



Coal Combustion Residuals Impoundment  
Retrofit Completion, Liner Completion, and  
Location Restriction Certifications

GenOn Northeast Management Company  
Keystone Generating Station  
Ash Filter Pond B (No. 0386201)  
Shelocta, Pennsylvania

GAI Project Number: C141273.11  
October 2018

Prepared by: GAI Consultants, Inc.  
Murrysville Office  
4200 Triangle Lane  
Export, Pennsylvania 15632-1358

Prepared for: GenOn Northeast Management Company  
Keystone Generating Station  
313 Keystone Drive  
Shelocta, Pennsylvania 15774

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## Professional Engineer's Certification

I, the undersigned Professional Engineer, hereby certify that I am familiar with the technical requirements of 40 Code of Federal Regulations (CFR) Sections 257.60 through 257.64, 257.72, and 257.102. It is my professional opinion, as a Professional Engineer licensed in the Commonwealth of Pennsylvania, that the activities outlined in the Retrofit Plan for Ash Filter Pond B (GAI, 2017) have been completed in accordance with good and accepted construction and engineering practices as exercised by others practicing in the same discipline(s), under similar circumstances, at the same time, and in the same locale. It is my professional opinion that the alternative composite liner has been constructed in accordance with the requirements of 40 CFR Section 257.72. It is my professional opinion that the location of retrofitted Ash Filter Pond B meets the location restrictions of 40 CFR Sections 257.60 (placement above uppermost aquifer), 257.61 (wetlands), 257.62 (fault areas), 257.63 (seismic impact zones), and 257.64 (unstable areas).

40 CFR Sections 257.60 through 257.64, 257.72, and 257.102, are from the United States Environmental Protection Agency's "Disposal of Coal Combustion Residuals from Electric Utilities," published in the Federal Register on April 17, 2015, with an effective date of October 19, 2015.

This Professional Engineer's Certification is limited to the information available to GAI at the time this report was prepared. The use of the words "certification" and/or "certify" in this document shall be interpreted and construed as a Statement of Professional Opinion and is not and shall not be interpreted or construed as a guarantee, warranty or legal opinion.

John R. Klamut, P.E.  
Printed Name of Professional Engineer

PE082873  
Commonwealth of Pennsylvania License Number

  
Signature of Professional Engineer

10/11/2018  
Date



## 1.0 Introduction

The Keystone Generating Station is a steam electric generating station located along Crooked Creek in Plumcreek Township, Shelocta, Pennsylvania (PA). The station is jointly owned by the utilities in the Keystone Owners Group, and operated by GenOn Northeast Management Company. The station consists of two 900-megawatt coal-fired units.

Three ash filter ponds are located at the Keystone Generating Station site and are operated and maintained under the PA Department of Environmental Protection (PADEP) Water Quality Management Permit No. 0386201. The ash filter ponds consist of Ash Filter Ponds A, B, and C. During station operations, bottom ash is sluiced from the ash hoppers to the hydrobins where the ash particles are allowed to settle. The hydrobin overflow gravity-flows to a distribution box, which controls the water's routing to the individual ash filter ponds. The hydrobin underflow also gravity-flows to the ash filter ponds when it is periodically drained. The dewatered Coal Combustion Residuals (CCR) are loaded onto trucks for disposal at the Keystone Station Disposal Site. During normal operations, two ponds are in service to handle the hydrobin overflow, and the remaining pond is drained, cleaned, and prepared for service.

Ash Filter Pond B (Pond B) was retrofitted in accordance with the written Retrofit Plan (GAI, 2017) and 40 Code of Federal Regulations (CFR) §257.102(k)(1). Retrofitting consisted of raising the pond bottom, side slopes, crest, and inlet and outlet structures, and constructing a PADEP Class I liner that meets the alternative composite liner requirements of §257.72. Retrofitting was initiated in May 2018 and substantially complete on October 5, 2018.

## 2.0 Location Demonstrations

Location restrictions relative to uppermost aquifer, wetlands, fault areas, seismic impact zones, and unstable areas apply to new and existing CCR surface impoundments and lateral expansions of CCR surface impoundments (§257.60 through §257.64). For existing CCR surface impoundments, documents demonstrating whether or not the impoundments are in compliance with the location restrictions must be placed in the facility's operating record [§257.105(e)] by October 17, 2018 [§257.60(c)(1), §257.61(c)(1), §257.62(c)(1), §257.63(c)(1), and §257.64(d)(1)]. In addition, the owner or operator must notify the State Director that the demonstrations have been placed in the operating record and on the owner or operator's publicly accessible CCR internet site [§257.106(e) and §257.107(e)].

### 2.1 Placement above the Uppermost Aquifer

Section 257.60 states that "...existing and new CCR surface impoundments, and all lateral expansions of CCR units must be constructed with a base that is located no less than 1.52 meters (five feet) above the upper limit of the uppermost aquifer...". Based on data from upstream monitoring well MW-5 and downstream monitoring wells MW-29, MW-30 and MW-6, the pond retrofit construction meets the 5-foot separation requirement of §257.60.

### 2.2 Wetlands

Section 257.61 states that "...existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in wetlands as defined in §232.2 of this chapter...". Wetlands are defined under §232.2 as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas". The Ash Filter Ponds at the Keystone Generating Station have been continuously operated and maintained as an industrial facility. The ponds are

designed to maintain a water depth of several feet over the entire pond area, except during annual cleanout, and the surrounding areas are designed to drain runoff without ponding. Wetlands are not identified at Ash Filter Ponds B on the site-specific wetlands mapping (USFWS, 2017) generated in March 2017 using the U. S. Fish and Wildlife Services National Wetlands Inventory website. In addition, a GAI wetland specialist did not detect indicators of wetlands or potential wetlands based on a review of site photos. Therefore, the pond retrofit construction meets the requirements of §257.61.

### 2.3 Fault Areas

Section 257.62 states that "...existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time...". Available information and published geologic information does not indicate that Ash Filter Pond B is located within 60 meters of the outermost damage zone of a fault that has had displacement in Holocene time. Therefore, the pond retrofit construction meets the requirements of §257.62.

### 2.4 Seismic Impact Zones

Section 257.63 states that "...existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in seismic impact zones...". Section 257.53 defines a seismic impact zone as "...an area having a 2% or greater probability that the maximum expected horizontal acceleration, expressed as a percentage of the earth's gravitational pull (g), will exceed 0.10g in 50 years." Based on the 2014 United States Geological Survey Seismic Hazard Map (USGS, 2015) and the location of Ash Filter Pond B, the peak ground acceleration for Ash Filter Pond B ranges from 0.04g to 0.06g. Based on this information, Ash Filter Pond B is not located in a seismic impact zone. Therefore, the pond retrofit construction meets the requirements of §257.63.

### 2.5 Unstable Areas

Section 257.64 requires that existing CCR surface impoundments "...must not be located in an unstable area...the owner or operator must consider all of the following factors, at a minimum, when determining whether an area is unstable: (1) On-site or local soil conditions that may result in significant differential settling; (2) On-site or local geologic or geomorphologic features; and (3) On-site or local human-made features or events (both surface and subsurface)." These factors are discussed in more detail below.

- ▶ Soil conditions: GAI reviewed soil information obtained from borings completed around the impoundments in 2015. The soils in the vicinity of Ash Filter Pond B consist of medium stiff to hard residual silts and clays containing varying amounts of rock fragments overlain in some areas by fill apparently derived from the same materials. The depth to rock varies from 10 feet to 20 feet. The area has been in use for a number of years and there is no evidence to suggest that the soils vary markedly in density and consistency. Based on GAI's review of this information, there should not be significant differential settlement that will result in unstable conditions.
- ▶ Geologic or geomorphic features: Rock immediately underlying Ash Filter Ponds A, B, and C consists of interbedded sandstones and shales belonging to the Lower Mahoning Sandstone, which is the basal member of the Glenshaw Formation of the Conemaugh Group. The Lower Mahoning Sandstone is underlain by the Allegheny Formation, which consists of alternating sequences of coal, thin limestones, shales, claystones, and sandstones. The limestones are not known to form karst features. Some of these shales and coals can be expansive if exposed in excavations, but no such excavations into rock are proposed for Ash Filter Pond B; therefore, such expansion is unlikely. With neither karst nor expansion potential, there should be no geologic or geomorphic features at Pond B that will produce unstable conditions.

- ▶ Human-made features: There are a number of coals within the upper portion of the Allegheny Formation, and two of them, the Upper Freeport (UF) Coal and the Upper Kittanning (UK) Coal, are considered to be minable in the general area of the power station. In the area of Ash Filter Pond B, the UF Coal is projected to occur at about elevation 955 feet and the UK coal about 70 feet lower, at elevation 885 feet. The ground surface elevation at Ash Filter Pond B is approximately 1,020 feet, putting the UF Coal approximately 65 feet below the ground surface. There is no evidence based upon available information that underground mining has been conducted beneath the impoundments in either the UF Coal or the UK Coal. Therefore, it does not appear that there are human-made features at the impoundments that would produce unstable conditions.

Based on this evaluation, the pond retrofit construction meets the requirements of §257.64.

### 3.0 Retrofit Activities

The retrofit activities first included the removal of all CCR from Pond B, including any contaminated soils and sediments per the requirements of 257.102(k)(1)(i) and as described in the Retrofit Plan (GAI, 2017). The retrofit also included placement and compaction of earthen fill to raise the base and crest of Pond B, installation of new inlet and outlet structures, and the installation of a PADEP Class I liner system.

The PADEP Class I liner system includes a composite liner that meets the alternative composite liner requirements of §257.72. The Class I liner system was constructed in accordance with the requirements of §257.72 and Title 25 of the Pennsylvania Code (Pa Code) for Residual Waste Impoundments as follows, from bottom to top:

- ▶ Subbase [contaminant resistant (enhanced) geocomposite clay liner (EGCL)].
- ▶ Secondary liner [60-mil textured high-density polyethylene (HDPE) geomembrane].
- ▶ Geocomposite drainage net and perforated pipe collection system.
- ▶ Composite primary liner (EGCL and 60-mil textured HDPE geomembrane).
- ▶ 16 ounce per square yard non-woven cushion geotextile.
- ▶ Protective cover consisting of a reinforced concrete slab on the pond bottom and a concrete uniform section mat on the pond side slopes.

Ash Filter Pond B has been retrofitted in accordance with the Retrofit Plan (GAI, 2017) and §257.102 (k)(1). Construction was substantially complete on October 5, 2018.

## 4.0 References

GAI Consultants, Inc. (GAI), 2017. *Coal Combustion Residuals Impoundment, Liner Design Certification and Retrofit Plan*, GenOn Northeast Management Company, Keystone Generating Station, Ash Filter Ponds A, B, and C (No. 0386201), Shelocta, Pennsylvania. Prepared for NRG. March.

United States Environmental Protection Agency (EPA), 2015. *40 CFR Parts 257 and 261 Hazardous and Solid Waste Management Disposal System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule*, April 17.

U. S. Fish and Wildlife Service, 2017. *National Wetlands Inventory Website*, U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. <http://www.fws.gov/wetlands/>, downloaded March 27, 2017.

United States Geological Survey (USGS), 2015, Petersen, M.D., Moschetti, M.P., Powers, P.M., Mueller, C.S., Haller, K.M., Frankel, A.D., Zeng, Yuehua, Rezaeian, Sanaz, Harmsen, S.C., Boyd, O.S., Field, E.H., Chen, Rui, Luco, Nicolas, Wheeler, R.L., Williams, R.A., Olsen, A.H., and Rukstales, K.S., *Seismic-hazard maps for the conterminous United States, 2014 - Peak Horizontal Acceleration with 2 Percent Probability of Exceedance in 50 Years*, U.S. Geological Survey Scientific Investigations Map 3325, <http://dx.doi.org/10.3133/sim3325>, downloaded February, 2017.