

# STRUCTURAL STABILITY ASSESSMENT

**CFR 257.73(d)**

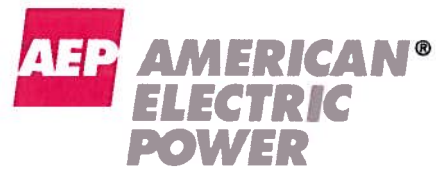
Stingy Run Flyash Pond

Gavin Plant  
Cheshire, Ohio

October, 2016


Prepared for: AEP Generation Resources, Inc. (GENCO) - Gavin Plant  
Cheshire, Ohio


Prepared by: American Electric Power Service Corporation  
1 Riverside Plaza  
Columbus, OH 43215

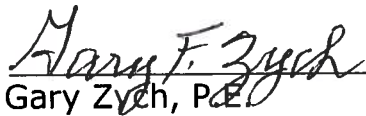


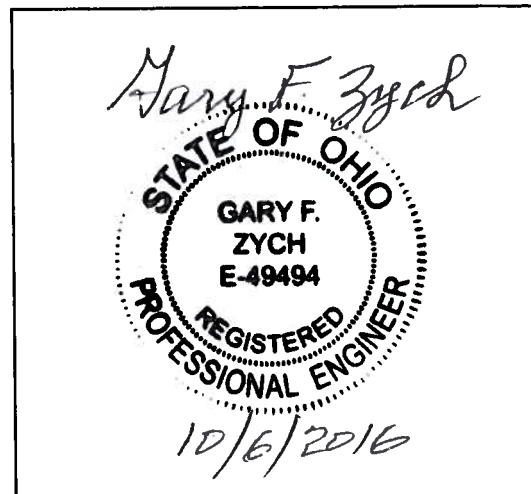
**Document No. GERS-16-107**

Structural Stability Assessment  
CFR 257.73(d)  
Gavin Plant  
Stingy Run Flyash Pond

PREPARED BY  DATE 10-4-2016  
Shah Baig, P.E.

REVIEWED BY  DATE 10/4/2016  
Dan Pizzino, P.E.

APPROVED BY  DATE 10/6/2016  
Gary Zych, P.E.  
Manager - AEP Geotechnical Engineering



I certify to the best of my knowledge, information and belief that the information contained in this structural stability assessment meets the requirements of 40 CFR 257.73(d)

## Table of CONTENTS

<b>1.0 OBJECTIVE 257.73(d)</b> .....	4
<b>2.0 NAME AND DESCRIPTION OF CCR SURFACE IMPOUNDMENT</b> .....	4
<b>3.0 STABLE FOUNDATION AND ABUTMENTS 257.73(d)(1)(i)</b> .....	5
<b>4.0 SLOPE PROTECTION 257.73(d)(1)(ii)</b> .....	6
<b>5.0 EMBANKMENT CONSTRUCTION 257.73 (d)(1)(iii)</b> .....	7
<b>6.0 VEGETATION CONTROL 257.73 (d)(1)(iv)</b> .....	7
<b>7.0 SPILLWAY SYSTEM 257.73(d)(1)(v)</b> .....	7
<b>8.0 BURIED HYDRAULIC STRUCTURES 257.73 (d)(1)(vi)</b> .....	8
<b>9.0 SUDDEN DRAWDOWN 257.73 (d)(1)(vii)</b> .....	8

## **1.0 OBJECTIVE 257.73(d)**

This report was prepared by AEP- Geotechnical Engineering Services (GES) section to fulfill requirements of CFR 257.73(d) and document whether the design, construction, operations, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices. This is the initial assessment as per the Rule.

## **2.0 NAME AND DESCRIPTION OF CCR SURFACE IMPOUNDMENT**

The Gavin Flyash Pond is located in Gallia County, Ohio, northwest of the Gavin Power Plant and west of State Route 554 and the Ohio River, along Stingy Run which intersects Kyger Creek. The pond was previously used for sedimentation and storage of fly ash produced as a coal combustion byproduct in burning pulverized coal at the Gavin Power Plant.

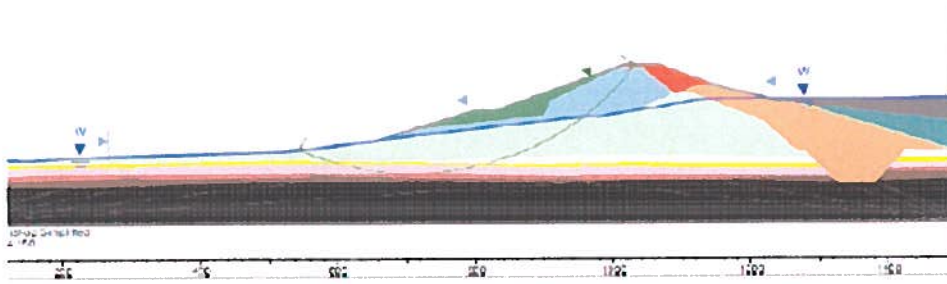
The existing fly ash facility consists of the main dam and principal spillway. The emergency spillway channel was closed as a part of landfill construction in 1997. The main dam was initially constructed in 1973-74 to the crest elevation of 692 feet, and subsequently raised to the current crest elevation of about 735 feet in 1987-88. The existing crest is about 1,650 feet long by 30 feet wide and about 145 feet high. The main dam is a zoned earthen dam with a clay core on the upstream slope, a chimney filter and random fill on the downstream slope. The upstream slope grade is 2.5H:1V with a stabilizing berm that begins at approximately 8H:1V to elevation 640 feet, 3H:1V to 30 foot wide bench at elevation 670 feet, 3H:1V to the crest of the original dam (varies, but about elevation 692 feet), and 2H:1V to the current crest elevation of about 735 feet. The downstream slope is 2.5H:1V from the ditch at the downstream toe to the current crest elevation of about 735 feet, including a 30 foot wide bench at elevation 660 feet. The upstream slope and toe of the downstream slope is protected with oversize rock.

AEP has started pond closure project in 2015 and plan to close the pond with a cover system combined with series of channel for water management. At the end of the project the entire flyash pond will be capped and covered with cover system. The water level in the flyash pond adjacent to the dam is currently maintained at about 665 feet.

### **3.0 STABLE FOUNDATION AND ABUTMENTS 257.73(d)(1)(i)**

***[Was the facility designed for and constructed on stable foundations and abutments? Describe any foundation improvements required as part of construction.]***

The foundation soils under the embankment consist of layers of sand and clay underlain with shale and competent rock. The clay core was extended through overburden foundation layers of clay, sand, and weathered shale and keyed into intact foundation bedrock and abutments. The abutments are formed of the natural hillside sandstone. A core trench extended the full length of the dam into the rock. A grout curtain was provided in the abutments of the dam. The dam was arched in the upstream direction and camber was provided to compensate for settlement. The foundation soils were typically very stiff to hard, red-brown mottled with gray silty clay characteristics similar to very soft shale. Hand penetrometer measurements of cohesive samples within this stratum ranged from 3.75 to 4.5+ tons per square foot and SPT (N-values) ranged between 31 and 69 blows per foot. Based on the subsurface soil properties of soils and rock supporting the dam, the foundation and abutments of this dam is found to be in good and stable condition. Typical cross-section and engineering properties of the foundation soils/rock under the embankment are illustrated below.



Material Name	Color	Unit Weight (lbs/ft <sup>3</sup> )	Sat. Unit Weight (lbs/ft <sup>3</sup> )	Cohesion (psf)	Phi (deg)
'88 U/S Clay Core	Red	120	129	700	16
'88 D/S Random Fill	Green	126	129	800	16
Bottom Ash zone	Light Blue	105	115	0	35
'74 Clay Core	Orange	130	133	0	23
'74 D/S Random Fill	White	130	136	0	27
'74 U/S Random Fill	Dark Blue	127	130	0	21
Upstream Fly Ash	Grey	100	100	0	30
Upper Clay	White	127	127	860	21
Upper Sand	Yellow	127	130	0	30
Intermediate Clay	White	126	126	0	22
Lower Sand	Red	127	130	0	30
Lower Clay/Shale	Brown	130	131	0	22
Competant Rock	Dark Grey	130	131	5000	0

**Source:** Stinky Run FlyAsh Reservoir, Supplemental Investigation and Analysis Report, Prepared By S&ME Engineering (Formerly BBCM Engineering, Inc.), 2010.

#### **4.0 SLOPE PROTECTION 257.73(d)(1)(ii)**

*[Describe the slope protection measures on the upstream and downstream slopes.]*

The entire upstream slope of the dam was originally protected by riprap. Recently due to the flyash pond closure and dam modification project, some of the riprap from the upstream slope has been removed. The downstream slope of the dam is mostly covered with vegetative cover. The lower section of the downstream slope below the intermediate bench is protected by riprap.

The slopes covered with grass are properly maintained by mowing and vegetation control. Any undesired, excessive vegetation are removed as needed.

## **5.0 EMBANKMENT CONSTRUCTION 257.73 (d)(1)(iii)**

***[Describe the specifications for compaction and/or recent boring to give a relative comparison of density.]***

The design drawings show that the embankment materials were to be compacted to 95% Standard proctor density. Recent borings through the embankment indicate that the embankment fill material is stiff to hard and representative of compacted earthen materials.

The FAD is an earth fill dam consisting of the following main zones of fill:

- Clay Core (original dam): consists of compacted clay placed in a foundation cut-off trench and as a sloping clay core forming the upstream face of the dam up to the original dam crest (approximately Elevation 692 ft).
- Upstream Random Fill (original dam): consists of a random earth fill berm constructed with an 8H:1V top slope against the upstream face of the clay core.
- Downstream Random Fill (original dam): consists of random earth fill and shale fill forming the main downstream zone of the dam.
- New Clay Core (raised dam): consists of a compacted clay zone placed on the upstream face of the dam above the original dam crest to the existing dam crest (approximately Elevation 735 ft).
- Bottom Ash (raised dam): consists of bottom ash placed downstream of the new clay core and above the original downstream random fill.
- Upper Random Fill (raised dam): consists of random earth fill placed above the bottom ash and serving as the downstream face of the existing dam.

## **6.0 VEGETATION CONTROL 257.73 (d)(1)(iv)**

***[Describe the maintenance plan for vegetative cover.]***

The vegetative areas are mowed to facilitate inspections and maintain the growth of the vegetative layer; and prevent the growth of woody vegetation.

## **7.0 SPILLWAY SYSTEM 257.73(d)(1)(v)**

***[Describe the spillway system and its capacity to pass the Inflow Design Flood as per its Hazard Classification.]***

The facility is classified as a High Hazard Potential Dam. The Inflow Design Flood is the probable Maximum Flood (PMF). The outlet works for the Flyash Pond (FAP) consists of a principal spillway structure. The structure serves as the sole discharge point for the ash pond. The structure is a tower-type decant structure with a concrete drop inlet leading to a 4-foot diameter pipe. The spillway structure is located in the northwest area of the ash pond. The

discharge conduit is a 4-foot-diameter steel cylinder reinforced concrete pressure pipe with rubber gasket joints. The pipe is placed on a reinforced concrete cradle. A United States Bureau of Reclamations (USBR) impact-type stilling basin is provided at the downstream end of the conduit for energy dissipation. Stop logs were originally provided to raise the elevation of the overflow crest concurrently with the rising buildup of settled fly ash in the reservoir. The initial design decanting elevation was 645.0, over time Gavin Power Plant installed stop logs such that the final decanting actually occurred at Elevation 663 feet. The existing crest elevation of the dam at 735 feet and the current water elevation maintained at 665 feet is more than sufficient to handle the PMF at present and during construction.

#### **8.0 BURIED HYDRAULIC STRUCTURES 257.73 (d)(1)(vi)**

***[Describe the condition of the sections of any hydraulic structure that in buried beneath and/or in the embankment.]***

The discharge conduit is a 4-foot diameter steel cylinder reinforced concrete pressure pipe that is buried under the dam and connected to the conveyance channel downstream of the dam. A 3-inch diameter drain pipe is also buried under the dam. The discharge pipe is functioning as designed and no sign of any leak was noticed to date. The pipe was inspected using camera approximately 5 years ago and no issues with the pipe were observed based on the inspection.

#### **9.0 SUDDEN DRAWDOWN 257.73 (d)(1)(vii)**

***[If the downstream slope is susceptible to inundation, discuss the stability due to a sudden drawdown.]***

The downstream slope of the flyash dam will not be unundated from any adjacent water bodies.