Indianapolis Power & Light Company
Petersburg Generating Station

History of Construction of CCR Surface Impoundments

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1 PURPOSE

Pursuant to 40 CFR 257.73(c)(1), this document provides a history of construction of the coal combustion residual (CCR) surface impoundments at Indianapolis Power & Light Company's (IPL) Petersburg Generating Station. Based on the applicability criteria presented in 40 CFR 257.73(b), the following existing CCR surface impoundments are addressed herein:

- Pond A,
- Pond A', and
- Pond C.

2 HISTORY OF CONSTRUCTION REQUIREMENTS PER 40 CFR 257

This document provides, to the extent feasible, the information to be included in a history of construction pursuant to 40 CFR 257.73(c)(1). Per 40 CFR 257.73(c)(1), "...the owner or operator of the CCR unit must compile a history of construction, which shall contain, to the extent feasible, the information specified in paragraphs (c)(1)(i) through (xi) of [40 CFR 257.73]." The preamble to 40 CFR 257 clarifies the Environmental Protection Agency's (EPA) intent for including the clause "to the extent feasible." The preamble states, "EPA acknowledges that much of the construction history of the surface impoundment maybe *[sic]* unknown or lost." Elsewhere, the preamble continues:

> EPA is using the phrase "to the extent available" and clarifying that the term requires the owner or operator to provide information on the history of construction only to the extent that such information is reasonably and readily available. EPA intends facilities to provide relevant design and construction information only if factual documentation exists. EPA does not expect owners or operators to generate new information or provide anecdotal or speculative information regarding the CCR surface impoundment's design and construction history.

Table 1 lists the information requested by 40 CFR 257.73(c)(1)(i) through (xi).

Readily available and applicable historical information (e.g., drawings, reports, historical aerial photographs, etc.) relevant to the existing CCR surface impoundments at Petersburg Generating Station have been reviewed. This document compiles this information into a single history of construction document for Ponds A, A', and C. Several of the historical documents that were reviewed report elevations with respect to the National Geodetic Vertical Datum of 1929 ("NGVD29"). At this location, this datum is approximately 0.47 feet higher than the present-day standard, the North American Vertical Datum of 1988 ("NAVD88"). All elevations referenced in this history of construction are with respect to NAVD88.

Table 1: Requested Information for History of Construction

40 CFR Reference	Requested Information	Location in History of Construction
257.73(c)(1)(i)	The name and address of the person(s) owning or operating the CCR unit.	Section 3
257.73(c)(1)(i)	The name associated with the CCR unit.	Section 3
257.73(c)(1)(i)	The identification number of the CCR unit if one has been assigned by the state.	N/A
257.73(c)(1)(ii)	The location of the CCR unit identified on the most recent U.S. Geological Survey (USGS) 7½ minute or 15 minute topographic quadrangle map, or a topographic map of equivalent scale if a USGS map is not available.	Section 3 Exhibit 1
257.73(c)(1)(iii)	A statement of the purpose for which the CCR unit is used.	Section 5
257.73(c)(1)(iv)	The name and size in acres of the watershed within which the CCR unit is located.	Section 3
257.73(c)(1)(v)	A description of the physical and engineering properties of the foundation and abutment materials on which the CCR unit is constructed.	Section 4
257.73(c)(1)(vi)	A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit.	Section 4
257.73(c)(1)(vi)	The method of site preparation and construction of each zone of the CCR unit.	Section 4
257.73(c)(1)(vi)	The approximate dates of construction of each successive stage of construction of the CCR unit.	Section 4
257.73(c)(1)(vii)	At a scale that details engineering structures and appurtenances relevant to the design, construction, operation, and maintenance of the CCR unit, detailed dimensional drawings of the CCR unit, including a plan view and cross sections of the length and width of the CCR unit, showing all zones, foundation improvements, drainage provisions, spillways, diversion ditches, outlets, instrument locations, and slope protection, in addition to the normal operating pool surface elevation and the maximum pool surface elevation following peak discharge from the inflow design flood, the expected maximum depth of CCR within the CCR surface impoundment, and any identifiable natural or manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation.	Section 4 Section 5 Attachment A Attachment D
257.73(c)(1)(viii)	A description of the type, purpose, and location of existing instrumentation.	Section 6 Attachment E
257.73(c)(1)(ix)	Area-capacity curves for the CCR unit.	Section 5 Exhibit 3
257.73(c)(1)(x)	A description of each spillway and diversion design features and capacities and calculations used in their determination.	Section 4 Attachment F
257.73(c)(1)(xi)	The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit.	Section 6

3 SITE DESCRIPTION & LOCATION

IPL owns and operates Petersburg Generating Station, which is located approximately 2.9 miles northeast of downtown Petersburg, Indiana, in Pike County. The Station's address is 6925 North State Road 57, Petersburg, IN 47567 (Latitude: 38.527°N, Longitude: 87.254°W). The Station's property is contained within Sections 1 and 12 of Township 1N, Range 8W and Section 6 of Township 1N, Range 7W of the Second Principal Meridian. Exhibit 1 shows the approximate location of the Station's Ash Pond System on a reproduction of the USGS 7.5-minute topographic map of the Sandy Hook, Indiana, Quadrangle.

The Station's Ash Pond System, which is shown in Exhibit 2, includes the following existing CCR surface impoundments as defined by 40 CFR 257.53:

- Pond A,
- Pond A', and
- Pond C.

These existing CCR surface impoundments are contained within the Lower White River watershed (Hydrologic Unit Code 05120202), which extends over approximately 1,052,800 acres of west central Indiana. Ponds A, A', and C have not been assigned identification numbers by the State of Indiana.

4 HISTORICAL INFORMATION & STAGES OF CONSTRUCTION

The following construction histories were developed for Ponds A, A', and C through the review of historical design drawings, which are included herein as Attachment A, and reports. Boring logs and cone penetrometer test (CPT) data were also reviewed and are included in Attachments B and C. In accordance with 40 CFR 257.73(c)(1), this construction history only includes information that was readily available at the time this document was written.

Although former Ponds B and D are depicted in several of this document's attachments, they are not discussed herein. Prior to October 2015, CCR was also treated in these former CCR surface impoundments. By October 16, 2015, IPL had implemented operational changes to prevent future deposits of CCR into former Ponds B and D and had completed construction tasks to prevent liquid impoundment in these former CCR surface impoundments. Going forward, IPL will not place CCR into these former CCR surface impoundments and will prevent the future impoundment of liquids. Therefore, former Ponds B and D do not satisfy either of the definitions for existing CCR surface impoundments or inactive CCR surface impoundments given in 40 CFR 257.53. Consequently, former Ponds B and D are exempt from the requirements stipulated in 40 CFR 257.73(c)(1).

Based on the available boring and CPT logs, Petersburg Generating Station's ash ponds are, in general, founded at an approximate elevation of 418 feet, where a natural lean clay is often encountered. When present, the thickness of this clay layer varies between 5 to 15 feet under the ash ponds. The consistency of this clay layer also varies under the ash ponds, ranging from medium stiff to stiff. The natural secondary foundation layer underlying the clay layer is typically comprised of a poorly-graded, medium dense sand, which is sometimes interbedded with silt and extends deep into the subsurface profile.

In 1967, the Station commissioned an ash pond with a footprint encompassing the present-day area of Ponds A and A'. The approximate grade elevation was 419 feet prior to the construction of this surface impoundment. Before constructing the dikes, the top 1-foot of topsoil underlying the dikes was removed, and the ground was subsequently compacted. Specifications for this compaction effort are unknown. Natural fill from inside the perimeter of the proposed ash pond was used to build the dikes up from the stripped areas at approximately elevation 418 feet to an approximate crest elevation of 430 feet. Following the placement of each lift of fill, the lift was compacted. The dikes' crests were approximately 16-feet wide, with the middle 12 feet featuring an approximately 8-inch-thick layer of "select material" for access roads. The remaining widths of the crests featured approximately 6-inch-thick layers of seeded topsoil. The exterior and interior faces of the dikes were graded to approximately 2.25-Horizontal:1-Vertical ("2.25H:1V") slopes and were overlain by approximately 6-inch-thick layers of seeded topsoil.

In 1979, a partition dike was constructed within the footprint of the 1967 ash pond. This dike was built in the vicinity of the present-day partition dike separating Ponds A and A'.

Concurrent to the construction of the aforementioned partition dike, the perimeter dikes of the 1967 ash pond were extended inward and raised to a new approximately crest elevation of 435 feet. A majority of the fill used to construct these modified perimeter dikes consisted of a mixture of bottom ash and fly ash. These vertical expansions featured approximately 8-foot-wide clay cores, and the crests were capped with approximately 12-inch-thick layers of topsoil that were subsequently seeded and mulched. Boring and CPT logs located along the perimeter dikes of Ponds A and A' typically identify a clay fill from approximately elevation 435 feet down to the dikes' foundations. The exterior and interior faces of the new dikes were graded to approximately 3H:1V slopes. While the latter extended down to the interface point with the original bottom-of-pond elevation – approximately 415 feet – the former extended down to the interface point with the original perimeter dike at approximately elevation 430 feet. Finally, riprap was installed along the interior faces that were adjacent to the overflow weir in Pond A'.

The dikes for Ponds A and A' were raised to approximate crest elevations of 440 feet in the mid-1980s. The exterior and interior side slopes of this expansion were graded to approximately 3H:1V slopes to match those from the previous expansions. The clay core that was installed in the 1979 expansion, however, was not extended above its original top elevation (approximately 434 feet). Boring and CPT logs located along the perimeter dikes for Ponds A and A' identify a general fill, typically consisting of a silty sand, from the dikes' crests down to approximately elevation 435 feet. Except for select areas, the crests and slopes of this vertical expansion were seeded and mulched. Finally, riprap along the southwestern corner of Pond A' was extended up to approximately elevation 438 feet.

In 1986, a second ash pond northeast of the Station's power block was commissioned. This ash pond encompassed the present-day footprints of former Pond B and Pond C. The perimeter dikes were constructed with 20-foot-wide crests established at approximately elevation 440 feet with approximately 2.5H:1V exterior and interior side slopes. The interior of the ash pond was lined with a 3-foot-thick layer of clay. In addition, a diversion dike, which had design characteristics similar to the perimeter dikes, was constructed underneath existing overhead electrical transmission lines in order to isolate a transmission tower from the ash pond's storage area. Boring logs located within these historical dikes indicate that

these dikes were constructed with general fill, often silts and clays with intermittent, interbedded granular materials. In general, these fill materials exhibited medium stiff to very stiff consistencies.

In 1999, the diversion dike within the 1986 ash pond was extended southeasterly, effectively bisecting the pond and creating the present-day footprint of Pond C. Concurrently, Pond C's dikes were raised to their present-day crest elevations. This expansion was constructed within the existing pool area, and it was keyed into the existing dikes. This key was constructed by excavating a small area of impounded ash near the interface of the 1986 dike's crest and its interior face and subsequently replacing it with Poz-O-Tec. Boring and CPT logs near the centers of Pond C's perimeter dikes indicate that Poz-O-Tec was also used as the primary fill material for the dike expansions. One boring identified Poz-O-Tec fill from approximately elevation 455 feet down to approximately elevation 435 feet, and the fill's density varied from very loose to very dense. The boring and CPT logs also identified a very soft, saturated ash fill underlying the Poz-O-Tec fill. The expansion dikes were constructed with 30-foot-wide crests with approximately 3H:1V exterior and interior side slopes. Finally, riprap was installed along the interior faces of the expansion dikes from approximately elevation 440 feet to approximately 445 feet.

In 2016, IPL installed two emergency spillways, one each on the western and eastern perimeter dikes of Pond A' ("Pond A' spillway" and "Pond A spillway," respectively). These spillways consist of 45-foot-wide overflow crests with adjoining ramps sloped at approximately 10H:1V up to the existing dikes' crest elevations. The Pond A' spillway has an overflow crest elevation of approximately 437 feet, while the Pond A spillway has an overflow crest elevation of approximately 437.5 feet. Both crests have approximately 15-foot-wide access roads and are graded at approximately 1% slopes towards the ponds' pool areas. The spillways' interior and exterior side slopes are graded at approximately 3H:1V to match the side slopes of the existing dikes. These spillways' design features are based on calculations included herein as Attachment F.

Prior to excavating the existing dikes to install the emergency spillways, the affected areas were stripped of topsoil, all other organic material, and riprap. Following excavation, the exposed subgrade material was compacted to at least 90% of its maximum dry density, as determined by ASTM D1557. The subgrade was also proofrolled in accordance with Section 203.26 of the Indiana Department of Transportation's Standard Specifications ("INDOT 203.26"). Prior to constructing each spillway, a non-woven geotextile conforming to INDOT 918.02 was placed atop the spillway's subgrade. Each spillway was then constructed by placing, in accordance with INDOT 606.05, an approximately 18-inch-thick layer of revetment riprap conforming to INDOT 904.04(f). Access roads were subsequently constructed by placing an approximately 6-inch-thick layer of INDOT #53 crushed stone atop the revetment riprap in accordance with INDOT 301.05. Immediately following its placement, this crushed stone was compacted to at least 95% of its maximum dry density, as determined by ASTM D1557.

5 CURRENT CCR SURFACE IMPOUNDMENT CONFIGURATIONS

Currently, the Station only sluices ash directly to Pond A. Pond A serves as the Station's initial settling pond and directs residual wastewater to Pond A' through two 36-inch-diameter corrugated metal pipes, which have invert levels at approximately elevation 427 feet. After undergoing final sedimentation of its

finer waste constituents in Pond A', the treated water discharges through a concrete outlet structure (National Pollutant Discharge Elimination System-permitted Outfall 001) featuring an approximately 6-foot-wide sharp-crested weir. Treated water is subsequently conveyed through a 24-inch-diameter reinforced concrete pipe into a discharge canal, which flows into Lick Creek and thence into the White River. The original overflow weir structure was constructed in the 1960s to an approximate top-of-concrete elevation of 432 feet. This structure was vertically extended approximately 10 feet to correspond with the vertical expansions to the perimeter dikes of Ponds A and A' in the late 1970s. This extension was keyed into the original structure. The weir structure interfaces with a reinforced concrete footing at approximately elevation 412 feet, just below the invert elevation for the adjoining 24-inch-diameter discharge pipe, which, as previously mentioned, conveys treated water into Lick Creek.

Pond C does not receive any CCR directly from the Station; rather, it serves as an intermittent dewatering basin for CCR dredged from Ponds A and/or A' prior to relocating the material to the Station's permitted landfill. Although Pond C is not directly related to the wastewater treatment activities in the Ash Pond System, storm water from this pond may be directed to Pond A through a concrete outlet structure fitted with stop logs. This outlet structure discharges surface run-off to a swale on the southern-most corner of Pond C. The swale subsequently conveys storm water through a 30-inch-diameter reinforced concrete pipe into Pond A.

Table 2 provides a list of key features for each existing CCR surface impoundment at Petersburg Generating Station. Existing minimum crest elevations, storage areas, and storage capacities were obtained from site-specific topographic and bathymetric surveys conducted in 2015. These surveys are included herein as Attachment D. Corresponding area-capacity curves for Ponds A, A', and C, which were developed from these surveys, are provided in Exhibit 3.

Table 2: Attributes of Existing CCR Surface Impoundments

Pond Designation	Purpose	Existing Minimum Crest Elevation[1] (ft)	Estimated Existing Storage Area (acres)	Estimated Existing Storage Capacity (acre-ft)
Pond A	Primary Settling	437.5	57.5	1,190
Pond A'	Secondary Settling	437	6.9	113
Pond C	Final Settling	453	26.6	775

[1] Elevations are with respect to NAVD88.

6 ACTIVE MAINTENANCE & SURVEILLANCE PROGRAMS

Specifications and provisions for surveillance, maintenance, and repair of the Station's existing CCR surface impoundments are contained within the Station's active Ash Pond Operations and Maintenance Plan ("O&M Plan"). The O&M Plan is included herein as Attachment E. This document:

- Discusses the existing instrumentation installed to monitor the water level in each CCR surface impoundment,

- Describes the active inspection program,
- Provides provisions for maintaining the vegetation, riprap, and access roads along the CCR surface impoundments' dikes,
- Discusses remedial actions for damages caused by erosion and seepage,
- Provides provisions for maintaining the outlets within the Ash Pond System, and
- Provides example forms used to document each repair/maintenance activity.

The Station's current O&M Plan has been in effect since April 6, 2012. As such, it has not been updated to reflect the operational changes to former Ponds B and D. Thus, the operational, maintenance, and surveillance programs performed at the Station that are discussed therein are no longer applicable to these former ash ponds.

IPL performs routine inspections of the Ash Pond System and employs a separate entity to perform annual independent maintenance inspections.

As shown on Figure 2 of Attachment E, several piezometers and staff gauges are distributed around and within the Station's Ash Pond System. The eight piezometers installed around the ash ponds' perimeters are used to monitor the groundwater levels within the dikes and foundation materials. The three staff gauges, which are installed within the ash ponds, monitor the elevation of the impounded water in each ash pond. Readings from these piezometers and staff gauges are recorded, at a minimum, on a monthly basis and a weekly basis, respectively.

7 CONCLUSION

In compliance with 40 CFR 257.73(c)(1), this history of construction has compiled, to the extent feasible, the relevant historical and current information regarding the existing CCR surface impoundments (i.e., Ponds A, A', and C) at the Petersburg Generating Station.

EXHIBITS