



INITIAL HAZARD POTENTIAL CLASSIFICATION ASSESSMENT REPORT

**Fly Ash Impoundment
KCP&L Greater Missouri Operations Company
Sibley Generating Station**

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Fly Ash Impoundment KCP&L Greater Missouri Operations Company Sibley Generating Station

SECTION 1.0 DISCUSSION

1.1 PURPOSE

The purpose of this Initial Hazard Potential Classification Assessment is to document that the requirements specified in 40 CFR §257.73(a)(2) of the Coal Combusting Residual (CCR) Rule¹ have been met for the Fly Ash Impoundment at the KCP&L Greater Missouri Operations Company (KCP&L GMO) Sibley Generating Station. The Fly Ash Impoundment is an existing CCR surface impoundment as defined by 40 CFR §257.53.

1.2 REGULATORY REQUIREMENT

The Initial Hazard Potential Classification Assessment must document the hazard potential classification of the Fly Ash Impoundment as either a high hazard potential CCR surface impoundment, a significant hazard potential CCR surface impoundment, or a low hazard potential CCR surface impoundment as required by 40 CFR §257.73(a)(2). The basis for the hazard potential classification must also be documented.

1.3 BRIEF DESCRIPTION OF IMPOUNDMENT

The Sibley Generating Station is located adjacent to the Missouri River in Sections 1 and 2 of Township 50 North, Range 30 West just east of Sibley, Missouri. The Fly Ash Impoundment is located to the east of the generating plant along the south bank of the Missouri River. The impoundment was designed in 1977 by Burns & McDonnell Engineering Company (Burns & McDonnell) and included stability analyses of the embankments². It was originally constructed primarily using silts and clays obtained from the interior of the impoundment or from the adjacent bluffs. The construction was completed in 1977³ and was overseen by staff of Burns & McDonnell.

¹ United States Environmental Protection Agency, April 17, 2015, *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities*.

² Burns & McDonnell Engineering Company, 1977, *Sibley Generating Station Contract 100 - Fly Ash Pond Construction*.

³ Dewberry & Davis, LLC, March 2011, *Coal Combustion Waste Impoundment Round 7 - Dam Assessment Report, Sibley Generating Station, Fly Ash Pond*.

1.3.1 Size Classifications

Based on the United States Army Corps of Engineers (USACOE) Recommended Guidelines for Safety Inspection of Dams ER 1110-2-1064, the size classification for the Sibley Fly Ash Impoundment is “Small”. Size classification is determined by either storage or height, whichever is larger, therefore the impoundment is categorized as “Small”.

Category	Storage (Ac-Ft)	Height (Ft)
Small	<1000	<40
Intermediate	1000 to <50,000	40 to <100
Large	>50,000	>100

1.3.2 Impoundment Dimensions

Based on the available published information³, the approximate ash impoundment dimensions are summarized in the following table. SCS reviewed the Dewberry information included in the table at a cursory level and found it to be accurate for this level of review.

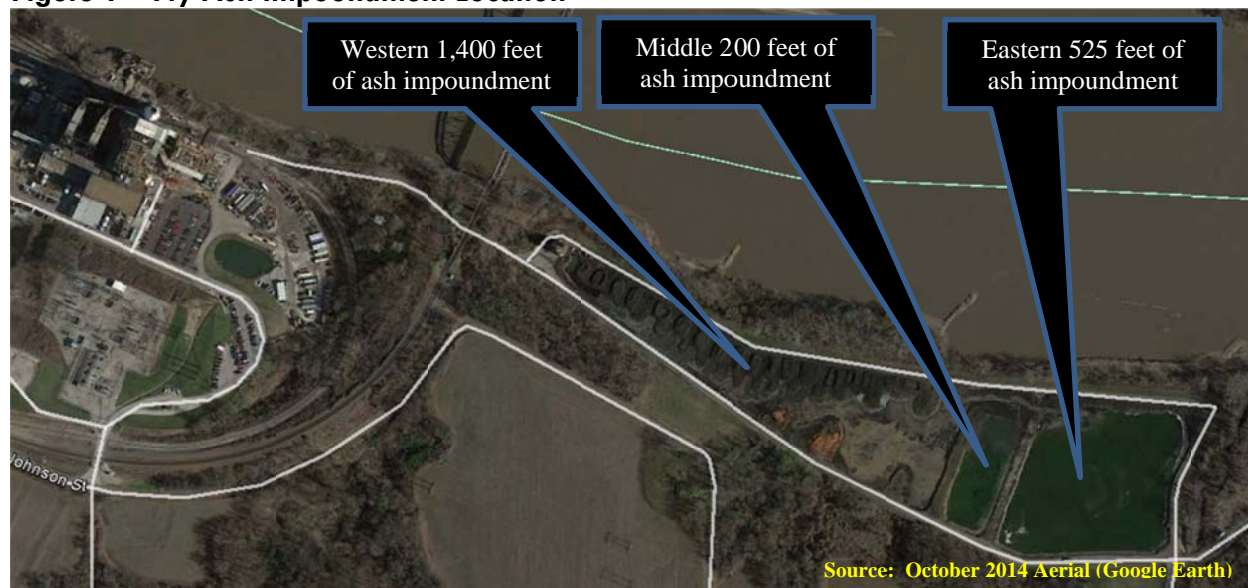
Measurement	Quantity/Measurement
Surface Area	15.8 acres
Dam Height	22 feet
Size Classification	Small
Total Storage Capacity	236 acre-feet

1.3.3 Impoundment Operations

The Fly Ash Impoundment is operated by Kansas City Power & Light (KCP&L). Based on conversations with plant personnel, the fly ash impoundment is used for ash conditioning and as a staging area before the fly ash is ultimately disposed in a nearby landfill operated by KCP&L. Fly ash from the plant is sluiced to the impoundment at its western end. Water is ultimately discharged at the eastern end of the impoundment via a NPDES-permitted outfall. The western 1,400 feet of the impoundment is used to settle out the majority of the fly ash. A periodic excavation operation removes the ash and stockpiles the ash on the northern half of the impoundment where it is allowed to drain. After the ash has sufficiently drained, it is periodically loaded into trucks and transported to the landfill. The approximate middle 200 feet of the impoundment is used to further settle out ash, while the eastern 525 feet of the impoundment is used as a final settling basin before the excess water is discharged to the Missouri River from a structure located on the eastern embankment of the fly ash impoundment. The fly ash impoundment is presented in Figure 1 on the following page.

⁴ United States Army Corps of Engineers, 1979, *Recommended Guidelines for Safety Inspection of Dams ER 1110-2-106*.

Figure 1 – Fly Ash Impoundment Location



SCS' estimate of the relative volume of fly ash and water in the three operational areas of the impoundment based on visual observation and a review of available construction documentation is summarized in the table below.

Operational Area	Volume of Ash / Water
Western	90% / 10%
Middle	50% / 50%
Eastern	30% / 70%

1.4 PLAN APPROACH

This Hazard Potential Classification Assessment was completed using the April 2004 Federal Emergency Management Agency (FEMA) "Federal Guidelines for Dam Safety: Hazard Potential Classification Systems for Dams". As part of the Hazard Potential Classification Assessment, SCS completed the following tasks.

1. Reviewed available site information and history pertaining to the Fly Ash Impoundment and surrounding facility and infrastructure.
2. Visited the site to validate information and data gathered during site information review noted above and to potentially identify additional infrastructure or receptors that may be impacted.
3. Completed an assessment of the Fly Ash Impoundment utilizing guidance from the "Federal Guidelines for Dam Safety: Hazard Potential Classification Systems for Dams – April 2004" published by the Federal Emergency Management Agency (FEMA).

SECTION 2.0 ANALYSIS

2.1 RELEASE SCENARIOS

The Fly Ash Impoundment has safely operated for approximately 40 years. In the unlikely event that a failure should occur, it would most likely result from erosion of the south alluvial bank of the Missouri River, undermining the north portion of the impoundment embankment. It is unlikely that the erosion would occur without warning, given the operational history of the site and frequent unit inspections; therefore SCS does not consider a catastrophic failure of the impoundment a likely release scenario.

The most likely release scenario is that a portion of the embankment would be undermined by river flooding, causing a slope failure of the impoundment embankment and release of water and fly ash down the adjacent river embankment and into the Missouri River. The location of the failure would have an effect on the volume of ash and water released before the breach could be repaired.

A failure in the western part of the impoundment is unlikely, given the solid nature of the ash adjacent to the north embankment and the small volume of water in the area.

In the middle portion, less stable fly ash is present, but the volume of water available to erode and transport fly ash into the Missouri River is small.

In the eastern portion of the impoundment, the volume of water available for transport of ash is larger than the other areas, while the volume of ash is expected to be smaller, but variable, as the area serves as a final settling basin for the discharge of water from the ash pond.

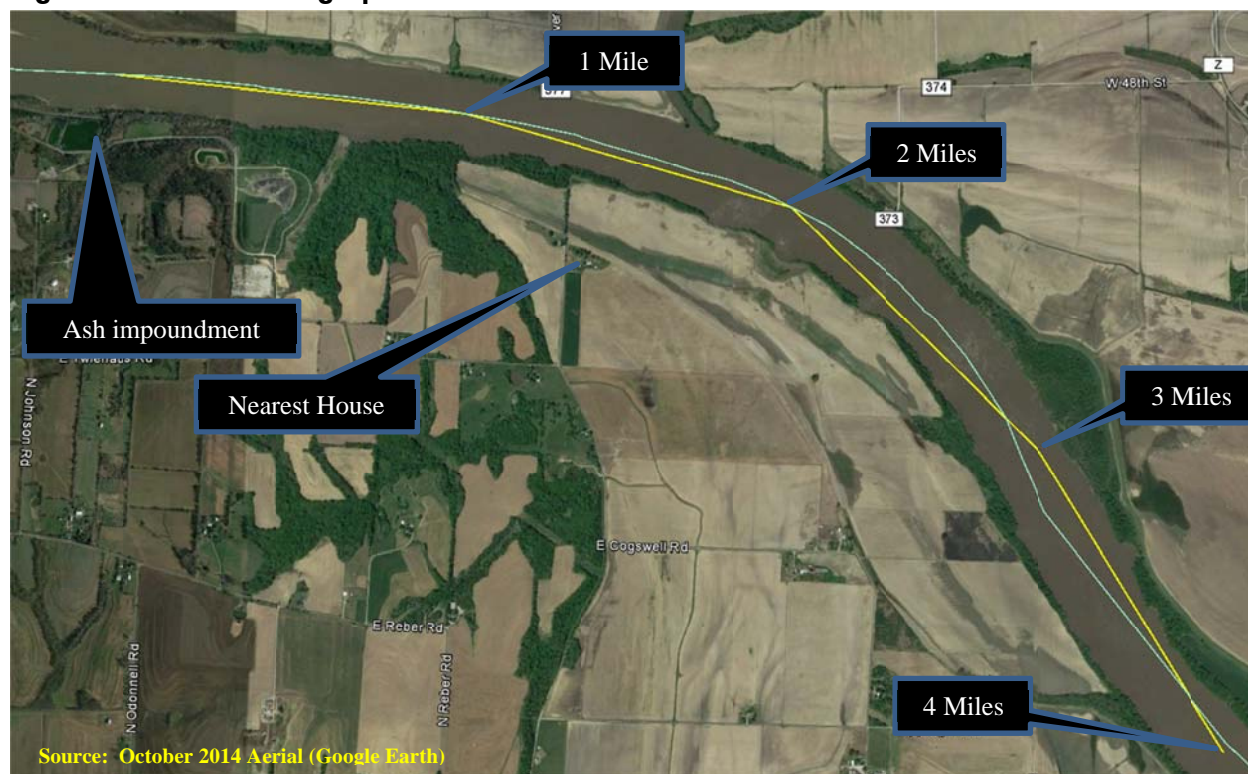
The most likely release scenario would result in the flowing of water and ash into the Missouri River most likely over a period of 2 to 6 hours. Assuming the failure occurs at a time just before the east area of the impoundment requires cleaning out, a large volume of ash could flow into the river and mix with the existing muddy water in the river.

2.2 DOWNSTREAM ENVIRONMENT

The Sibley Fly Ash Impoundment is located along the southern bank of the Missouri River in a rural area of western Missouri. The downstream environment is located within the alluvial flood plain of the Missouri River, which is subject to natural flooding on a nearly annual basis. The downstream environment is summarized in the Table 4 and is shown on the aerial photograph below.

Table 4 – Downstream Environment	
Potential Receptor	Approximate Distance From Impoundment
Distance to Nearest House	1.5 miles (Located outside river levee)
Distance to Nearest Road	Not Applicable
Distance to Nearest Body of Water	50 feet (Missouri River)
Distance to Nearest Town	6.5 Miles (Napoleon, Mo)
Distance to Nearest State Park	116 Miles (Arrow Rock, Arrow Rock, Mo)
Distance to Nearest Affected State Park	140 Miles (Katy Trail, Rocheport, Mo)

Figure 2 – Aerial Photograph



2.3 BREACH ANALYSIS

While SCS considers a catastrophic failure unlikely, the Federal Hazard Potential Classification System and the EPA is concerned with the resulting impact from a catastrophic failure. In the “Coal Combustion Waste Impoundment Dam Assessment Report³” for the Sibley Generating Station prepared for the EPA, Dewberry staff conducted a Breach Impact Analysis for the site. In its analysis, Dewberry assumed the total volume of ash and water was catastrophically released into the river with no residual left on site. Dewberry concluded the release would cause “a momentary rise in the river” elevation and the “impact to the river would be a layer of inert ash along the bank and an addition of water to the river which would be absorbed quickly. No environmental damage or property damage should result”.

Based on site observations and data collected during this assessment, SCS is in agreement with the Dewberry & Davis breach analysis.

Infrastructure along the Missouri River includes surface water intakes and recreational areas. According to the Missouri Department of Natural Resources 2016 Census of Missouri Public Water Systems⁵, eight public water systems maintain surface water intakes downstream on the Missouri River as shown below. The Kansas City intake is located upstream of the Sibley Generating Station and would not be impacted by a release from the impoundment.

Public Water System Surface Water Sources

PWS ID	System Name	Stream Name	County
Missouri River			
MO3010089	BOONVILLE	MISSOURI RIVER	COOPER
MO1010363	HIGGINSVILLE	MISSOURI RIVER	LAFAYETTE
MO1010415	KANSAS CITY	MISSOURI RIVER	JACKSON
MO1010464	LEXINGTON	MISSOURI RIVER	LAFAYETTE
MO3010409	MO AMERICAN JEFFERSON CITY DISTRICT	MISSOURI RIVER	COLE
MO6010716	MO AMERICAN ST LOUIS CO ST CHARLES CO	MISSOURI RIVER CENTRAL 1 & 2	ST LOUIS
MO6010716	MO AMERICAN ST LOUIS CO ST CHARLES CO	MISSOURI RIVER CENTRAL 3 & 4	ST LOUIS
MO6010716	MO AMERICAN ST LOUIS CO ST CHARLES CO	MISSOURI RIVER NORTH	ST LOUIS
MO6010715	ST LOUIS CITY	MISSOURI RIVER	ST LOUIS CITY

The nearest downstream surface water intake is Lexington, located approximately 18 miles downstream of Sibley. The next closest downstream intake is located at Higginsville, located approximately 28 miles downstream of Sibley. Treatment of water taken from the Missouri River requires the removal of a large amount of sediment from the river; therefore a release of ash into the Missouri River is not expected to cause a shutdown of water systems taking water from the Missouri River.

The Missouri River carries a large load of sediment in the water. The nearest state park to the Sibley Generating Station is the Katy Trail State Park, located along the Missouri River, near Rocheport, Missouri. Recreational uses of the Missouri River and areas along the river are not expected to be significantly impacted should a breach occur.

⁵ Missouri Department of Natural Resources, *2016 Census of Missouri Public Water Systems* (<http://dnr.mo.gov/env/wpp/docs/2016-census.pdf>)

SECTION 3.0 SCS HAZARD POTENTIAL ASSESSMENT

The 2004 Federal guidelines for dam safety classification systems focuses on the loss of human life and economic and environmental losses resulting from a dam (ash impoundment) failure. The following table summarizes the Hazard Classification System.

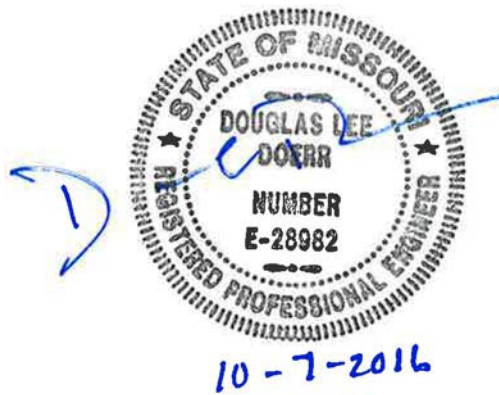
	Loss of Human Life	Economic, Environmental Losses
Low	None	Low and generally limited to the owner
Significant	None	Yes
High	Probable, one or more	Yes

SCS' assessment of the Sibley Generating Station Fly Ash Impoundment is that a catastrophic failure of the impoundment dikes is unlikely. In the event of a catastrophic failure, the loss of human life is highly unlikely and the economic and environmental impact of a failure is generally limited to KCP&L GMO property. Based on this assessment, SCS believes the appropriate hazard classification for the Sibley Generating Station Fly Ash Impoundment is LOW. The table below summarizes the hazard assessment of the Sibley Generating Station Fly Ash Impoundment.

	Loss of Human Life	Economic, Environmental Losses
Low	X	X
Significant		
High		

SECTION 4.0 CERTIFICATION

I, Douglas L. Doerr, hereby certify that I am a Qualified Professional Engineer licensed in Missouri, and that the initial Hazard Potential Classification Assessment for the Fly Ash Impoundment located at the Sibley Generating Station was conducted in accordance with the requirements of §257.73(a)(2) of the CCR Rule. The Hazard Potential Classification Assessment consists of all of the pages in Sections 1 through 4 of this document.



Douglas L. Doerr, P.E.
Missouri Professional Engineer
License No. 028982

SECTION 5.0 REFERENCES

1. United States Environmental Protection Agency, April 17, 2015, *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities*.
2. Burns & McDonnell Engineering Company, 1977, *Sibley Generating Station Contract 100 - Fly Ash Pond Construction*.
3. Dewberry & Davis, LLC, March 2011, *Coal Combustion Waste Impoundment Round 7 - Dam Assessment Report, Sibley Generating Station, Fly Ash Pond*.
4. United States Army Corps of Engineers, 1979, *Recommended Guidelines for Safety Inspection of Dams ER 1110-2-106*.
5. Missouri Department of Natural Resources, *2016 Census of Missouri Public Water Systems* (<http://dnr.mo.gov/env/wpp/docs/2016-census.pdf>).