Energy (Talen). The ash basin is formed by an earth embankment with a maximum height of approximately 30 feet. The ash basin is, therefore, required to have an annual inspection performed by a qualified engineer in accordance with the CCR Final Rule. This is the initial (first) annual inspection performed in accordance with the CCR Final Rule. The ash basin is also subject to regulation by the Pennsylvania Department of Environmental Protection (PADEP) and is classified as Size B, Hazard Classification 3 under the PADEP Dam Safety Guidelines, corresponding to a medium-sized, significant-hazard-potential dam. Talen and their predecessor, PPL, have been inspecting the ash basin in accordance with PADEP requirements for a number of years.

Talen is no longer discharging ash slurry into the basin, although process water which has come into contact with ash is still being discharged at the northwest corner of the basin; therefore, the ash basin is still considered to be active. Talen intends to discontinue pumping water into the basin within the next few years, pending approval by PADEP of an alternate process water treatment plan.

The CCR Final Rule requires that the annual inspection include the following:

- a review of available information to verify that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards;
- a visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit and appurtenant structures; 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 supporting studies required by the rule to support this review are currently being developed and are not due until later. Preliminary project documentation indicates that Ash Basin No. 6 was designed and constructed in accordance with good engineering standards that were recognized and generally accepted at the time of design and construction between 1975 and 1979. A more definitive assessment of the design, construction, operation, and maintenance of the ash basin as it relates to recognized and generally accepted good engineering standards will be made when the supporting studies described later in this report are completed.

No signs of significant distress or malfunction of the CCR unit, appurtenant structures, and hydraulic structures passing through the dike were observed during the visual inspection. The project is generally operated and maintained in accordance with recognized and generally accepted good engineering standards and the CCR Final Rule. Continued attention to the items noted below is appropriate to adequately satisfy the CCR Final Rule inspection requirements for surface impoundments:

- Maintenance of vegetation on the slopes of the embankment with a height not to exceed 6 inches, and periodic repair of ruts, sloughs, and slope irregularities;
- Monitoring of seepage and slope stability, with additional action conducted as necessary if conditions change significantly or evidence of internal erosion is observed. This should include monitoring of downstream slopes following recession of flooding on the Susquehanna River;
- Evaluation of the spillway adequacy of the outlet works, and maintenance of the outlet system including trash handling and removal, to maintain the hydraulic capacity;
- Maintenance of the piezometer road boxes; and
- Documentation of design, construction, operation, and maintenance as required by the CCR Final Rule, as well as implementation of remediation, monitoring or other risk reduction measures recommended as a result of these studies.

2.0 Project Description and History

Ash Basin No. 6 is located between Black Gut Creek and the Susquehanna River at the southern end of Brunner Island in East Manchester Township, York County, Pennsylvania. The island is located along the western shore of the river and can be located on the York Haven USGS 7.5 Minute Quadrangle Map at 40º04′59″N, 76º40′58″W. The GPS address is 1281 Wago Rd, York Haven, PA 17370. The basin was originally owned by PPL Brunner Island, LLC (PPL). In June of 2015, the company changed their name to Brunner Island LLC, which is a division of Talen Energy (Talen).

The ash basin was designed and constructed between 1975 and 1979. The basin is formed by an oval-shaped, above-ground embankment constructed with random earth fill and includes a 10-foot-thick clay liner covering the upstream slope, from bedrock to elevation 287.5 feet. The maximum height of the embankment is approximately 30 feet. The nominal crest elevation of the embankment is 290 feet. Overall, the embankment is about 8,300 feet long and the impoundment has a surface area of about 70 acres. The basin is subdivided into three main areas. The northern part of the main basin has been completely filled with ash. The southern part of the main basin has not been completely filled and retains open water. To the south of the main basin is a polishing pond separated from the main basin by a dike which also retains open water. Elevations in this report refer to Plant datum. The Plant vertical datum, National Geodetic Vertical Datum of 1929 (NGVD 29), is approximately 0.76’ higher than the North American Vertical Datum of 1988 (NAVD 88) at Ash Basin 6.

Water enters the polishing pond from the ash basin for final treatment via a flow-through concrete drop structure. The structure consists of a weir-type riser and a drop structure that discharges into one, 48-inch-diameter reinforced concrete pipe that discharges to the polishing pond.

The terminal outlet structure is located in the polishing pond and consists of two, 60-inch reinforced riser pipes with skimmers draining into a single, 48-inch, reinforced concrete discharge pipe that discharges into the Susquehanna River. A flapper gate and an outlet control structure are provided at the river-end of the discharge pipe to prevent river water from entering the ash basin during high tailwater conditions.

Talen is no longer discharging ash slurry into the basin, although process water which has come into contact with ash is still being discharged at the northwest corner of the basin; therefore, the ash basin is still considered to be active. The plant’s equalization pond also discharges into the basin at the northeast corner. Talen intends to discontinue pumping water into the basin within the next few years, pending approval by PADEP of an alternate process water treatment plan.

In accordance with the CCR Final Rule inspection requirements for surface impoundments, the following information is required. Since this is the initial (first) annual inspection report to be conducted in accordance with the requirements of the CCR Final Rule, a description of the changes with respect to the previous inspection is not applicable; however, the following information is provided as a baseline for the assessment of changes with respect to future reports.

2.1 Changes in Geometry Since the Previous Inspection

The sill of the outlet structure for the main basin is elevation 283.5 feet, resulting in a normal water surface elevation in the main basin of about 284.2 feet. The sill of the outlet structure in the polishing pond is at elevation 268.0 feet, resulting in a normal water surface elevation in the polishing of about 268.30 feet. No significant quantities of fill are currently being discharged into the basin, although existing ash near the north end of the basin is being reclaimed and removed for beneficial re-use.

2.2 Location and Type of Instrumentation

Refer to Section 5 of this report for a discussion of instrumentation.

2.3 Approximate Minimum, Maximum, and Present Depth of and Elevation of Impounded Water and CCR

Elevations and depths of CCR and free water are shown in Table 1 below. These are based on the original ash basin topography, as shown on Drawing E158595 sheet 1, Revision 6, dated November 26, 2007. Contours shown on Drawing E244272 Sheet 1 Rev. 18 were based on a bathymetric survey conducted on May 20-21, 2015 and a photogrammetric survey conducted on April 2, 2015.

Table 1
Elevations and Depths of CCR and Free Water

CCR Surface Elevation (feet)	Original Ground Surface (feet)	Water Surface Elevation (feet)	Ash Depth (feet)	Free Water Depth (feet)	Location
290 (dam crest elevation) or dry stacked up to 314	varies from 262 to 284	284.5	12’ at the shallowest (284 to 296) up to 40’ at the deepest (268 to 308) considering dry stacked piles	N/A	North End of Main Basin
Ash varies from 262 to 284.5	varies from 262 to 280	284.5	0’ at the shallowest (262-262) to 20.5 at the deepest (264 to 284.5)	22.5’ at the deepest (262 to about 284.5)	South end of Main Basin

2.4 CCR Storage Capacity

The total CCR storage capacity of the ash basin is approximately 3,864,000 tons. An estimated 3,598,130 tons of CCR has already been deposited, resulting in a remaining CCR storage capacity from the existing CCR surface to the reservoir surface elevation, of 265,870 tons in the southern part of the basin where ash has yet to be deposited.

3.0 Review of Supporting Technical Information

As required by the USEPA CCR Final Rule, the annual inspection is to include verification that the design, construction, operation, and maintenance of the CCR unit are consistent with recognized and generally accepted good engineering standards.

Talen established their CCR website, posted their fugitive dust control plan, continued required record keeping, provided required notifications, implemented weekly inspections, and implemented monthly monitoring of instrumentation by October 19, 2015, in accordance with the CCR Final Rule. The permanent marker required by the CCR Final Rule was installed prior to December 17, 2015.

Talen is preparing summaries of the following information, to be completed by October 17, 2016.

- Periodic Hazard Potential Classification Assessments;
- History of Construction;
- Liner Documentation;
- Periodic Structural Stability Assessments; and
- Periodic Safety Factor Assessments.

Talen will be preparing documentation to demonstrate that the ash basin complies with the location restriction requirements of the CCR Final Rule by October 17, 2018.

The summaries listed above were not completed at the time of the preparation of this inspection report and were not available for review. Available supporting technical information that was reviewed included the following:

- Project drawings provided by Talen;
- Previous annual inspection reports by HDR Engineering, Inc., from 2008 to 2015;
- USEPA inspection report, dated December 12, 2012;
- Slope stability analyses, most recently summarized in a draft memo by HDR Engineering, Inc., dated July 2, 2015, titled *Slope Stability Analysis - Preliminary Summary of Findings*; and
- Hydrologic and hydraulic assessments, by HDR Engineering, Inc., most recently summarized in a draft report dated June 30, 2015, titled *Spillway Design Flood Analysis.*

Based on a review of the available information, it appears the embankment was designed and was reportedly constructed in accordance with good engineering standards that were recognized and generally accepted at the time of design and construction between 1975 and 1979. The embankment was constructed with a 10-foot-thick (horizontally) clay liner on the upstream face of the embankment, and the embankment was constructed of controlled, compacted sandy silt to silty clay fill, with a specified compaction of 95 percent of the Standard Proctor maximum density. The embankment was constructed with an upstream slope of 2.5H to 1V, a crest width of 15 feet, and a downstream slope of 2:H to 1V. The original slope stability analyses were not available for review, but the embankment slopes are consistent with common embankment construction design practices of the time.

There have been significant changes in embankment dam design practices since Ash Basin No. 6 was constructed in the 1970s, most notably:

- Additional testing and specification requirements for cohesive fills to reduce the risk of cracking and piping;
- Provision of diaphragm filters around through-embankment penetrations;
- Provision of diaphragm or toe filters on the downstream face of earthen embankments;
- Assessment of the potential for slope instability due to rapid drawdown of tailwater on the downstream face embankments due to recession of flood water from adjacent rivers; and
- Provision of emergency spillways to reduce the potential for an overtopping event due to plugging or mis-operation of primary spillway structures.

These practices are common in new construction, though existing dams are normally not retrofitted unless they are demonstrating behavior that is considered to be a significant risk.

While seepage at the toe of the embankment has been observed along the eastern and northwestern sections of the embankment, the observed seepage is not considered particularly unusual, and there is no evidence of piping or internal erosion. In their report in 2012, USEPA requested that areas of soft ground at the east embankment be investigated, but did not request that filters be installed. Talen attributed the soft ground to wet seasonal weather, poor drainage at the toe of the embankment, and seepage.

No seepage has been identified that is associated with the through-embankment conduits, though seepage along the underside of conduits would be difficult to view directly.

Several shallow sloughs of the downstream face of the embankment occurred previously, reportedly as significant flooding of the Susquehanna River receded. Talen, through a consultant, performed a rapid drawdown analysis of the downstream embankment slope assuming partially saturated conditions and determined that the stability of the downstream slope for critical failure surfaces satisfies the requirements of the USEPA CCR Final Rule.

The adequacy of the spillway was assessed as a result of a recommendation presented by USEPA during their inspection of the ash basin in 2012. Note that the basin is formed by an above-ground embankment for its full perimeter, so that all inflow is the result of precipitation falling directly on the basin, with no run-on from adjacent areas. The 2012 analysis determined that the ash basin could safely pass the inflow resulting from the ½ Probable Maximum Flood (PMF), which was the Inflow Design Flood (IDF) prescribed by the PADEP, provided that the discharge structures remain unobstructed during the flood. The IDF prescribed by the USEPA CCR Final Rule is the 1,000-year flood, which has significantly lower inflow than the ½ PMF. In addition, Talen has lowered the normal operating surface from approximate elevation 286.0 feet in 2012 to the current elevation of 284.2 feet, providing an additional 1.8 feet of usable water storage in the open part of the basin. Updated analyses determined that the spillway capacity is adequate, again assuming unobstructed discharge. Although the 2012 USEPA inspection report recommended that provisions be made for an emergency spillway, they acknowledged that "*some of the above studies and analyses and remedial measures recommendations may not be critical given the current permanent closure plans.*"

The sole spillway for the basin comprises an outlet structure at the main basin with a conduit leading to the polishing pond, and an outlet structure at the polishing pond with a conduit leading to the Susquehanna River. During the internal inspection of the discharge conduits that pass through the ash basin embankments that were conducted as part of the USEPA annual inspection, a mixing chamber was observed in the conduit between the main basin and the polishing pond. The mixing chamber, which had been shown schematically on construction drawings, but for which there were no details, may have a significant throttling effect on the conduit discharge capability, as well as the potential to catch trash, which could adversely affect spillway adequacy. In addition, there is a removable weir at the downstream end of the conduit that needs to be removed in the event of significant flooding. Both of these structures are associated with monitoring and treatment of discharge in accordance with Talen's environmental permits. Talen cleared the trash in the mixing chamber subsequent to the internal inspection and has reportedly verified that removal of the weir is included in the basin and polishing pond operating plan for the operators to take emergency action when a large storm event is predicted. Talen is still in the process of assessing the impact of the mixing chamber on discharge capability and spillway adequacy.

As stated previously, the embankment was constructed with a clay liner, which does not extend over the foundation. The existing CCR surface impoundment is considered to be an existing unlined CCR surface impoundment as defined by the CCR Final Rule, as it is not constructed with a two-layer composite liner including an upper geomembrane component and a lower compacted soil component. The ash basin will, therefore, likely be subject to the additional monitoring and operational restrictions of the CCR rule. The bottom of the basin is close to the normal river level in the Susquehanna River, thus the ash basin may not satisfy aquifer location limitations of the CCR Final Rule. This will be evaluated in more detail as part of the evaluation of the Location Restrictions requirements of the CCR Final Rule.

As noted previously, the only discharge to the basin is process water, which does not carry significant CCR, so that operational needs for the ash basin are limited. Talen staff reportedly patrol the ash basin daily to observe the basin, pond, embankments, and discharge structures for any abnormalities such as excessive flow, leakage, or structural damage. Talen also reportedly conducts monthly inspections of the ash basin, including monitoring of the piezometers, as well as 7-day inspections as required by the USEPA's CCR Final Rule, and annual inspection reports that are required by the PADEP.

Maintenance measures include vegetation control and repair of ground disturbance that occurs during vegetation control. These measures are generally consistent with good practice and are described in more detail in Section 4.

An assessment of the groundwater monitoring program, sampling, analysis, and detection, as described by the CCR Final Rule, is not a required element of the visual inspection and was not included in this inspection report.

A more definitive assessment of the design, construction, operation, and maintenance of the ash basin as it relates to recognized and generally accepted good engineering standards will be made during a later inspection when the studies noted above are completed.

4.0 Visual Inspection Site Visit

The visual inspection site visit was conducted on July 7, 2015, by Adam Jones, P.E. and Heather Newton, P.E. of HDR. Benjamin Wilburn, P.E. of Talen accompanied HDR during the inspection. The reservoir was at elevation 284.75 feet. Note that since the inspection, the normal operating level has been lowered to roughly elevation 284.2 feet. The weather during the inspection was partly cloudy with temperatures between 80 and 85 degrees. Rain occurred during the 24 hours prior to the inspection, but did not affect the inspection.

Relevant photographs and a key plan are provided in Appendix A.

East Embankment

The east embankment generally appeared to be in good condition, as seen in Photos 2 through 8. Evidence of the historic sloughs, slough repairs, and wet areas previously reported on the downstream slope were still evident. Vegetation had been cut immediately prior to the inspection, with the height over the majority of the slope at or below 6 inches. Clearing of vegetation extended to the ditch at the toe of the east slope. The ditch, which was constructed as part of erosion and sedimentation control measures during original construction and is effectively part of the embankment, was cleared in 2013 but has since become heavily overgrown.

Much of the toe of the embankment was wet. Standing water was observed in ruts and depressions intermittently along the toe of the embankment. Wet soil, extending 3 to 8 feet vertically up the slope, was observed at Sta. 1+50 and between Sta. 16+80 and 17+60, such

as that seen in Photo 4. No flow or evidence of piping was observed at any of these locations. A new stone filter blanket was installed between Stations 0+75 and 1+50 to address the wet area observed at the south end of the east embankment. The filter blanket extends about 20 feet upslope and is about 3 feet thick.

The slough repair areas on the downstream embankment mentioned in prior reports were re-vegetated. These were located at Stations 0+20 to 0+50 (such as that seen in Photo 2), 21+70 to 22+10, 22+20 to 24+00 (seen in Photos 7 and 8), 25+20, and 26+00. The sloughs were previously estimated to be less than 3 feet deep and extended to within 6 feet of the crest. There was no evidence of recent movement of these sloughs.

There was no evidence of woodchuck burrows. A burrow was observed at Station 3+75 in 2011, though none have been observed since, indicating that animal control efforts have been effective. There was no other evidence of instability, deformation, sinkholes, cracking, or leakage except as described above.

The crest of the embankment, which was recently raised to the nominal design elevation of 290 feet, consisted of a gravelly surface and can be seen in Photos 2, 8, and 10. No evidence of movement, settlement, cracking, or other distress was observed. Minor erosion rills were observed along the downstream edge of the crest as seen in Photo 36. The condition of the roadway crest was consistent around the entire ash basin. Talen periodically regrades the access road and repairs the erosion rills.

Little of the upstream slope of the east embankment was exposed above the basin water level or ash fill, though more of the upstream slope of the embankment was exposed than in previous inspections due to the lower impoundment level and dry swale. An approximately 12-inch abandoned HDPE pipeline was observed along the east embankment of the basin. Vegetation along the upstream face of the west embankment, east embankment, and splitter dike has grown, as seen in Photo 29, and should be cut and removed or eliminated to prevent clogging of outlet structures. No evidence of instability, movement, sinkholes, or burrows was observed.

North Embankment

The north embankment separates Ash Basin No. 5, which is closed, and Ash Basin No. 6. This embankment has been filled on both sides and currently can only be distinguished by the presence of the access road on its crest, as seen in Photo 10. An approximately 18-inch-diameter pipe discharges process water from the equalization pond into a small channel at the northeast end of Ash Basin 6. Talen has implemented a monitoring program to address concerns regarding overtopping due to this discharge. A new staff gage has been installed at the northeast corner of the basin to monitor water level.

The process water discharge pipes, which were used previously for ash discharge, cross the north dike near its west end and discharge to a pool near the west end of the basin, as noted below. The exposed upper portions of the upstream slope had been cleared of vegetation and

seemed to be in good condition. The crest of the northeast corner of the basin can be seen in Photo 10. The downstream slope of the embankment at the northwest corner can be seen in Photo 11.

South Embankment/Polishing Pond

The downstream slope of the south embankment can be seen in Photo 13. The access road to the polishing pond discharge structure had been recently leveled and reinforced with stone, as seen in Photo 12. The slope itself appeared to be in good condition with no visible evidence of movement, sinkholes, distress, or erosion. The vegetation had been trimmed over the downstream face and toe prior to the inspection, with the vegetation over the majority of the slope at or below 6 inches. The toe of the downstream embankment was wet, with deep ruts and standing water in places, as seen in Photo 14. There was no visible seepage or evidence of piping, although the ruts were ponding water.

The upstream slope appeared to be in good condition, and the vegetation along the upstream slope had been trimmed recently, except along the waterline, as seen in Photos 15, 16, and 30. There was no evidence of movement, sinkholes, or distress. The shallow depression observed on the northeast slope where the floating boom attaches to the slope, which was observed in 2014 and appeared to be the result of site grading, was not evident during the 2015 inspection. The eroded areas along the waterline noted in previous reports had been repaired with riprap. There was no evidence of significant erosion elsewhere.

West Embankment

A new stone access road and berm was installed along or downstream of the toe of the west embankment in the fall of 2014. The access road and berm are up to 10 feet high above the toe in places, about 10 feet wide, and are constructed of 4-inch stone fill.

The vegetation on the downstream slope of the west embankment was recently cut, as seen in Photos 17 through 20, with the height over the majority of the slope at or below 6 inches. There was no evidence of movement, seepage, sinkholes, distress, or erosion, except as noted below. Minor slope irregularities were observed along the upper edge of the slope, which were likely due to mowing equipment, road traffic, or snow plowing. There was no evidence of cracking. The toe of the downstream slope was wet at the southern end, but remained dry from the splitter dike between the main basin and the polishing pond to the outside bend north of the transmission line crossing as shown on Figure 1. Hummocks and tire ruts were observed along the toe, which had been repaired in the area of the transmission line crossing. The toe of the slope in this area was observed to be wet during HDR's previous annual visits that were conducted earlier in the spring.

Seepage or wet soils were observed nearly continuously along a roughly 1,000-foot-long section of the lower slope and toe of the northern part of the west embankment between the two outside bends, as shown on Figure 1 and as seen in Photos 21 and 22. The basin adjacent to the embankment in this area has been completely filled with ash, with no open

water. This area has demonstrated varying degrees of seepage in previous inspections, depending on the season, but the toe along the entire section between the two bends was either wet or there was standing water during this site visit. No flow was visible and there was no evidence of piping, material deposition, or entrained fines. Artesian conditions were observed in the riser of Monitoring Well 6-1B near the northwest corner of the basin, with flow coming from a hole in the riser about 2 feet above grade (approximately 3 to 4 feet above the embankment toe and 8 feet above the Sedimentation Basin No. 1 drainage ditch). This is indicative of the wet conditions in this area. An area that had previously been heavily disturbed had been repaired, as seen in Photos 20 and 21. The ditch adjacent to Sedimentation Basin No. 1, located along the toe in the northwest corner of the basin, was heavily vegetated with flow in the ditch estimated at less than 1 gallon per minute. A 150- to 200-foot-long historic slough, which reportedly occurred in 2005, was repaired, as seen in Photos 24 and 25. The slough had previously extended from within 2 feet of the crest to the toe of the slope. There was no evidence of recent movement, but the toe remained overgrown, making it difficult to see clearly. Trees along the old drainage ditch had been cut and removed, though downed trees, stumps, chest-high vegetation, irregular ground, and standing water were observed at the northwest corner, immediately downstream of the new access road berm, as seen in Photos 23 and 25. Wet soils were observed at the toe of the existing slope and access road, as seen in Photo 21, which appeared to be due to runoff or shallow seepage, as the rock fill access road should not significantly change embankment drainage. There was no other evidence of seepage, instability, or erosion, and no sinkholes or animal burrows were observed.

The northern part of the basin has been filled with ash to within 900 feet of the polishing pond. The southern part of the basin still retains water. The upstream slope of the west embankment, where it is filled and where it retains water, is heavily vegetated as seen in Photos 26 and 27. There was no visible evidence of movement, settlement, sinkholes, cracking, or other distress.

Former Ash Discharge Sluices and Discharge Channel

The former ash discharge sluices are located near the northwest corner of the basin. The discharges consist of three pipes that currently discharge process water into an open pool, seen in Photo 28. Although ash sluicing has been discontinued, the discharge sluices are still used to discharge process water from the steam plant dewatering troughs, and the discharge pool was still full of water. As noted previously, a separate discharge pipe for equalization pond process water is located near the northeast end of the basin, which is also still in service. The discharge channel for this pipe was cleared. Talen reportedly monitors the discharge area daily for evidence of flow backing up. An old 12-inch floating fly ash pipeline was observed along the east slope, extending to the basin. Talen confirmed this pipeline is abandoned. An emergency swale was installed which would convey the equalization pond discharge to open water if the normal swale becomes blocked.

Intake/Outlet Structures

The outlet structure located between the main basin and the polishing pond was in good condition and can be seen in Photo 29. The splitter dike between the main basin and the polishing pond can be seen in Photos 30, 31, and 32. The concrete appeared to be in good condition, and the skimmer gate appeared to be new. The walkway paint showed some signs of deterioration, although the walkway itself was sound. New winches with stainless cable were installed within the last 5 years to suspend the skimmer gates at the outlet structure. Two 9-inch-high stoplogs had been removed since the previous inspection, lowering the impoundment level by 18 inches. The top of stoplog elevation was 284.25 feet at the time of the inspection, and the impoundment water surface elevation was 284.75 feet. Talen reported that an additional stoplog was removed in the fall of 2015, after the 2015 inspection, with the top of stoplog elevation now 283.5 feet and the normal reservoir surface elevation at 284.2 feet. The skimmer gates were out of the water at the time of inspection.

Talen engineers performed a dewatered inspection of the outlet structure in February 2012 and reported that the structure was in good condition and the gates operated smoothly. Talen reported that Marion Hill Associates performed a dive inspection on October 15, 2015, after the 2015 inspection. The dive inspection included assessing the condition of the interior concrete, and the gate, stem guides, concrete stoplogs and concrete panels. A stainless steel rod was observed resting against the low level outlet control gate, which was removed by the divers during the inspection. The divers did not report any other adverse findings regarding the condition of the outlet structure or its ability to convey flow.

Missing nuts were observed on the bolts on the saddles of the discharge pipeline through the splitter dike, from the main basin to the polishing pond as seen in Photo 38. This is not typically a concern under normal or flood conditions but could result in movement or damage to the outlet pipe during earthquakes.

The discharge pipe through the splitter dike was observed to be 2/3 blocked with a timber exit weir as shown in Photo 39. Talen reported that this weir is in place to raise the water level in the pipe to allow chemistry and water quality testing but that it can be removed in the event of a flood to achieve full capacity.

A visual (video) inspection of hydraulic structures that pass through the ash basin embankments using a Remotely Operated Vehicle (ROV) was conducted on October 15, 2015, by Sorg, Inc., Roto-Rooter Sewer & Drain, and monitored by HDR. A mixing chamber structure was observed in the conduit between the main basin and the polishing pond. The mixing chamber, which had been shown schematically on construction drawings but for which there were no details, may have a significant throttling effect on the conduit discharge capability, as well as the potential to catch trash. In addition, there is a removable weir at the downstream end of the conduit that needs to be removed in the event of significant flooding. Both of these structures are associated with monitoring and treatment of discharge in accordance with Talen's environmental permits. The ROV could not travel past the mixing chamber to observe the remaining section of the conduit. Talen is developing a plan to clear

the trash and sediment in the mixing chamber and pipe and has reportedly verified that removal of the weir is included in the basin and polishing pond operating plan, but is still in the process of assessing the impact of the mixing chamber on discharge capability and hydraulic capacity.

The outlet structure from the polishing pond to the Susquehanna River consists of an inlet on the east embankment, seen in Photos 33 and 34, and a regulating structure just upstream of the discharge point, seen in Photo 12. Both of these structures appeared to be in good condition. The flapper valve at the end of the discharge line, seen in Photo 35, appeared to have not been lubricated or exercised recently and was open on a skew.

The interior of the conduit through the polishing pond embankment was also inspected with an ROV on October 15, 2015. The conduit appeared to be in good condition, and no unusual conditions were observed that would affect the integrity or discharge capacity of the conduit.

5.0 Instrumentation

Four piezometers were installed in the east embankment in 2009 along two sections, at approximately Stations 22+60 and 7+30, as seen in the figures in Appendix B. The piezometers at Station 22+60 were installed adjacent to a repaired sloughed area in the filled section of the ash basin, while the piezometers at Station 7+30 were installed in an area with no nearby sloughs, in the open-water section of the ash basin. Two piezometers were installed at each section; one piezometer was located in the crest road and the second was located on the slope approximately 1/4 to 1/3 of the way up from the toe. Piezometer B09-03, reported as missing previously, was located and read. Piezometer readings at Station 22+60 were higher than at Station 7+30, and were consistent with previous readings. The phreatic surface was below the bottom of Piezometer B09-4 at Station 7+30, which was also consistent with previous readings. Piezometers B09-3A, B09-3B, and B09-4 have historically read dry or at/slightly above the measured piezometer tip elevation. The road box cover for Piezometer B09-1 was broken and the riser was filled with bentonite but the piezometer tube was intact. The road box cap for Piezometers B09-3A and B appeared to have been hit by a snow plow or grader and was cracked, but still functional.

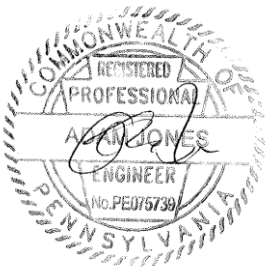
Other instrumentation consists of gage boards and level transducers at the outlet structures in the main basin and polishing pond. The level transducers are monitored full time by the Brunner Island Steam Electric Station System Operator. The water surface elevation in the main basin was 284.75 feet and the gage at the polishing pond outlet structure read 2.5 inches at the time of the inspection. The gage board was extended subsequent to the inspection to provide readings at the lowered water level. Since removal of the stoplogs at the outlet structure between the main basin and the polishing pond, the basin water level is now below the base of the staff gage as seen in Photo 37.

6.0 Closure

This annual inspection was conducted in accordance with the requirements of the United States Environmental Protection Agency (USEPA) 40 CFR Parts 257 and 261 Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, April 17, 2015 (CCR Final Rule). HDR appreciates the opportunity to perform this work for Talen. If you have any questions or comments, please contact us.

Sincerely,

HDR ENGINEERING, INC.



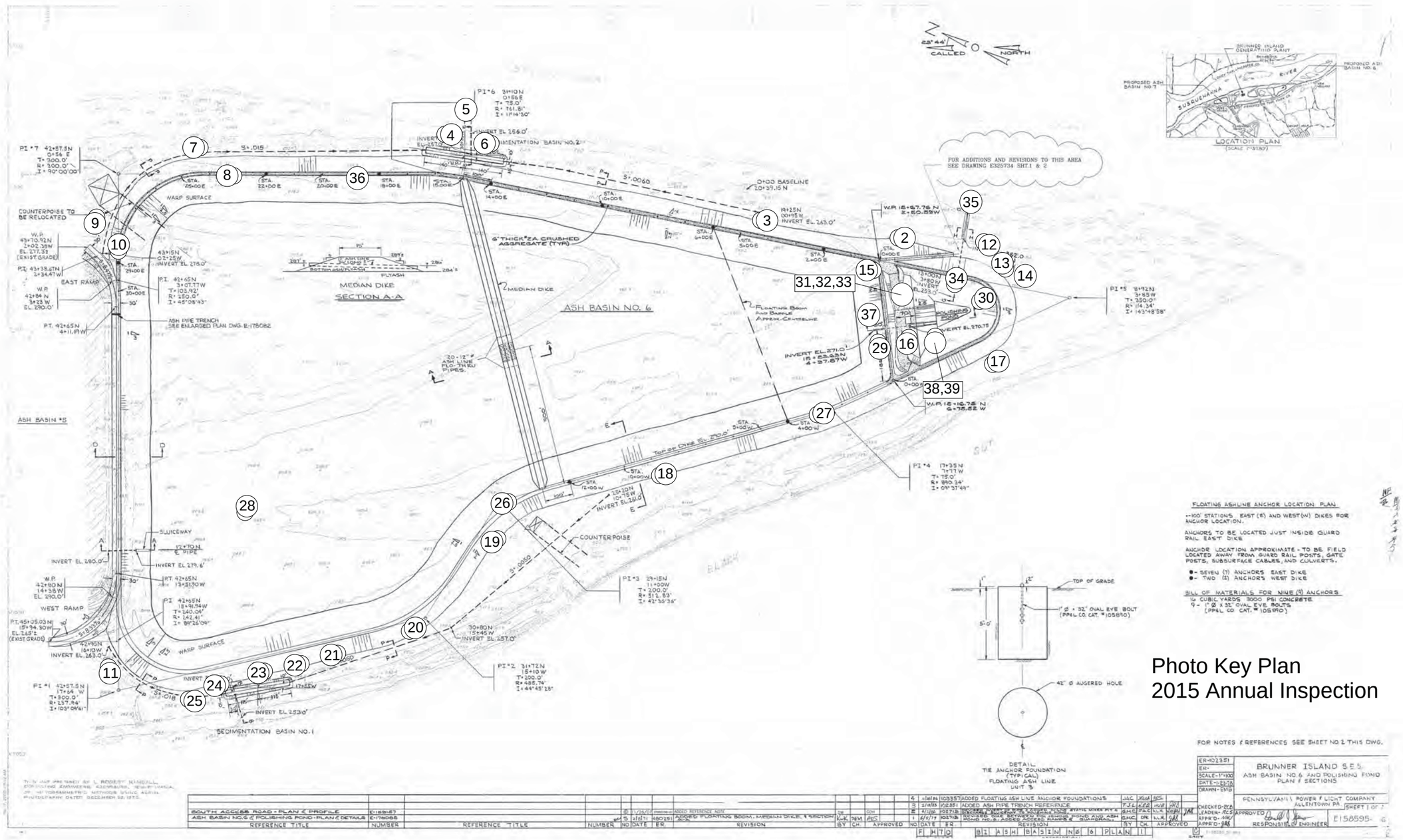
12/11/2015

Adam N. Jones, P.E.
Senior Engineer

ANJ/cw

Appendix A: Inspection Photographs
Appendix B: Piezometer Plots and Data

APPENDIX A
INSPECTION PHOTOGRAPHS


ASH BASIN NO. 6
MEDIAN DIKE
SECTION A-A
ASH BASIN #5
SEDIMENTATION BASIN NO. 1
WEST RAMP
EAST RAMP
COUNTERPOISE TO BE RELOCATED
COUNTERPOISE
SLUICEWAY
ASH PIPE TRENCH SEE ENLARGED PLAN DWG. E-178082
6" THICK 2A CRUSHED AGGREGATE (TYP.)
WARP SURFACE
Top of Dike El. 280.0'
FLOATING ASH LINE ANCHOR LOCATION PLAN
BILL OF MATERIALS FOR NINE (9) ANCHORS
DETAIL TIE ANCHOR FOUNDATION (TYPICAL) FLOATING ASH LINE UNIT 3
LOCATION PLAN
Photo Key Plan
2015 Annual Inspection
BRUNNER ISLAND S.E.S.
ASH BASIN NO. 6 AND POLISHING POND PLAN & SECTIONS
PENNSYLVANIA POWER & LIGHT COMPANY ALLENTOWN PA.

A-1

Photo 1 – Aerial Photo of Brunner Island Ash Basin No. 6. PPL Flyover 2014

Photo 2 – Downstream slope of the east embankment, looking north from the south end, south of Station 0+00. A seepage blanket, shown in the middle of the photo, has been installed at the toe of the slope, which has historically been wet.

Photo 3 – Looking north at a wet area at the toe of the east embankment at about Station 1+50. Wet soils extended about 3 feet vertically up the slope.

Photo 4 – Toe of the east embankment at about Station 16+00. Wet soil extended up to 8 feet vertically up the slope between Stations 16+80 and 17+60.

Photo 5 – Abandoned drainage structure in the ditch at the toe of the east embankment at about Station 16+00.

Photo 6 – East embankment looking south near Station 16+00. Heavy vegetation at toe indicates a wet area where equipment could not operate.

Photo 7 – East embankment looking south from about Station 24+00 at an area where previous sloughs had been repaired and re-vegetated.

Photo 8 – East embankment looking south from about Station 23+50, showing repairs of previous sloughing on the downstream slope and the recently raised gravel crest.

Photo 9 – Downstream slope of the embankment at the northeast corner, looking east.

Photo 10 – Crest of the north embankment at the northeast corner of the basin. The crest was raised to the design elevation of 290 feet in 2014.

Photo 11 – Downstream slope of the north embankment near the northwest corner, showing a section of the slope where vegetation was not recently cut.

Photo 12 – South embankment at the polishing pond discharge regulating structure, looking north.

Photo 13 – Downstream slope of the south embankment looking west.

Photo 14 – Pool of stagnant standing water at the toe of the downstream slope of the polishing pond.

Photo 15 – Interior slope of the polishing pond, looking south.

Photo 16 – Interior slope of the polishing pond, looking east.

Photo 17 – Downstream slope of the west embankment, looking north from the south end. Note the new gravel access road along the toe.

Photo 18 – Downstream slope of the west embankment, looking north from Station 9+00W.

Photo 19 – Downstream slope of west embankment, looking south.

Photo 20 – Toe of the west embankment where significant disturbance was observed in 2011. The area has been regraded and reseeded. Wet soils and rutting were observed previously. A new gravel access road was installed along the toe in 2015.

Photo 21 – Wet area with standing water at the north end of the west embankment in a previously disturbed area that had been restored.

Photo 22 – Standing water in ruts at the toe of the slope at the north end of the west embankment.

Photo 23 – Access road and grading for Monitoring Well No. 6 at the toe of the west embankment near the north end, showing irregular ground, thick vegetation and stumps.

Photo 24 – Downstream slope of the west embankment near the north end, where an old slough was repaired. Grass on slope was chest high and downed trees had not been cleared.

Photo 25 – Area of historic slough at the north end of the west embankment which was recently repaired. An access road with a stone berm was recently constructed. Note vegetation at toe.

Photo 26 – Crest of the west embankment, looking south from bend.

Photo 27 – Vegetation along the upstream slope of the west embankment.

Photo 28 – Former ash slurry discharge location near the northwest corner of the basin. The discharge pipes in the center of the photo are still being used to discharge process water.

Photo 29 – Outlet structure between basin and polishing pond.

Photo 30 – Median dike, metering station, and discharge structure to the polishing pond, looking north.

Photo 31 – Median dike between the main basin and the polishing pond.

Photo 32 – Catch basin and ditch at the median dike, which has grown in and should be maintained.

Photo 33 – Outlet structure in the polishing pond.

Photo 34 – The discharge structure for the polishing pond.

Photo 35 – Flapper valve at the end of the polishing pond discharge line.

Photo 36 – Typical erosion rills observed at the top of the east and south embankments, where the crest was recently raised. This erosion rill is approximately located at STA. 18+40 on the east embankment.

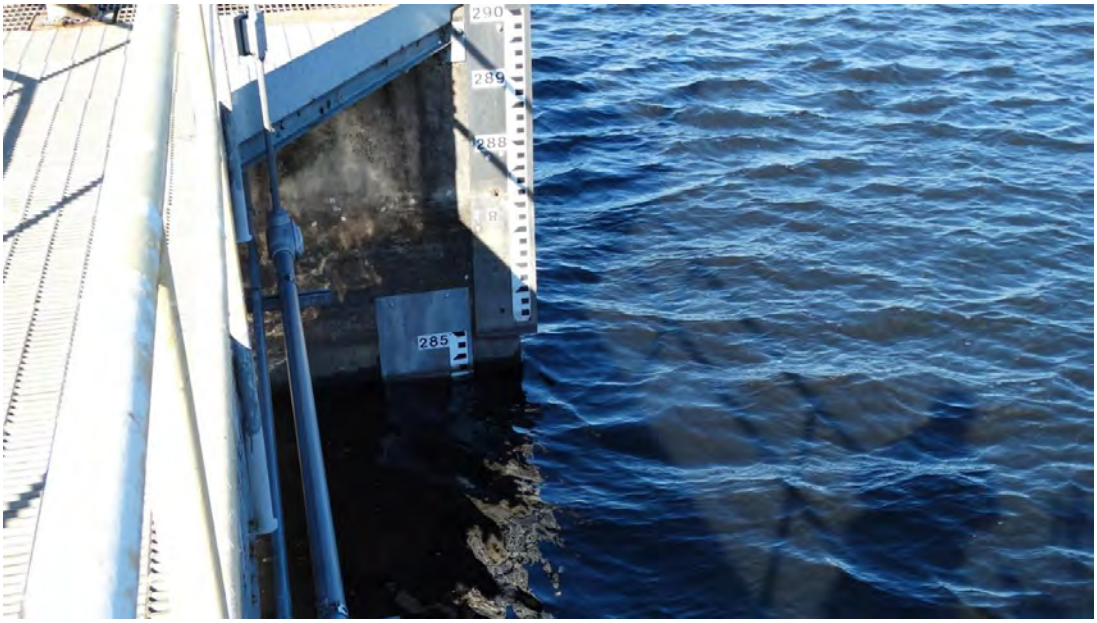


Photo 37 – Staff gauge extension at the basin outlet structure (Photograph provided by Talen).

Photo 38 – Missing nuts observed on most of the bolts on the saddles of the discharge pipeline to the polishing pond.

Photo 39 – Discharge pipe through the median dike observed to be 2/3 blocked with a timber exit weir. The spillway adequacy analysis assumed this discharge structure to be at full capacity. Maintenance staff were aware that the weir needs to be removed during a flood.

APPENDIX B
PIEZOMETER PLOTS AND DATA

SECTION 1-1
STA. 22+60±

SECTION 2-2
STA. 7+30±

B09-2
B09-1

B09-4
B09-3

BRUNNER ISLAND
PIEZOMETER LOCATION
PLAN

LEGEND OF SYMBOLS AND ABBREVIATIONS

- CONTROL POINT
- PIEZOMETER
- MONITORING WELL
- MANHOLE
- LIGHT POLE
- FIRE HYDRANT
- UTILITY POLE
- POST
- FLAG POLE
- BUSH
- CONTOURS 2014
- INDEX CONTOURS 2015
- INTERMEDIATE CONTOURS 2015
- TREELINE
- BRUSHLINE
- GUIDERAIL
- EDGE OF ROAD/TRAIL
- EDGE OF WATER

L.R.Kimball

NOTES:

1. From ground control surveys dated May 20 – 21, 2015 by L.R. Kimball, aerial photography dated April 2, 2015 by Air Photographics, Inc. and from the following plans:
   - → Brunner Island SES, Ash Basin No. 6 2014 Mapping for 2013 Operational Report by PPL Services
2. Horizontal control is based on NAD83, PA South Coordinates provided by Talen Energy Services.
3. Vertical control is based on NAVD88 datum provided by Talen Energy Services.
4. 2014 Contours are depicted in the main pond and polishing pond as light grey. The 2015 contours are darker.

0 200 400 Feet

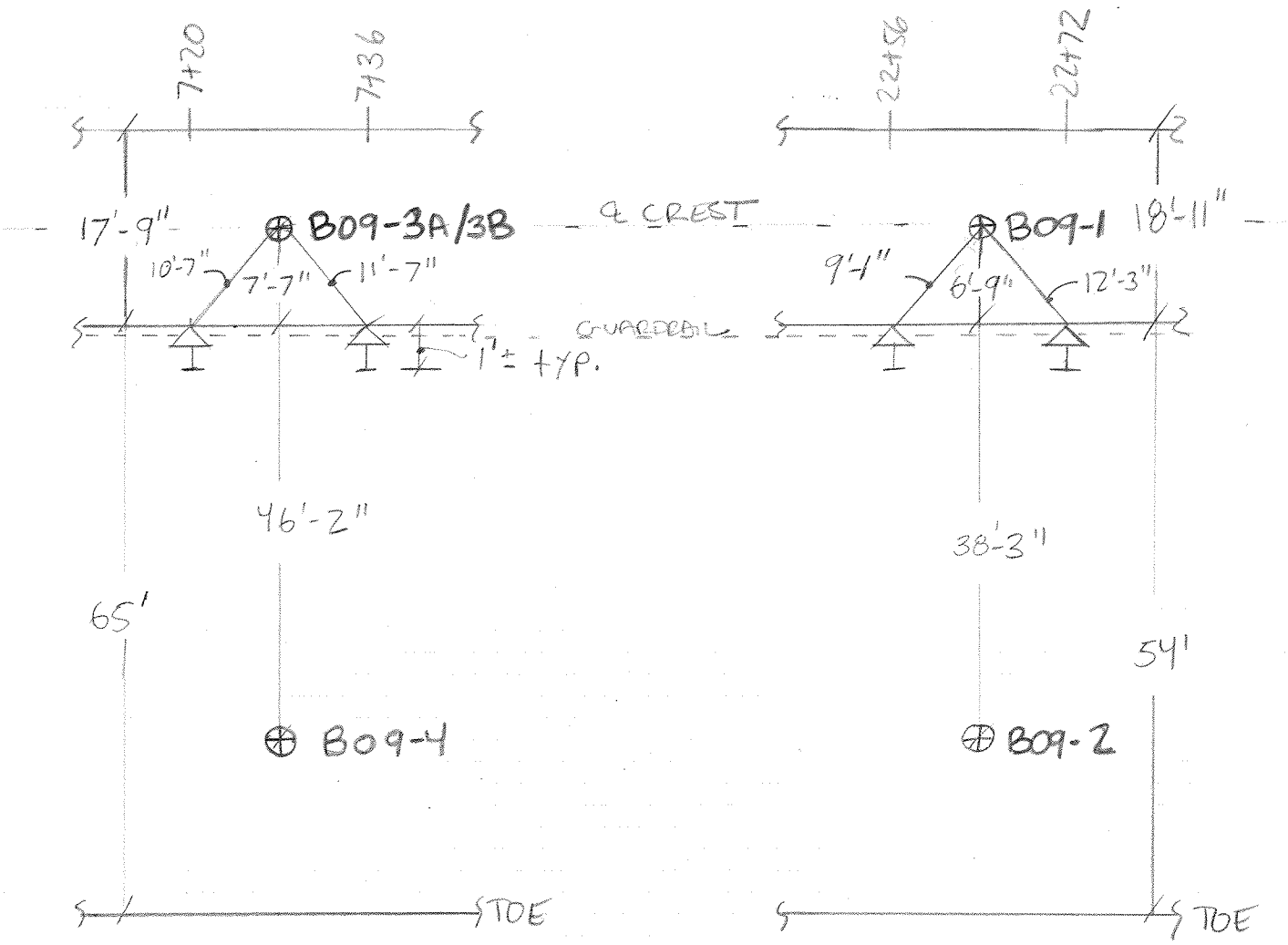
NO	DATE	ACCE	REVISION	BY	APPROVED
18	6/15		ADDED 2015 ASH CONTOURS & CHANGED TITLE TO REFLECT 2014 RESULTS	JMW	AL
17	2/14	750160	ADDED 2014 ASH CONTOURS & CHANGED TITLE TO REFLECT 2013 RESULTS	JTC	AL BRW
16	4/13	750159	ADDED 2013 ASH CONTOURS & CHANGED TITLE TO REFLECT 2012 RESULTS	JTC	AL SKA
15	4/12	750069	ADDED 2012 ASH CONTOURS & CHANGED TITLE TO REFLECT 2011 RESULTS	JTC	AL BRW SDP
14	6/11	750158	ADDED 2011 ASH CONTOURS & CHANGED TITLE TO REFLECT 2010 RESULTS	JTC	AL ADS

BRUNNER ISLAND S.E.S.
ASH BASIN NO. 6
2015 TOPOGRAPHICAL MAPPING
FOR 2014 OPERATIONAL REPORT
EAST MANCHESTER TOWNSHIP, YORK CO., PA.

Talen Energy Corp

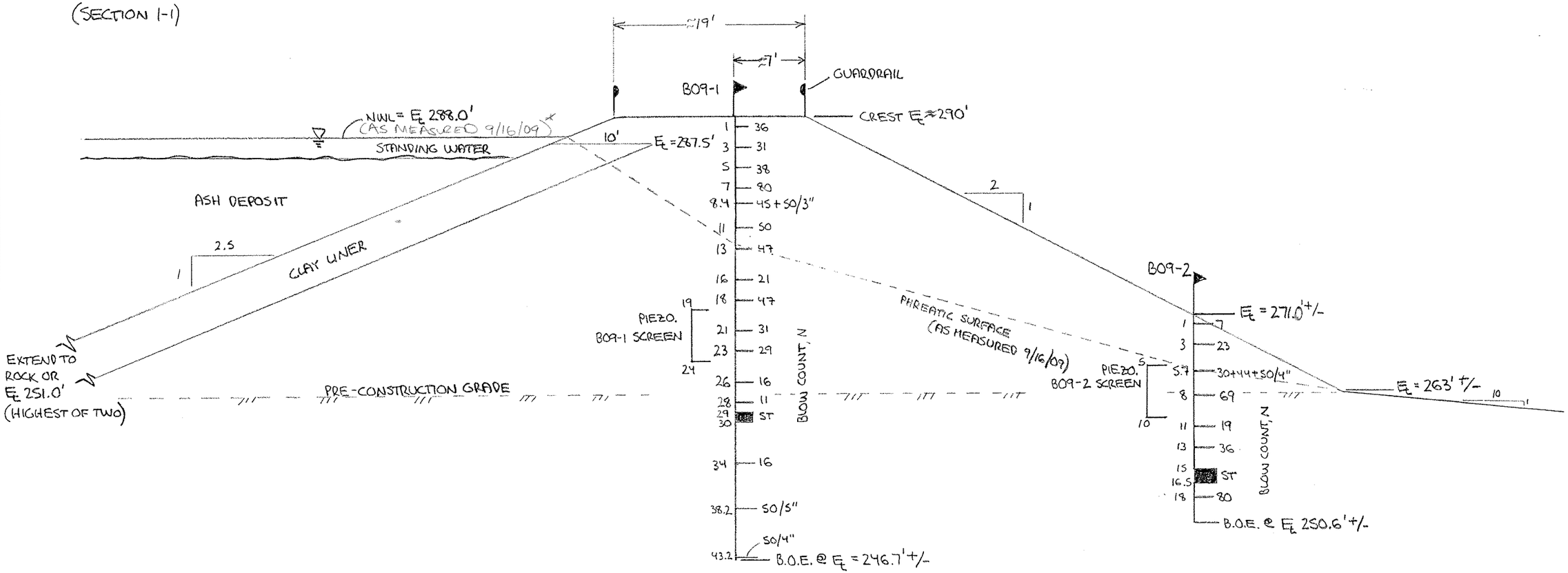
PPL DRAWING NO. 750189 | SHEET NO. 1 | REV. 18

Project: BRUNNER ISLAND	Computed: HNN	Date: 8/4/15	
Subject: PIEZOMETER LOCATION	Checked:	Date:	
Task: B09-1 THROUGH B09-4	Page:	of:	
Job #:	No:		



PLAN N.T.S.

STATION 22+60 +/- :
(SECTION 1-1)



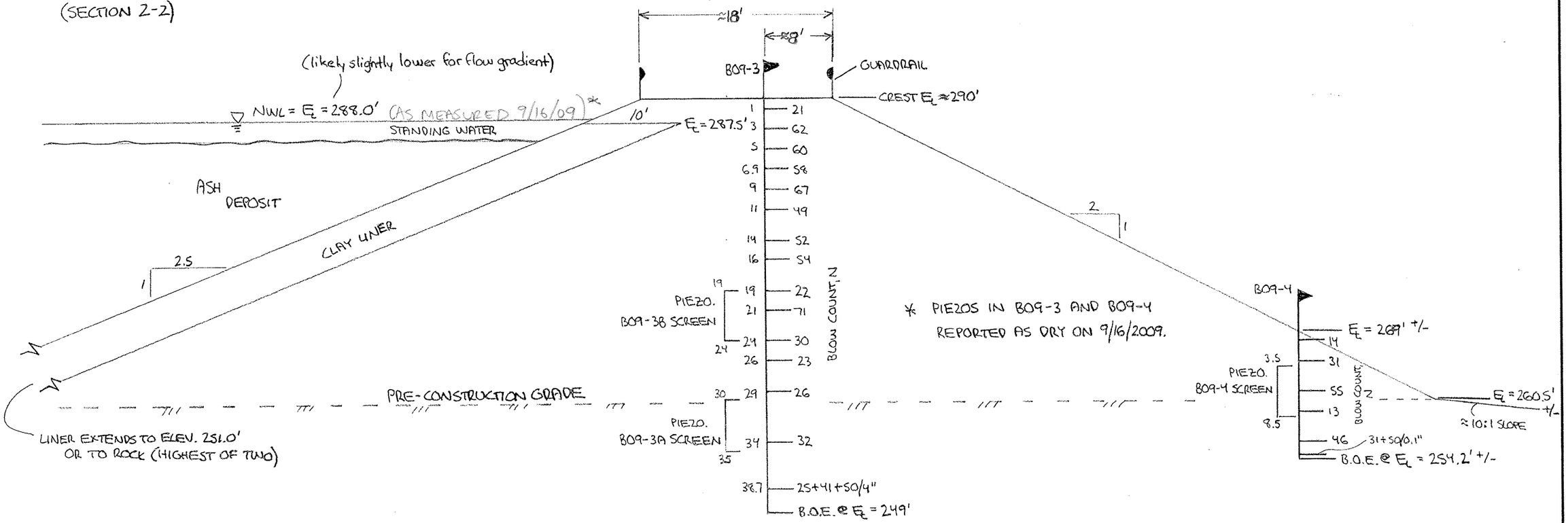
* NOTE: "ST" = SHELBY TUBE

* NOTE, TALEN HAS REMOVED STOPLOGS FROM THE BASIN WHICH HAS LOWERED THE POOL TO ABOUT EL 284.75'

REV	BY	DATE	CHECKED	DATE	BRUNNER ISLAND AB 6 - STATION 21+80	JOB NO	PAGE 1 OF 2
	NBS	9/23/09				CALC NO	

STATION 7+30 +/- :

(SECTION 2-2)



* PIEZOS IN B09-3 AND B09-4 REPORTED AS DRY ON 9/16/2009.

* NOTE, TALEN HAS REMOVED STOPLOGS FROM THE BASIN WHICH HAS LOWERED THE POOL TO ABOUT EL 284.75'

REV	BY	DATE	CHECKED	DATE		JOB NO	PAGE 2
	NBS	9/23/09				CALC NO	OF 2

Figure 5. Piezometer Time-History Plot