

Submitted to Southern Indiana Gas & Electric Company dba Vectren Power Supply, Inc. (SIGECO) One Vectren Square Evansville, IN 47708 Submitted by AECOM 1300 E 9th St. Suite 500 Cleveland, OH 44114

April 17, 2018

CCR Certification: Initial Written Closure Plan §257.102 (b) & (d)

for the

West Ash Pond

at the

F.B. Culley Generating Station

Revision 0

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Executive Summary

The Culley West Ash Pond is currently an inactive surface impoundment at the F.B. Culley Generating Station owned by Southern Indiana Gas & Electric Company dba Vectren Power Supply, Inc. (hereinafter Vectren). This Coal Combustion Residuals (CCR) Initial Written Closure Plan (Closure Plan) for the West Ash Pond has been prepared in accordance with the requirements specified in the EPA's Final CCR Rule under 40 CFR §257.102. These regulations require that the specified documentation, assessments and plans for an inactive CCR surface impoundment be prepared by April 17, 2018, in accordance with 40 CFR §257.100(e).

This Closure Plan for the West Ash Pond meets the regulatory requirements as summarized in Table ES-1.

Table ES-1 – Certification Summary					
Report Section	CCR Rule Reference	Requirement Summary	Requirement Met?	Comments	
Closure Plan					
2.1	§257.102 (b)	An Initial Written Closure Plan must be prepared that describes the steps necessary to close the unit	Yes	All steps necessary to close the unit and information as required concerning the unit are included in the Closure Plan.	
2.2	§257.102 (d)	Closure performance standard when leaving CCR in place	Yes	The Closure Plan has been prepared in accordance with the required performance standards	

In accordance with the originally published version of the EPA 40 CFR §257.100(c)(1) of the Final CCR Rule, Vectren filed a Notice of Intent (NOI) to initiate closure of the West Ash Pond as "inactive" and placed the NOI in the facility's operating record on December 17, 2015. While early closure activities (i.e., partial dewatering, etc.) were previously initiated when the unit declared the intent to close in December 2015, closure construction of the West Ash Pond is estimated to begin by mid-2018 and will be completed by December 17, 2020 (i.e. within 5 years from the date of the NOI as allowed in the Final CCR Rule under 40 CFR §257.102(f)(1)(ii)).

1 Introduction

1.1 Purpose of this Report

The purpose of this Initial Written Closure Plan (Closure Plan) is to document that the requirements specified in Environmental Protection Agency's (EPA's) Final CCR Rule (hereinafter referred to as the CCR Rule), 40 Code of Federal Regulations (CFR) §257.102, have been met to support the certification required under each of the applicable regulatory provisions for the closure of the F.B. Culley Generating Station (Culley) West Ash Pond. The West Ash Pond is an "inactive" coal combustion residuals (CCR) surface impoundment as defined by 40 CFR §257.53, since sluicing of ash to the West Ash Pond ceased prior to October 14, 2015 and still contains both CCR and liquids after October 14, 2015. In accordance with the originally published version of the EPA 40 CFR §257.100(c)(1) of the CCR Rule, Vectren filed a Notice of Intent (NOI) to initiate closure of the West Ash Pond as "inactive" and placed the NOI in the facility's operating record on December 17, 2015.

As a direct result of the order issued by the United States Court of Appeals for the D.C. Circuit on June 14, 2016, the EPA removed certain provisions of the CCR Rule at 40 CFR 257.100(b), (c), and (d) related to the "early closure" of inactive CCR surface impoundments by April 17, 2018. Specifically, EPA issued a "Direct Final Rule" on August 5, 2016 (effective on October 4, 2016), constituting a vacatur of 40 CFR §257.100 (the "early closure" provision). The Direct Final Rule applies the requirements of "existing surface impoundments" (§257.102) to ponds that had been previously declared "inactive" (such as the Culley West Ash Pond), but grants a 547 day (approximately 18 month) extension for complying with those requirements. As a result of this order, owners and operators of inactive CCR surface impoundments must comply with all of the requirements for existing CCR surface impoundment as listed in 40 CFR §257.102 of the CCR Rule. The alternative timeframes resulting from the Direct Final Rule's extension of the regulatory requirements for inactive ponds have been revised accordingly in 40 CFR §257.100(e). In accordance with the alternative timeframe stated in §257.100(e)(6)(i), this initial written closure plan must be prepared no later than April 17, 2018. The West Ash Pond will complete closure by December 17, 2020, conforming to the schedule requirements 40 CFR §257.102(f)(ii) of the CCR Rule (i.e., within 5 years of initiation of closure).

The following table summarizes the documentation required within the CCR Rule and the sections that specifically respond to those requirements of this plan.

Table 1-1 – CCR Rule Cross Reference Table						
Report Section	Title	CCR Rule Reference				
2.1	Content of the Plan	§257.102 (b)(1)				
2.2	Achievement of Performance Standards	§257.102 (d)(1)				
2.3	Stabilization of Waste	§257.102 (d)(2)				
2.4	Final Cover System	§257.102 (d)(3)				

1.2 Brief Description of Impoundment

The Culley station is located in Warrick County, Indiana, southeast of Newburgh, Indiana, and is owned and operated by Southern Indiana Gas and Electric Company, dba Vectren Power Supply Inc. (SIGECO). The Culley station is located along the north bank of the Ohio River and the west bank of the Little Pigeon Creek along the southeast portion of the site. Culley has two CCR surface impoundments, identified as the West Ash Pond and the East Ash Pond. The East Ash Pond actively receives CCR materials and the West Ash Pond no longer receives CCR materials. This Closure Plan has been developed only for the West Ash Pond. The West Ash Pond is located west of the coal storage pile and is approximately 32 acres in size.

Original design plans indicate that this pond was constructed in the 1950's by placing fill along the south side (i.e., adjacent to the Ohio River) and the east side, and tying into existing high ground at the north and west sides. Bottom elevation of the pond was set approximately at 365' but followed the natural topography and gradually increased in elevation as the pond extended north. The Little Pigeon Creek originally coursed through the footprint of the West Ash Pond before being re-routed east of the Culley Station at the time of the original construction in the 1950's. As such, portions of the east and west embankments of the West Ash Pond extend to the bottom of the creek bed which is at an approximate elevation of 340'. The top of the embankment was constructed to an approximate elevation of 393' with a small portion in the northeast corner extending to an elevation of 402'. Interior side slopes of the pond vary, but original design documents indicate that the slopes are 2H:1V along the south embankment and 2.5H:1V on the east and west embankments. The original construction drawings indicated that the sub-base of the pond was composed of native soils.

Current conditions of the south embankment at the West Ash Pond indicate that the crest of the south embankment is approximately 40' wide and is covered with crushed stone that forms the existing gravel access road and is in good condition. The interior riprap lined slope is sparsely vegetated with brush and weeds and is relatively steep. The exterior slope is mostly covered with riprap and concrete rubble, with brush and large trees encroaching upon the toe of the existing slope. Based upon topographic mapping provided, the exterior slope of the embankment varies between approximate slopes of 2.5H:1V to 1.9H:1V. The normal pool elevation in the West Ash Pond was previously maintained at an operating level of 390' by a pumping station. However, as of January 2016, Vectren began passive dewatering measures in the West Ash Pond and has maintained the water level at approximately 370' since the fall of 2017 by using a localized sump adjacent to the existing pumping station. It is Vectren's stated intent that they plan on maintaining this lower water level until closure construction has been initiated.

A Site Location Map showing the area surrounding the station is included as **Figure 1** of **Appendix A**. **Figure 2** in **Appendix A** presents the Aerial Site Map and **Figure 3** presents the Site Topography.

2 Initial Written Closure Plan

Regulatory Citation: 40 CFR §257.102 (b); Written closure plan-

(1) Content of the plan. The owner or operator of a CCR unit must prepare a written closure plan that describes the steps necessary to close the CCR unit at any point during the active life of the CCR unit consistent with recognized and generally accepted good engineering practices. The written closure plan must include, at a minimum, the information specified in paragraphs (b)(1)(i) through (vi) of this section.

The Initial Written Closure Plan for the West Ash Pond is described in this section. Information about operational and maintenance procedures was provided by Culley plant personnel. The Culley station follows an established maintenance program that quickly identifies and resolves issues of concern.

2.1 Content of the Plan

2.1.1 Closure Plan Description

Regulatory Citation: 40 CFR §257.102 (b)(1);

(i) Narrative description of how the CCR unit will be closed in accordance with this section.

The southern portion of the existing West Ash Pond footprint will be excavated to historical grades and a structural fill buffer area will be installed adjacent to the existing south embankment. North of the buffer area, the southeastern portion of the pond will also be excavated to historical grades and a lined Contact Stormwater Pond will be constructed. Subsequently, the northern portion of the east side of the pond footprint will be excavated to create the Excavation Area. The remainder of the existing pond footprint (the western side north of the buffer area) will be the CiP (Closure in Place) area where existing CCR materials will be dewatered and combined with the CCR materials and as much as 2-feet of underlying native soils excavated from the previously identified excavation areas. The CCR materials in the CiP area will be regraded and remain in-place to thereafter be capped by the final CiP cover system. The designated CiP area will effectively reduce the existing CCR footprint from 32 acres to 15 acres. The closure of the West Ash Pond will consist of the following operations:

- 1) Removal of surface water and free water remaining in the pond;
- 2) Dewatering to reduce pore water and stabilize the CCR materials;
- 3) Excavation of CCR materials in locations shown, including as much as 2-feet of underlying native soils, until materials previously in contact with the CCR materials have been removed based on visual confirmation;
- 4) Relocation and redistribution of the excavated CCR materials to fill the CiP area and establish the subgrade for the final cover system; and
- 5) Construction of a final cover system that complies with 40 CFR §257.102.

The final cover system proposed for construction over the CiP area will be sloped to promote non-contact stormwater drainage to the south. Non-contact stormwater drainage will flow through a series of channels and ultimately discharge to the Ohio River via a proposed new NPDES permitted outfall.

In accordance with §257.102 (b)(3), this Closure Plan will be amended as needed to provide additional details if design changes occur after the final engineering design is completed. This Closure Plan reflects the information available to date.

Regulatory Citation: 40 CFR §257.102 (b)(1);

(ii) If closure of the CCR unit will be accomplished through removal of CCR from the CCR unit, a
description of the procedures to remove the CCR and decontaminate the CCR unit in accordance with
paragraph (c) of this section.

Not applicable. Although this Closure Plan includes the complete removal of CCR materials along with as much as 2-ft of underlying native soil material from the defined Excavation Area, the CCR material will be reconsolidated with other CCR that will remain within the overall CCR unit. Therefore, this Closure Plan will be governed by the requirements for closure "accomplished by leaving CCR in place" in accordance with 40 CFR §257.102 (b)(1)(iii).

Regulatory Citation: 40 CFR §257.102 (b)(1);

 (iii) If closure of the CCR Unit will be accomplished by leaving CCR in place, a description of the final cover system and methods and procedures used to install the final cover.

The final cover system will be installed in direct contact with graded CCR material to achieve final subgrade elevations and will include (from bottom to top):

- 1) 40 mil LLDPE Geomembrane
- Geocomposite Drainage Layer
- 3) 24-inch Infiltration Soil Layer
- 4) 6-inch Topsoil Layer (vegetated)

CCR material will be placed and regraded as fill to achieve the final subgrade design slopes and the geomembrane liner and geocomposite drainage layer will be deployed atop. Earthen material will be placed, graded, and compacted to meet the required 24-inch for the infiltration soil layer. Topsoil will then be placed on top of the infiltration soil layer to create a 6-inch soil layer that will sustain native plant growth. The final cover surface will be seeded and vegetated. The final cover system will have a minimum slope of 2% and will be graded to convey non-contact stormwater runoff to a series of channels which will ultimately discharge to the Ohio River via a proposed new NPDES permitted outfall.

2.1.2 Inventory and Area Estimates

Regulatory Citation: 40 CFR §257.102 (b);

(iv) An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit.

An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit is 1,008,000 cubic yards.

Regulatory Citation: 40 CFR §257.102 (b);

(v) An estimate of the largest area of the CCR unit ever requiring a final cover as required by paragraph
 (d) of this section at any time during the CCR unit's active life.

An estimate of the largest area of the CCR unit ever requiring a final cover is 15 acres.

2.1.3 Closure Schedule

Regulatory Citation: 40 CFR §257.102 (b)(1);

 (vi) Schedule for completing all activities necessary to satisfy the closure criteria in this section, including an estimate of the year in which all closure activities for the CCR unit will be completed.

The milestones and the associated timeframes are initial estimates. Some of the activities associated with the milestones will overlap. Amendments to the milestones and timeframes will be made as the schedule is finalized.

Table 2-1 – Closure Schedule				
Milestone / Activity	Milestone Date			
Notification of Intent to Close Placed in Operating Record	Completed December 17, 2015. Closure to commence in accordance with the applicable timeframes in 40 CFR 257.102(e).			
Submittal of Initial Written Closure Plan	By April 17, 2018			
Agency coordination and permit acquisition - Coordinating with state agencies for compliance. - Acquiring state permits.	2018-19 2018-19			
Mobilization	2018			
Closure Construction Activities CCR - Complete dewatering, as necessary - Complete Stabilization and Relocation of CCR - Grade CCR material in pond - Install Final Cover System Estimate of Year in which all closure activities will be completed.	2018 2018-19 2018-19 2019			

2.2 Achievement of Performance Standards

Regulatory Citation: 40 CFR §257.102 (d); Closure performance standard when leaving CCR in place.

- (1) The owner or operator of a CCR unit must ensure that, at a minimum, the CCR unit is closed in a manner that will
 - (i) Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or combined run-off to the ground or surface waters or to the atmosphere

The final cover will be installed over existing and relocated CCR materials and has been designed to minimize surface water infiltration (thus minimizing leachate generation), support vegetation, minimize the effects of changes in climate, and to provide an aesthetically acceptable final surface. The selected final cover system consists of a low permeability geosynthetic layer and a protective earthen layer.

Regulatory Citation: 40 CFR §257.102 (d)(1)

- (ii); Preclude the probability of future impoundment of water, sediment or slurry.

The final cover will be installed with a minimum 2% slope. Drainage channels overtop the final cover system will be installed with a minimum 2% slope.

Regulatory Citation: 40 CFR §257.102 (d)(1)

(iii); Include measures that provide for major slope stability to prevent the sloughing or movement
of the final cover system during the closure and post-closure care period.

Drainage channels will be lined with grass and erosion control matting or with riprap, where required, to reduce the potential for erosion. Geotechnical analysis has confirmed that the proposed final slope of the berms and cover system will meet the stability requirements to prevent sloughing or movement of the final cover system.

Regulatory Citation: 40 CFR §257.102 (d)(1)

(iv); Minimize the need for further maintenance of the CCR Unit.

The final cover will be seeded and vegetated to minimize erosion and maintenance.

Regulatory Citation: 40 CFR §257.102 (d)(1)

 (v); Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.

Closure is estimated to be completed within two years after commencing closure construction activities.

2.3 Stabilization of Waste

Regulatory Citation: 40 CFR §257.102 (d)

- (2) Drainage and stabilization of CCR surface impoundments.
 - (i); Free liquids must be eliminated by removing liquid wastes or solidifying the remaining wastes and waste residue.

The unit will be dewatered sufficiently, as necessary, to remove the free liquids in order to provide a stable base for the construction of the final cover system.

Regulatory Citation: 40 CFR §257.102 (d)(2)

(ii); Remaining wastes must be stabilized sufficiently to support the final cover system.

Dewatering as necessary, and regrading of existing in-place CCR will sufficiently stabilize the CCR materials to support the final cover.

2.4 Final Cover System

Regulatory Citation: 40 CFR §257.102 (d)

 (3) Final cover system. A final cover system must be installed to minimize infiltration and erosion, and at a minimum, meets the requirements of (d)(3)(i)(A) through (D).

The final cover will be installed over existing and relocated CCR materials and has been designed to minimize surface water infiltration (thus minimizing leachate generation), support vegetation, minimize the effects of changes in climate, and to provide an aesthetically acceptable final surface. The selected final cover system consists of a low permeability geosynthetic layer and a protective earthen layer. The design of the final cover system is included in Section 2.1.1.

Regulatory Citation: 40 CFR §257.102 (d)(3)

(i); The design of the final cover system must be included in the Initial Written Closure Plan.

The design of the final cover system is included in Section 2.1.1. When the design of the final cover system is finalized, the Closure Plan will be amended if the final design would substantially affect this Closure Plan. The current design of the final cover system meets the requirements of §257.73 (d)(3)(i)(A)–(D) as described below.

Regulatory Citation: 40 CFR §257.102 (d)(3)(i)

- (A); The permeability of the final cover system must be less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1x10⁻⁵ cm/sec, whichever is less.
- (B); The infiltration of liquids through the closed CCR unit must be minimized by the use of an infiltration layer that contains a minimum of 18-inches of earthen material.

The final cover system is a composite system consisting of a low permeability layer (geomembrane), a geocomposite drainage layer, a 24-inch infiltration soil layer and a 6-inch topsoil layer. It will be installed over existing and relocated CCR materials which will serve as the subgrade for the geomembrane. It will have a demonstrated permeability that satisfies the requirements of 40 CFR §257.102 (d)(3)(i)(A) and has been designed to minimize surface water infiltration in accordance with 40 CFR §257.102 (d)(3)(i)(B). This will be verified during construction per the construction quality assurance plan.

Regulatory Citation: 40 CFR §257.102 (d)(3)(i)

 (C)); The erosion of the final cover system must be minimized by the use of an erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth. The top layer of the final cover system will include a minimum of 6-inches of an earthen erosion layer that is capable of sustaining native plant growth. The final cover will be seeded and vegetated.

Regulatory Citation: 40 CFR §257.102 (d)(3)(i)

 (D) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.

The final cover will be installed with a minimum 2% slope and the design has accounted for the calculated settlement as well as differential settling and subsidence.

2.5 Amendment to Initial or any Subsequent Written Closure Plan

This initial written closure plan will be amended as required by §257.102 (b)(3).

April 17, 2018

3 Certification

This Certification Statement documents that the West Ash Pond at the F.B. Culley Generating Station meets the Initial Written Closure Plan requirements specified in 40 CFR §257.102 (b) and the closure performance standards as specified in 40 CFR §257.102 (d). The West Ash Pond is an inactive CCR surface impoundment as defined by 40 CFR §257.53. The CCR Rule requires that the Initial Written Closure Plan for an inactive CCR surface impoundments be prepared by April 17, 2018, in accordance with 40 CFR §257.100(e).

CCR Unit: Southern Indiana Gas & Electric Company; F.B. Culley Generating Station; West Ash Pond

I, Jay Mokotoff, being a Registered Professional Engineer in good standing in the State of Indiana, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above referenced CCR Unit, that the Initial Written Closure Plan dated April 17, 2018 meets the requirements of 40 CFR §257.102.

Jay D. Mokotoff				
Printed Name				
4.47.40				
4-17-18				
Date				



4 Limitations

Background information, design basis, and other data which AECOM has used in preparing this report have been furnished to AECOM by SIGECO. AECOM has relied on this information as furnished, and is not responsible for the accuracy of this information. Our recommendations are based on available information from previous and current investigations. These recommendations may be updated as future investigations are performed.

The conclusions presented in this report are intended only for the purpose, site location, and project indicated. The provisions and recommendations presented in this report should not be used for other projects or purposes. Conclusions or recommendations made from these data by others are their responsibility. The conclusions and recommendations are based on AECOM's understanding of current plant operations, maintenance, stormwater handling, and ash handling procedures at the station, as provided by SIGECO. Changes in any of these operations or procedures may invalidate the findings in this report until AECOM has had the opportunity to review the findings, and revise the report if necessary.

This development of the Closure Plan was performed in accordance with the standard of care commonly used as state-of-practice in our profession. Specifically, our services have been performed in accordance with accepted principles and practices of the engineering profession. The conclusions presented in this report are professional opinions based on the indicated project criteria and data available at the time this report was prepared. Our services were provided in a manner consistent with the level of care and skill ordinarily exercised by other professional consultants under similar circumstances. No other representation is intended.

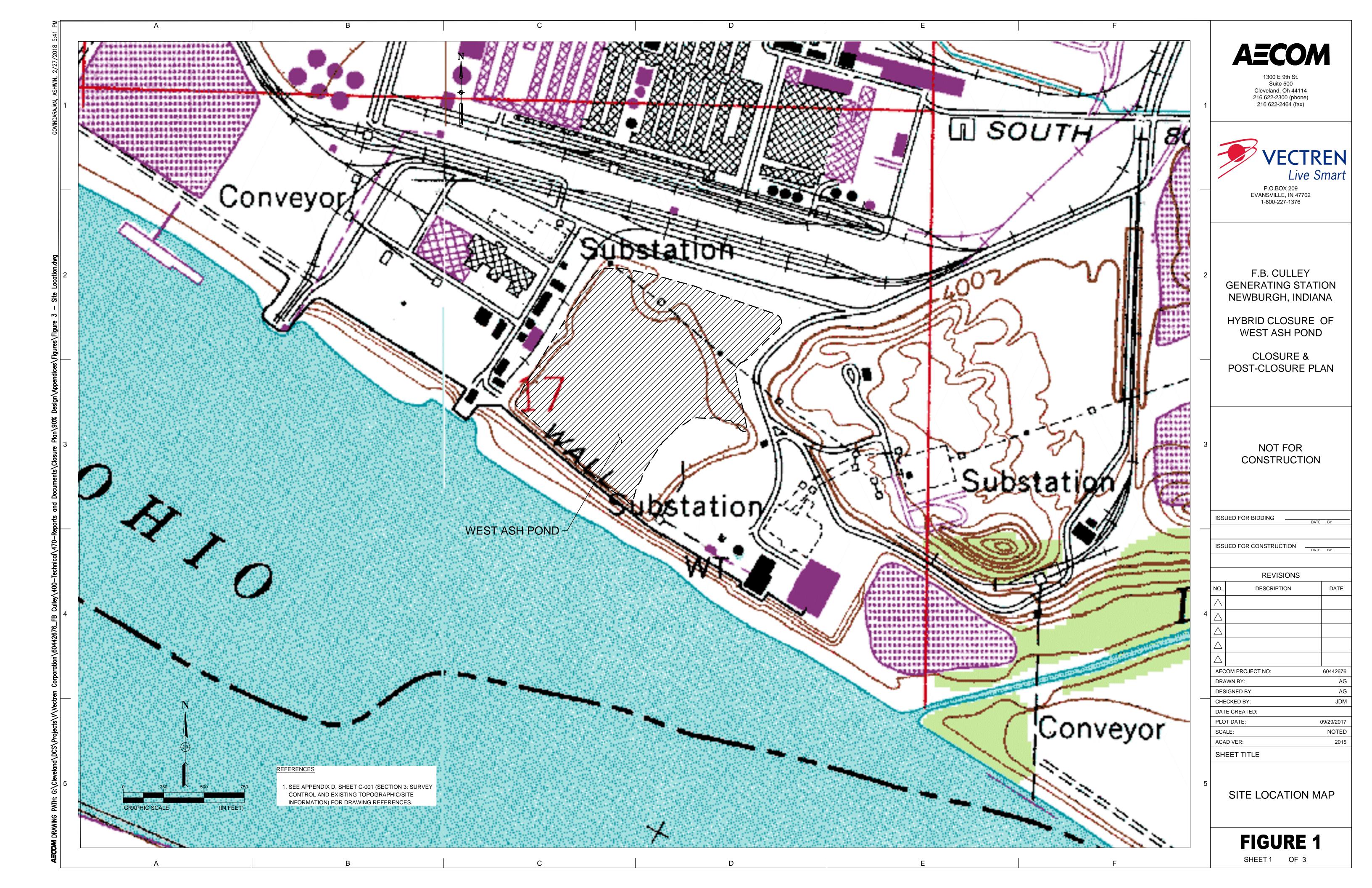
Appendix A Figures

Figure 1 – Site Location Map

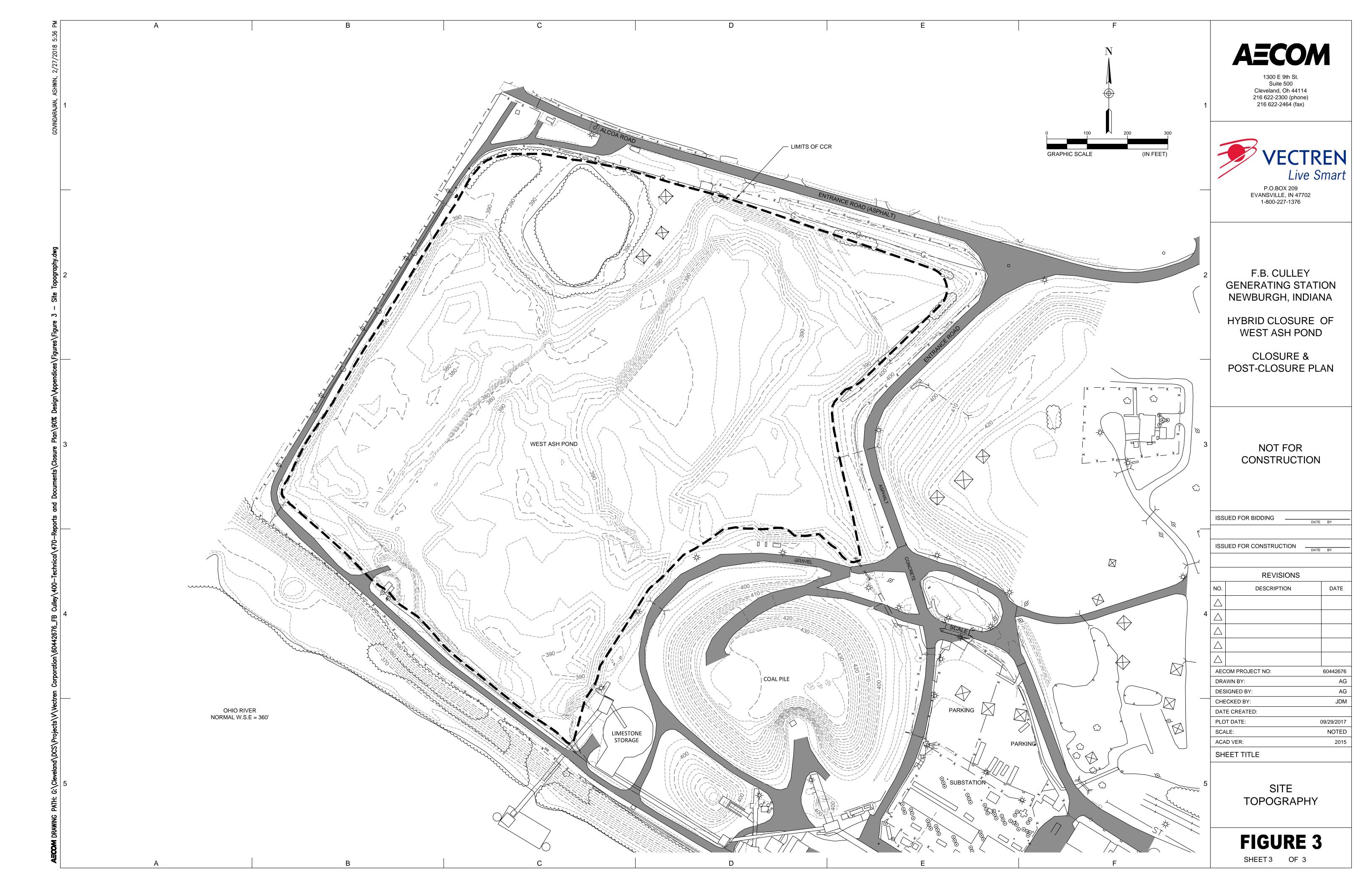
Figure 2 – Aerial Site Map

Figure 3 – Site Topography

April 17, 2018







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