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Subject: 2015 Annual (Initial) USEPA CCR Surface Impoundment Inspection Report Montour Ash Basin No. 1

Dear Mr. Wilburn:

This letter report presents the findings of the 2015 Initial Annual Inspection for the Montour Ash Basin No. 1 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

Montour Ash Basin No. 1 is an operating Coal Combustion Residual (CCR) surface impoundment, referred to as an ash basin, which is owned and operated by Montour LLC, a division of Talen Energy (Talen). The basin is still in service, although over half of the basin has been filled with ash and fill, and is being covered as part of the long-term closure plan. The ash basin is formed by an earth embankment, with a maximum height of approximately 40 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 1 under the PADEP Dam Safety Guidelines, corresponding to a medium-sized, high-hazard-potential dam. Talen and their predecessor, PPL, have been inspecting the ash basin in accordance with PADEP requirements for a number of years.

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. Verification that the project was designed and constructed in accordance with recognized and generally accepted good engineering standards was, therefore, limited to a review of available project drawings, discussions with Talen, and the visual inspection. Project drawings indicate that the embankment geometry and details were consistent with generally accepted good engineering standards at the time of construction in 1971. Talen noted that seepage and slope stability issues were identified starting shortly after the start of operation, reportedly due to insufficient blending of embankment materials, an indication that construction practices were not uniformly adequate. As a result, several seepage control measures have been implemented over the years, which are described in greater detail below. These remedial measures appear to be functioning as intended.

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 need to 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, with the exception of the hydraulic conduit inspection. A Remotely Operated Vehicle (ROV) inspection of the hydraulic conduits was conducted in 2015, subsequent to the annual inspection. The 36-inch-diameter, reinforced concrete pressure pipe (RCPP) conduit leading to the wastewater treatment area from the ash disposal decanting structure in Sub-basin C, which is currently the sole spillway outlet structure, had a large obstruction blocking 80 to 90 percent of the conduit located approximately 45 feet downstream from the Sub-basin C drop inlet structure. This blockage may adversely affect the spillway adequacy of the ash basin during floods. Talen is planning to investigate and remove the conduit blockage and is also in the process of performing an H&H analysis for the CCR rule.

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 CCR surface impoundments:

- Maintenance of vegetation on the slopes of the embankment with a height not to exceed 6 inches, removal of burrowing animals and repair of burrows, and periodic repair of ruts, sloughs, and slope irregularities;
- Evaluation of the spillway adequacy of the outlook works, maintenance of the outlet system to maintain the hydraulic capacity, and design and construction of emergency spillway measures;

- Monitoring of the integrity of through-embankment conduits and filling of abandoned conduits in the embankments;
- Maintenance of the pumped dewatering system at the north embankment; 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

Montour Ash Basin No. 1 was placed in service in 1971 and is located adjacent to the Montour Steam Electric Station (SES) in Derry Township, Montour County, Pennsylvania. The ash basin is formed by earthen dikes on the north, south, and west slopes, and ties to natural grade along the eastern slope. The dikes are constructed of homogenous earthfill obtained from overburden soil, consisting primarily of weathered shale bedrock. The perimeter of the basin is approximately 11,000 feet in length with a maximum height of about 40 feet, and the storage area is about 150 acres. The ash basin is located at 41^{o}4'25"N, 76^{o}40'16"W. An aerial view of the ash basin can be seen in Photo 1 located in Appendix A. The dam was originally owned by PPL Montour LLC (PPL). In June 2015, the company changed their name to Montour LLC, a division of Talen Energy (Talen).

Areas within the embankment with high permeability soils have been noted by Talen previously, reportedly due to insufficient blending of materials. As a result, several seepage control measures have been implemented over the years. A slurry wall extending around the entire perimeter of the basin was constructed approximately 30 years ago. Cement grouting was also performed. A seepage collection and slope stabilization system was installed along the toe of the north dike, consisting of four dewatering pumps and a gravel blanket along the toe. The pumps discharge back to the reservoir. A slope stabilization project consisting of a counterweight berm along part of the southwest dike, south of the pipe bridge, was completed in June 2008. The downstream slope of the south embankment near the east end was also stabilized at about that time.

The ash/water and coal mill rejects/water slurry from the Montour Steam Electric Station are pumped to Sub-basin B and discharged into the settling/dewatering troughs. The troughs remove nearly all of the bottom ash and coal mill rejects, leaving only ash fines to be discharged into Sub-basin B. Sub-basin B is partially filled in. Sub-basin A is completely filled and covered with soil and has been seeded. The settling troughs are still being used, but the screws to assist with bottom ash dewatering were not operating at the time of the inspection. A third trough receives coal mill rejects slurry. The screw feeder between the two ash troughs dewaters and conveys the majority of the ash to an adjacent stockpile. The water from the feeder screw overflows into the concrete troughs. Bottom ash that settles in the troughs is removed with heavy equipment and stockpiled, while the water is discharged through a narrow channel to Sub-basin B. A splitter dike that previously separated Sub-basins A and B has been incorporated in the basin fill. Sub-basin B now acts as the primary settling basin with the discharge water piped through the splitter dike separating Sub-basin B from Sub-basin C.

Overflow from Sub-basin C is discharged through a reinforced concrete riser pipe that leads to the Detention Basin before discharging to Chillisquaque Creek.

In accordance with the CCR Final Rule inspection requirements for surface impoundments, the following information is required. Since this is the 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 Sub-basin B is Elevation 557.27 feet (as determined by surveys performed by PPL in March and May 2014 using plant-specific NGVD 29 vertical datum), resulting in a normal water surface elevation in Sub-basin B of about 559.4 feet. The top of the decanting pipe outlet structure in Sub-basin C is at Elevation 553.1 feet (as determined by the PPL surveys performed by PPL in March and May 2014 using plant-specific NGVD 29 vertical datum), resulting in a normal water surface in the polishing pond of about 552.8 feet. No significant quantities of fill are currently being permanently discharged into the basin, though ash is being handled for beneficial re-use in the closed part of Sub-basin B.

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 G-199943, dated March 1968 (original drawing date) and revision 13 dated February 17, 2000. Contours shown on Drawing E376172 Rev. 5 were based on a bathymetric survey conducted on May 22, 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 Elevation Feet	Water Surface Elevation feet	Ash Depth feet	Free Water Depth Feet	Location
564 (dam crest elevation) or dry stacked up to 572	Varies from 520 to 558	559.4	6 (elevation 558 to 564) to 38 (elevation 520 to 558) at the deepest	0 to 5.4	Cell A and B
N/A – trace amounts	526	553.1	0	27.1	Cell C

2.4 CCR Storage Capacity

The total CCR storage capacity of the ash basin is approximately 8,760,470 tons. An estimated 8,689,909 tons of CCR has already been deposited, resulting in an average remaining CCR storage capacity, from the existing CCR surface to the reservoir surface elevation of 2 feet, or 70,561 tons.

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, and reportedly 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;
- Periodic Safety Factor Assessments;
- Initial Closure Plan; and
- Initial Post-Closure Plan.

Talen will be preparing documentation regarding 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:

- Drawings provided by Talen; and
- Previous annual inspection reports by HDR Engineering, Inc., from 2008 to 2015.
- Weekly inspection reports by qualified personnel

Based on a review of the limited available information, it appears the embankment was designed in accordance with good engineering standards that were recognized and generally accepted at the time of design and construction in 1971. The embankment was constructed of controlled 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 2H 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. 1 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 chimney drains, or blanket or toe filters on the downstream face of earthen embankments; 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. No unusual seepage associated with the embankments or conduits, or evidence of slope instability was identified that would be considered to pose an unusual risk, though seepage along the underside of conduits would be difficult to view directly.

Construction practices were apparently not in accordance with accepted standards at the time. Areas within the embankment with high permeability soils were noted by Talen previously, reportedly due to insufficient blending of materials. As a result, several seepage control measures have been implemented over the years. A slurry wall extending around the entire perimeter of the basin was constructed approximately 30 years ago. Cement grouting was also performed. A seepage collection and slope stabilization system was installed along the toe of the north dike, consisting of four dewatering pumps and a gravel blanket along the toe. The pumps discharge back to the reservoir. A slope stabilization project consisting of a counterweight berm along part of the southwest dike, south of the pipe bridge, was completed in June 2008. The downstream slope of the south embankment near the east end was also stabilized at about that time. This is an unusual amount of rehabilitation for a relatively small embankment. No documentation of these modifications was available for review, although they all appeared to be functioning as intended.

Talen is currently assessing the spillway adequacy of the basin as required by the CCR rule. The sole spillway for the basin currently comprises an outlet structure at Sub-basin B with two conduits leading to Sub-basin C, and an outlet structure at Sub-basin C with a conduit leading to the waste treatment basin (detention basin). During the internal inspections of the discharge conduits that pass through the ash basin embankments that were conducted as a requirement of the CCR Final Rule, an obstruction was observed in the 36-inch-diameter RCPP Sub-basin C outlet conduit. This obstruction was located about 45 feet downstream of the intake to the outlet works, and appeared to block 80 to 90 percent of the conduit. Talen is planning to investigate and remove this obstruction.

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 lower compacted soil component. The ash basin will, therefore, likely be subject to the additional monitoring and operational restrictions of the CCR rule.

The CCR Final Rule also places limits on the difference between the base of the impoundment and the top of the uppermost aquifer. Although detailed piezometric information regarding the aquifer groundwater surface profile was not available, the bottom of the basin appears to be close to the elevation of adjacent wetlands, 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, significant quantities of CCR are not being placed, so that operational needs for the ash basin are limited. Talen conducts 30-day instrument monitoring 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 submitted to 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. A large number of animal burrows were observed, and Talen has implemented an animal control program to trap and remove the animals and to fill the burrows.

An assessment of the groundwater monitoring program, sampling, analysis, and detection, as described by the CCR Final Rule, is 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 when the studies noted above are completed.

4.0 Visual Inspection Site Visit

The site visit was conducted on June 11, 2015, by Adam Jones, P.E. and Jennifer Gagnon, P.E. of HDR. Benjamin Wilburn, P.E., Senior Engineer; Kevin Smith of Talen; and Talen Contractor Lance Farr of Trans Ash, Inc. accompanied HDR during the inspection.

The weather during the inspection was partly cloudy with temperatures between 75 and 90 degrees. There was no rain in the 48 hours preceding the inspection, although wet weather was reported 3 days prior to the inspection. The water level in Sub-basin B was at elevation 559.4 feet, and the water level in Sub-basin C was at 553.1 feet. Talen surveyed and reset the gage boards prior to the 2014 inspection, so the reported levels may not be directly comparable to those of previous years.

Relevant photographs and a key plan are provided in Appendix A. An aerial view of the Basin can be seen in Photo 1.

Embankment

Upstream Slope

The vegetation on the upstream slope of Sub-basin C had been recently trimmed, and the height over the majority of the slope was 6 inches or less. The above-water part of the slope was visible. As noted in previous inspection reports, the upstream slope of Sub-basin C had been filled to widen the crest road for truck access, resulting in steep upstream slopes. Slope stability analyses have verified that the embankment is sufficiently wide to provide an adequate factor of safety for critical failure surfaces. The upstream slope of Sub-basin C can be seen in Photos 2 through 5. An abandoned 12-inch CMP was observed at the waterline along the west upstream slope of Dike C, which can be seen in Photo 4. The interior of the pipe was partially filled with debris. No flow was observed to be entering the pipe. The purpose of the pipe and alignment within the embankment is not known. Talen is planning to cap or plug this pipe. An irregularity that was observed in 2014 on the upstream embankment of Sub-basin C, just west of the stairs to the water level gage, had been repaired.

The upstream slope of Sub-basin B was flatter than at Sub-basin C, and it was apparent that the portions of the basin adjacent to the embankment sections were nearly filled with ash, effectively broadening the embankment. The south end of the open water has progressively moved north as the basin has filled, resulting in a smaller free water surface area and less impounded water volume. Vegetation varied from grass to exposed ash and construction debris. The exposed ash has little erosion potential due to the flat slopes. The upstream slope can be seen in Photo 6. Two separate 12-inch HDPE pipes were observed in 2014 extending into Sub-basin B along the north embankment at the waterline, but only one was visible during the 2015 inspection, as seen in Photo 7. The orientation and purpose of these pipes was not known. It appears that the second pipe observed in 2014 had been submerged in Sub-basin B during the previous inspections.

Dewatering Pump 4, at the east end of the north embankment, connects to an above-ground, soil-supported, partially buried, temporary, 700-foot-long, 4-inch-diameter PVC pipe running along the inside of the basin that discharges into Sub-basin B, seen in Photo 8. This pipe has been used to extend the discharge point of the pump line to free water since the basin is progressively being filled. No provisions for thermal expansion or contraction were observed and the 90 degree bend at the pipe discharge was unrestrained and unsupported, causing the 90 degree bend to separate from the pipe, resulting in a small erosion pocket adjacent to the crest. Talen reported that after the 2015 inspection, this pipe was shortened to discharge directly into the perimeter swale which eliminates the 90-degree bend and additional pipe length.

None of the pumps were observed to operate during the inspection, although flowing water could be heard at Wells 1, 2, 3, and 4 during the inspection. No evidence of material deposition was observed at the discharges although the wells do not discharge to a chamber where deposition can be readily observed, as seen in Photo 9. Thick brush was observed around each of the well discharge points, making it difficult to view the discharges clearly. The brush should be cleared.

Sub-basin A has been filled with ash and is closed. Sub-basin A can be seen in Photos 11 and 12. As part of the long-term closure plan, the southern part of the basin has been covered with top soil, graded, and stormwater runoff catch basins have been installed at regular intervals. The northern part of Sub-basin A includes the ash processing area and contains stockpiles of material that will be used for the closure of the remainder of the basin.

Several trenches were cut through a shallow surface dike surrounding Sub-basin A that was constructed prior to the 2014 inspection. The dike extended above the elevation of the crest access road. These trenches were cut to drain the crest access road into Sub-basin A as well as to supplement the discharge capacity of the outlet structures and prevent overtopping of the Sub-basin A dike as the result of an extreme flood. Standing water that formed periodically from access road runoff between the access road and the dike, as seen in Photo 12, would flow through the cuts and into Sub-basin A. Talen reported that in the fall of 2015, a perimeter channel was constructed within Sub-basin A, in accordance with their Major Permit Modification, which now conveys stormwater to Sub-basin B. The interior slopes near the dikes have been regraded and the small dike described above has been removed.

The southwest section of Sub-basin A, against the southwest embankment, was dry where standing water has previously been observed. Runoff from rainfall was previously directed to catch basins installed as part of the original closure plan. The catch basins along the southwestern embankment discharged to a ditch at the embankment toe, and the catch basins along the eastern embankment discharged into channels in an adjacent field. The catch basins were in good condition and were well constructed with bar screens and vortex breakers. The drop inlet structure intakes had been cut to allow more complete drainage of the capped part of the basin, as seen in Photo 10, but, as noted previously, Talen modified the drainage in Sub-basin A by capping all of the stormwater pipes, re-grading the areas with a wide swale and directing stormwater to flow to the open water in Sub-basin B.

Crest Road

The crest road is surfaced with gravel and was in good condition. The road is used regularly. Talen surveyed the crest road and raised the low areas of the crest with road base material and raised the crest of the splitter dike between Sub-basins B and C up to 1.5 feet in 2014. There was no visible evidence of settlement, movement, or instability extending to the crest. The eastern access road is paved in sections with cracking and potholing evident, but this section of the basin does not normally retain water.

Downstream Slope

The ash basin has undergone a series of remedial repairs to address slope stability and seepage issues which are evident in places along the downstream slope. The vegetation control program was effective in allowing a much more complete inspection than in previous years. The majority of the thick vegetation reported in previous inspections had been cut, and grass and brush at the time of the inspection was generally less than 6 inches high.

Approximately 30 animal burrows, presumed to be woodchucks, were observed in the downstream slope. While still a significant number, the number of burrows has been reduced greatly in the last few years. Talen has been trapping for the last two years and noted that they had filled 50 burrows in 2015 prior to the inspection. The holes were filled by inserting a grout hose as far as it would go and pumping the holes with flowable fill until return was observed. Eradication and hole-filling efforts should be continued.

The southwest embankment was generally in good condition and can be seen in Photos 13 through 21. No evidence of active movement was observed. A berm was observed at mid-slope at the north end in an area where slope irregularities had been reported previously, seen in Photos 13 and 15. This area had been obscured by vegetation during earlier inspections. The toe of the embankment was drier than in previous inspections. Wet areas were still observed along the toe of the southwest embankment with standing water at the north end of the embankment at the access ramp, becoming dryer towards the south. The wet areas at the toe of the embankment appeared to be primarily due to lack of drainage along the toe. While there was no evidence of active seepage, wet areas at the toe of a water-retaining dam are a concern that needs to be monitored. The downstream toe of the southwest embankment was dry opposite the splitter dike between Sub-basins B and C. Standing water was present in the majority of the ditch between the toe of the southwest embankment and the railroad tracks, as seen in Photo 17. A wet area, reported as a small seep in previous reports, was observed along the toe of the berm about 80 yards north of the pipe bridge. A wet area previously observed on the downstream slope of the berm further to the south was dry. The wet areas on the embankment slope did not show any evidence of seepage or piping and are not located adjacent to sections of the basin impounding surface water. Wet areas on the slope are a concern and should be monitored.

The flow in the drainage ditch on the south side of the pipe bridge was flowing at less than 5 gallons per minute, with a significant amount of iron-fixing bacterial sludge. This may indicate that at least some of the drainage was the result of seepage. The drainage ditch receives flow from a wetland south of the ash basin, so it is difficult to distinguish between seepage, drainage, and runoff. Monitoring of seepage in this area is obscured by the riprap and vegetation and is complicated by the access and influence of runoff. While there does not appear to be any evidence of active seepage or piping, this area should be also be monitored.

Low thorn trees covering the southwest embankment stabilization berm that were noted in previous reports had been cleared, and the slope was covered with stone. There was no evidence of the slope crack observed previously at the brink of the berm, although the stone slope protection could have obscured cracking. The stabilization berm can be seen in Photos 18 and 19. Heavy vegetation along the toe south of the stabilization berm, approximately 20 to 35 feet wide, obscured observations during the inspection.

The south embankment was in good condition and can be seen in Photo 22. Wet soils were observed along much of the toe, and a wetland area at the toe extended from the southwest corner of the basin to near the east end of the south embankment. A wet area previously observed to be about 150 feet long had become overgrown as seen in Photo 20, and couldn’t be viewed closely.

A depression at the west end of the south embankment was reported in 2008 and was observed again during the 2010, 2011, 2012, and 2013 inspections. The depression was not visible in 2014 and 2015 due to overgrown vegetation, as seen in Photos 20 and 21. The dimensions of the depression were previously estimated as approximately 3 feet in depth and 5 feet in diameter. A second depression, first reported in 2011, measuring about 5 feet in diameter and 18 inches deep and located about 100 yards to the east, at the toe, was not observed in 2013, 2014, or 2015 due to thick vegetation.

There was no evidence of recent movement at the south embankment, although several wet spots were observed at the toe. This part of the ash basin does not impound water, so any wet areas would be the result of groundwater movement.

The east embankment is a relatively shallow embankment that does not hold water. The brush along portions of the downstream slope has not been cut in the recent past and is extremely thick. The toe of the embankment is not far below the level of the fill in the adjacent ash basin. The east embankment is shown in Photo 23.

The north embankment was in good condition. The north embankment can be seen in Photos 24 through 29. A gravel stabilization berm is located at the east end of the embankment and extends intermittently to the west end. The vegetation was well trimmed, with the exception of a narrow band at the northeast corner of the embankment, seen in Photo 28. Vegetation in this area should be cut. The wet area in the gravel berm at the east end of the north embankment, initially reported in 2008, was observed in 2013 but not observed in 2014 or 2015. The wet area was previously reported to be about 50 feet long and was located about 50 feet northwest of Well 4. A stormwater runoff drainage system was installed several years ago in the northeast corner of the basin. This system includes a catch basin within Sub-basin B with a drain line extending across the crest of the north embankment, down the downstream slope, and across the toe access road to a discharge structure. Talen reported that the stormwater pipe has since capped at the upstream end. There are two catch basins to the east of Dewatering Well 4 on the downstream slope of the north embankment. Groundwater was observed to be flowing into both catch basins from pipe penetrations that had not been properly sealed. The groundwater inflow into the catch basin is unfiltered and has the potential to wash fine soil into the catch basins, as evidenced by a small depression in the ground surface over the leaking penetration of the catch basin, adjacent to the toe access road that may be the result of piping and subsidence. Although it is unlikely that a significant amount of soil could wash in quickly, the pipe penetration into the lower catch basin should be sealed. Talen also noted that they had reviewed drawings, construction records, and pipe inspection videos, and it appeared that the east drain line that feeds into the catch basin for Dewatering Well 4 was cut when the stormwater drain piping was installed. The dewatering system drain line was rerouted under the stormwater drain line.

The ditch adjacent to Well 1 was drier than previous years, as seen in Photo 29. In past years the ditch was full of water indicating that the pump is either not working or is not completely effective in draining the embankment toe. Talen reported that this pump had been repaired in 2013 and the ditch was dry during the 2013 inspection. The surface of the north embankment gravel stabilization berm is irregular, as reported previously, although there is no evidence that this is the result of foundation subsidence as suggested in a previous report, or slope instability. None of the four permanent dewatering well pumps were observed to be pumping during this inspection, though water could be heard trickling into the wells at Pump Nos. 1, 2, 3, and 4, indicating they had been in operation recently. The outlets of Dewatering Wells 1 and 3 were overgrown and should be cleared. The discharge for Dewatering Well 2 is cantilevered a significant distance. Support should be added to prevent the line from breaking as a result of snow or ice loading. The elbow on the discharge for Dewatering Well 4 has become detached and should be repaired. The catch basin screen on Dewatering Well 4 has been partially pried off and should be reattached.

A steel post was located along the toe of the north embankment and contained a nameplate that stated “42-Inch Water Pipe.” This marks the location of the force main serving Lake Chillisquaque. Talen is aware of the location of the force main and monitors its condition and the surrounding ground for leaks. Talen reported that the force main alignment is walked annually and ROV inspected in segments as part of the monitoring program.

Other than as noted above, there was no visible evidence of movement, instability, erosion, sinkholes, or seepage.

<u>Discharge Structures</u>

The pipe bridge appeared to be in good condition with no signs of movement. The pipe bridge and supports can be seen in Photos 30 through 32. The grout pad supporting the southeast corner of the bridge had deteriorated and should be repaired. The grout pad at the northeast corner was also deteriorated, but the grout pad was not as thick, and the deterioration was not as severe, and it did not appear that repairs of this grout pad were necessary immediately. The 4-foot-diameter, 2-foot-deep scour hole slightly to the north of the bridge that was observed and likely the cause of a recent leak in one of the pipes in 2014 had been repaired. There was no evidence of additional scour in that area.

Cold joints, small voids, and unconsolidated concrete were evident, but the concrete filled the majority of the void. Scour holes on both sides of the footing measured from 11 to 34 inches deep under the footing. The footing should continue to be monitored for potential undermining.

The ash discharge piping was previously supported on stacks of timbers where it left the bridge and turned 90 degrees towards the ash processing area. Talen replaced the unstable cribwork supporting the ash discharge piping, as seen in Photo 33. The new pipe supports are constructed of structural steel.

The slurry ash-settling trough can be seen in Photo 34. The slurry handling facilities generally appear well constructed and well managed. The settling troughs are located in an area of Sub-basin B elevated approximately 7 feet above the top of the embankment. Overtopping of the sub-basins as a result of the basins filling with ash, a breach forming around the discharge hose, or a discharge hose coming loose could result in overtopping of the embankment. The sluice pipeline runs along the embankment between the utility bridge and the discharge structure and has the potential to cause significant erosion were it to break. These concerns warrant additional attention when monitoring this area, including observing during periodic inspections the amount of ash fill in the basins, the condition of the discharge hose and contact area, and the condition of the sluice pipeline running along the embankment.

The side slopes of the discharge channels extending from the ash reclamation area to Sub-basin B are steep and potentially unstable, as seen in Photo 35. A failure of the channel slopes could restrict the channel. Although it seems likely that the discharge would be able to re-route itself to Sub-basin B without an issue in the event of a partial collapse of the channel walls, this area should be monitored and the channel stabilized as needed.

The splitter dike between Sub-basins B and C was in good condition and Talen recently raised the crest and placed new riprap on the steep downstream slope. The dike is broad, so that a shallow failure of the steep downstream slope will not affect the stability of the dike, and, in any event, Sub-basin C should be able to contain any inflow resulting from a failure. It is possible that a slope failure could damage the discharge piping; therefore, continued remote monitoring of the Sub-basin B water level for abnormal increases is important. The downstream face of the dike is shown in Photo 36. The upstream end of the 24-inch CMP inlet to the discharge structure in the splitter dike between Sub-basins B and C was replaced with HDPE pipe in 2014. A debris float was installed surrounding the intake pipe, and the intake was free of debris as seen in Photo 37. Talen installed a trash rack at the upstream end of the intake subsequent to the 2015 inspection, as seen in Photo 37a of Appendix A. The deck of the intake structure had been previously jacked up by over-extension of the gate stem and was no longer plumb after lowering the gate stem. Several of the CMP discharge pipes at the downstream slope of the splitter dike were observed to be corroded and abandoned. These CMP discharge pipes, previously observed with under-seepage, were no longer flowing and it appeared that the upstream ends had been sealed. However, a boil was observed at the downstream end of one of the abandoned pipes, as seen in Photo 38. This boil should be monitored. The origin of these pipes is not clearly documented. There is little differential head acting on the splitter dike, and any discharge, were it to occur, would be contained by the exterior dike around Sub-basin C. If monitoring shows excessive flow or signs of internal erosion, the abandoned pipes should be excavated and removed. The two active 18-inch CMP discharge pipes of the splitter dike discharge structure exhibited signs of corrosion at the downstream end, as seen in Photos 39 and 40. Discharge was observed flowing from punctures at the ends and sides of the discharge pipes, though the observed punctures have no impact on the reliability of the piping. Access to the downstream end of these pipes should be provided by clearing vegetation and adding a landing at the pipe outlet to more readily allow visual observation of the pipe condition.

Little of the outlet structure in Sub-basin C could be viewed, although the skimmer attachment on top of the intake riser structure appeared to be tilted slightly, as noted in previous reports. The floating debris boom that had broken loose in 2014 had been repaired, as seen in Photo 2. The stability of the adjacent embankment slope is currently being reviewed. The outlet pipe of an abandoned outlet structure running from Sub-basin C to Chillisquaque Creek was located and observed. The downstream end was open, and no discharge was observed as seen in Photos 41 and 42. Talen inspected the pipeline with a ROV in 2014 and verified that the pipe was plugged with stone and cement approximately 59 feet from the discharge end of the pipe.

ROV inspections of several hydraulic conduits were conducted on October 15, 2015, by Sorg, Inc. Roto-Rooter Sewer & Drain, and monitored by HDR. The video inspection included the following conduits:

- Splitter dike between Sub-basins B and C:
  - One 20-foot-long, 24-inch-diameter CMP intake
  - Two 80-foot-long sections of 18-inch-diameter CMP discharge conduits
  - One 7-foot-long concrete box catch basin connecting the conduits described above.
- Sub-basin C ash disposal decanting structure: The first 45-feet (of a 1,400-foot-long conduit to the wastewater treatment area) of a 36-inch-diameter RCPP extending downstream from the inlet of the ash disposal decanting structure to beyond the downstream toe of the Sub-basin C dike. The intent of the inspection was to include the first 325 feet of this conduit, but was terminated at a blockage 45 feet downstream of the inlet as discussed below.
- Sub-basin A stormwater conduits were also inspected, although these have been capped and no longer convey water, in accordance with Talen's closure plan:
  - 24-inch-diameter HDPE at Swale 2A located on the north.
  - 24-inch-diameter HDPE at Swale 3A located on the east side.
  - 24-inch-diameter HDPE at Swale 4A located on the east side.
  - 15-inch-diameter HDPE at Swale 1A located on the east side.
  - 24-inch-diameter HDPE at Swale 5A (North) located on the west side.
  - 24-inch-diameter HDPE at Swale 5A (South) located on the west side.

The conduits appeared to be in satisfactory condition based on the ROV inspection, with the exception of the following significant findings. Note that Talen has closed off the stormwater conduits in Sub-basin A as noted previously, so that the comments below regarding vegetation and discharge capacity are not pertinent.

- The 36-inch-diameter RCPP conduit leading to the wastewater treatment area from the ash disposal decanting structure in Sub-basin C had a large obstruction approximately 45 feet downstream from the Sub-basin C drop inlet structure. The ROV was able to crawl up the obstruction, but was not able to advance past the gap between the conduit and the obstruction, so the remaining part of the conduit could not be inspected. The obstruction appeared to block 80 to 90 percent of the conduit. Due to the conduit being full of water at the time of the inspection it was not possible to determine the exact makeup, limits, and origin of the obstruction. The source of the obstruction should be identified and eliminated and the obstruction removed as soon as possible. The planned ROV inspection of the conduit downstream of the plug should be completed after the obstruction is removed.
- An area of minor corrosion and an opening, approximately 1-inch in size, was observed on the 20-foot-long, 24-inch-diameter CMP inlet pipe, located at the upstream toe of the splitter dike between Sub-basins B and C, where it connects to the 7-foot-long concrete box catch basin. The 1-inch opening and the area of corrosion are on the top third of the pipe. This conduit section is not located within the splitter dike, but at the upstream toe of the dike in Sub-basin B. The condition of the conduit should be monitored during future inspections.

5.0 Instrumentation

Instrumentation at the site consists of:

- Open standpipe piezometers,
- Survey benchmark monuments,
- Run-time meters on the dewatering well pumps, and
- Water level monitors in Sub-basins B and C.

A number of piezometers were observed, but the caps were locked and they could not be accessed. Talen reported that monitoring of all piezometers except those near the ash line bridge has been discontinued. The casing of Piezometer PZ-20, located at the toe of the south embankment, was broken and should be repaired if still in use. Talen installed four (4) piezometers in May 2015. Talen plans to take piezometric measurements every 30 days or less. Piezometric readings were taken by Talen immediately after installation and the day after this 2015 inspection. These measurements are included in Appendix B and will help to assess the consistency and behavior of the phreatic surface over time.

The dewatering well run time has historically been monitored from a maintenance viewpoint. This data was collected and plotted as kWh versus date for each well for 2008 through 2013. The plots show great variability in pumping effort, which is unusual given that the reservoir elevation is fairly constant. The pump motors and run-time meters are periodically rotated from pump to pump to balance motor wear, which made the run-time plots difficult to interpret. Talen has evaluated the variation in pump run times from year to year and has not identified a cause. Pump 1, located at the west end of the north embankment dewatering well system, also drains a section of the ditch adjacent to the access road, so that the run time for that pump is affected by surface runoff. Talen is recording the kWh readings on the meters as part of the 30-day instrument monitoring requirement.

The water level gages in Sub-basins B and C are monitored remotely at the control room which is staffed continuously. The system is reportedly annunciated with alarms for high level and rate of rise. Talen surveyed and reset the gage boards in 2014 and added redundant level indicators to Sub-basins B and C. Operations personnel are on duty continuously and would quickly respond in the event of an abnormal reading.

6.0 Closure

This initial 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.

Adam N. Jones, P.E.
Senior Engineer

1/15/2016

ANJ/cw

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

APPENDIX A
INSPECTION PHOTOGRAPHS

Figure 1
Photo Key Plan
2015 Annual Inspection

Photo 1 – Aerial view of Montour Ash Basin 1.


Photo 2 – Upstream slope of Sub-basin C looking southeast, showing outlet riser and riprap slope stabilization.

Photo 3 – Upstream slope of Sub-basin C looking southeast. The 12-inch CMP at the waterline was half submerged during the 2015 inspection. There was no current or other evidence of flow entering the pipe. The purpose of the pipe and the alignment of the pipe within the embankment is unknown.

Photo 4 – View of the interior of the 12-inch CMP at the waterline at upstream slope of Sub-basin C, showing pipe partially submerged. A photo of the pipe interior taken in 2014 showed the pipe partially clogged.

Photo 5 – Upstream slope of Sub-basin C looking northwest, showing riprap slope stabilization.

Photo 6 – Splitter dike between Sub-basin B and C, showing the vegetated bottom ash bench against the inside slope of Sub-basin B, effectively widening the embankment.

Photo 7 – Upstream slope of Sub-basin B showing the 12-inch HDPE extending into the basin in the background. This pipe is believed to be a discontinued ash deposition line, and the orientation and means of closure of the buried part are not known.

Photo 8 – PVC elbow disconnected from the 4-inch PVC discharge pipe from dewatering well 4, located on the upstream slope of Sub-basin B. Talen reported that a modified swale now conveys this discharge.

Photo 9 - Middle dewatering well discharge area. No significant deposition was observed.

Photo 10 - Cut out in the catch basin drainage pipe in Sub-basin A that has the potential to fill with mud or debris. Talen noted that the pipes were capped subsequent to the inspection.

Photo 11 – Closed area of Sub-basin A, adjacent to the southwest embankment.

Photo 12 – The closed portion of Sub-basin A at the southeast corner of the ash basin. Note some minor surface runoff ponds along the Sub-basin A dike on the crest road. The crest access road has been regraded to slope toward Sub-basin A, and a drainage swale has been constructed in Sub-basin A dike to drain runoff from the crest access road.

Photo 13 – North end of southwest embankment and access ramp. Wet areas observed in previous inspections along toe were observed dry or damp in 2015.

Photo 14 – Downstream slope of southwest embankment, looking northwest from near the splitter dike between Sub-basins B and C.

Photo 15 - Stabilization berm along the northwest end of the southwest embankment.

Photo 16 – Downstream slope of southwest embankment, looking southeast from near the splitter dike between Sub-basins B and C. The pipe bridge can be seen in the distance.

Photo 17 – Downstream slope of the southwest embankment, looking northwest from pipe bridge. Standing water had been observed previously along the stabilization berm where the tracks are, although this area was comparatively dry in 2015.

Photo 18 – Downstream slope of the southwest embankment, looking southeast from the pipe bridge.

Photo 19 – Crest of stabilization berm along the southwest embankment, looking northwest from southwest end.

Photo 20 – Downstream slope of the southwest embankment, looking northwest from the southwest corner of Sub-basin A.–Note the vegetation overgrowing the embankment toe.

Photo 21 – Southwest corner of the basin, looking southeast. A depression noted in previous reports at southwest corner of the basin, measuring 5 feet wide by 3 feet deep, was not visible due to overgrown vegetation.

Photo 22 – The south downstream slope of Sub-basin A, looking west.


Photo 23 – Crest and downstream slope of Sub-basin A, looking north.


Photo 24 – Alignment of the drain line at the east end of the north embankment. The two lower catch basins can be seen. Both catch basins had seepage entering the basin from improperly sealed penetrations, with surface subsidence above.

Photo 25 – East end of north embankment, showing gravel stabilization berm and the manhole that houses dewatering well 4. Wet areas have previously been observed here, and were damp during the 2015 inspection.

Photo 26 – Looking west along the downstream slope of the north embankment.

Photo 27 – The downstream slope of the north embankment, looking east.

Photo 28 – The downstream slope of the northwest embankment, looking northeast from access road.

Photo 29 – The ditch near the west end of the north embankment, adjacent to dewatering Well No. 1. Note the damaged screen on the top. The ditch was drier than previous years.

Photo 30 – Pipe bridge crossing the southwest embankment.


Photo 31 - Riprapped slope at the footing for the pipe bridge.


Photo 32- Slope stabilization at embankment toe near pipe bridge footing.

Photo 33 – Cribbing at discharge pipe bend near bridge abutment, which was modified in 2014.

Photo 34 – Ash discharge area, showing the settling basins.


Photo 35 – Discharge channel from the ash sluicing area to Sub-basin B. Note the narrow channel and steep side slopes.


Photo 36 – The downstream face (C side) of splitter dike between Sub-basins B and C.


Photo 37 – Intake structure at the splitter dike.


Photo 37a – Trash rack installed at upstream end of intake between sub-basin B and C


Photo 38 – Abandoned, corroded CMPs in the splitter dike. –Boil observed at outlet of one abandoned pipe.


Photo 39 – Active splitter dike discharge pipes exhibited signs of corrosion.

Photo 40 – Splitter dike discharge pipes exhibited signs of corrosion, view of the pipe interior from downstream end.

Photo 41 – The outlet pipe of an abandoned outlet structure running from Sub-basin C to Chillisquaque Creek.


Photo 42 – The outlet pipe of an abandoned outlet structure running from Sub-basin C to Chillisquaque Creek. View inside the RCCP outlet pipe.

APPENDIX B
PIEZOMETER PLOTS AND DATA

2015 Inspection - Montour AB 1