



INITIAL HAZARD POTENTIAL CLASSIFICATION ASSESSMENT REPORT

**Lower AQC Impoundment
Kansas City Power & Light Company
La Cygne Generating Station**

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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 Lower Air Quality Control (AQC) Impoundment located at Kansas City Power & Light Company (KCP&L) La Cygne Generating Station. The Lower AQC Impoundment is an existing CCR surface impoundment as defined by 40 CFR §257.53.

1.2 REGULATORY REQUIREMENT

This Initial Hazard Potential Classification Assessment documents the hazard potential classification of the Lower AQC 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 assessment also documents the basis for the hazard potential classification.

1.3 BRIEF DESCRIPTION OF IMPOUNDMENTS

The La Cygne Generating Station is located adjacent to and east of Lake La Cygne and approximately 6.6 miles east of the town of La Cygne, Kansas. The 7,500 acre site contains a 2,600 acre cooling water reservoir (Lake La Cygne), the generating station, and two air quality control (AQC) impoundments containing fly ash and flue gas desulphurization (FGD) residuals, both considered CCR waste. The power station and impoundments are generally located in Sections 27, 28, 33 and 34 of Township 19 South, Range 25 East.

The initial AQC Pond (now called the Lower AQC Impoundment) was constructed in 1973 as part of the original generating station development to store FGD waste and is located to the north of the generating station and to the east of Lake La Cygne. The Lower AQC Impoundment was formed by an approximate 10,500 foot long side hill embankment. In 1979, the Upper AQC Pond (now called the Upper AQC Impoundment) was constructed to store FGD waste. The Lower AQC impoundment was designed by Ebasco and the Upper AQC impoundment was

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

designed by Woodward Clyde Consultants. The locations of the AQC impoundments are shown on the October 2014 aerial photograph in Figure 1.

Figure 1 – Aerial Photograph



1.3.1 Size Classifications

Based on the United States Army Corps of Engineers (USACOE) Recommended Guidelines for Safety Inspection of Dams ER 1110-2-106², the size classification for the Lower AQC Impoundment is “Small” based on height and “Intermediate” based on storage. Size classification is determined by either storage or height, whichever is larger, therefore the impoundment is categorized as “Intermediate”.

| 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 Lower AQC 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 the level of review completed.

| Measurement | Quantity/Measurement |
|------------------------|----------------------|
| Surface Area | 151 acres |
| Dam Height | 24 feet |
| Size Classification | Small |
| Total Storage Capacity | 1,550 acre-feet |

1.3.3 Impoundment Operations

The Lower AQC Impoundment is operated as a non-discharging impoundment. Intake pumps are used to pump water to the plant for re-use or to the Upper AQC Impoundment to control the water level in the Lower AQC Impoundment. Influent to the Lower AQC Impoundment include stormwater runoff from the CCR Landfill and Upper AQC Impoundment, and the discharge from the station Gypsum Stormwater Runoff Pond.

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

³ Dewberry & Davis, LLC, June 2011, *Coal Combustion Waste Impoundment Round 7 - Dam Assessment Report, La Cygne Generating Station, Bottom Ash Settling, Upper and Lower AQC Ponds, Kansas City Power & Light Company, La Cygne, Kansas*.

1.4 PLAN APPROACH

As part of the Hazard Potential Classification Assessment, SCS completed the following tasks.

1. Reviewed available site information and history pertaining to the Lower AQC 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 Lower AQC 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 embankment of the Lower AQC Impoundment is an engineered/constructed retaining structure that has safely operated for over 40 years. Based on the engineered nature of the structures and the 40-year history, a catastrophic failure is unlikely.

If a failure were to occur, it would most likely occur due to a large storm event that exceeded the capacity of the Lower AQC Impoundment discharge structure or otherwise overtopped the embankment at another location, resulting in the erosion of the embankment and the potential loss of CCR from the storage unit. It is unlikely that a failure would occur without warning signs, given the operational history of the site.

The La Cygne AQC Impoundments are located on the east side of the plant Cooling Water Reservoir as shown in Figure 1. The cooling water discharge channel that is used to direct cooling water into the reservoir, is located along the east side of the reservoir, between the AQC impoundments and the main body of the reservoir. A release of CCR from the Lower AQC Impoundment would flow into the cooling water discharge channel where the water and CCR would mix with the cooling water. The potential release would then have to travel approximately 10,500 feet (~2 miles), to reach the north end of the discharge channel and enter the main body of the Cooling Water Reservoir. From that point, the CCR and water would have to flow approximately 16,000 feet (~3 miles) to the south, to the reservoir spillway, before the CCR could leave the site.

2.2 DOWNSTREAM ENVIRONMENT AND INFRASTRUCTURE

The La Cygne Generating Station is located on the east side of Lake La Cygne, which serves as the Cooling Water Reservoir for the station. The environment downstream of the reservoir is a rural area of Linn County, Kansas. Water from the Cooling Water Reservoir flows approximately 9 miles southwest via North Sugar Creek where the water enters the Marais Des Cygnes River. SCS developed Table 3 below to summarize the downstream environment, which is shown on the aerial photograph in Figure 2.

| Potential Receptor | Approximate Distance From Impoundment |
|---|--|
| Distance to Nearest House | 3.5 miles |
| Distance to Nearest Road | 1.8 miles (Wakefield Road) |
| Distance to Nearest Body of Water | 9 miles (Marais Des Cygnes River) |
| Distance to Nearest Town | 13 Miles (Trading Post, Kansas) |
| Distance to Nearest Affected State Park | >60 Miles (Truman Reservoir) |

2.3 BREACH ANALYSIS

While SCS considers a catastrophic failure unlikely, the Federal Hazard Potential Classification System and the EPA are concerned with the resulting impacts from a catastrophic failure.

As indicated above, a failure of the Lower AQC Impoundment would potentially release water and CCR into the Cooling Water Discharge Channel. During the SCS site visit on September 19, 2016, the water level in the Cooling Water Reservoir was flowing through the notch in the top of the radial gate, approximate elevation 841.5, the approximate maximum operating pool elevation during normal flow conditions. This elevation provides approximately 12.5 feet of freeboard between the water surface and the top of the dam. The volume provided by this freeboard could be used to store water and ash from a catastrophic failure of the Lower AQC Impoundment.

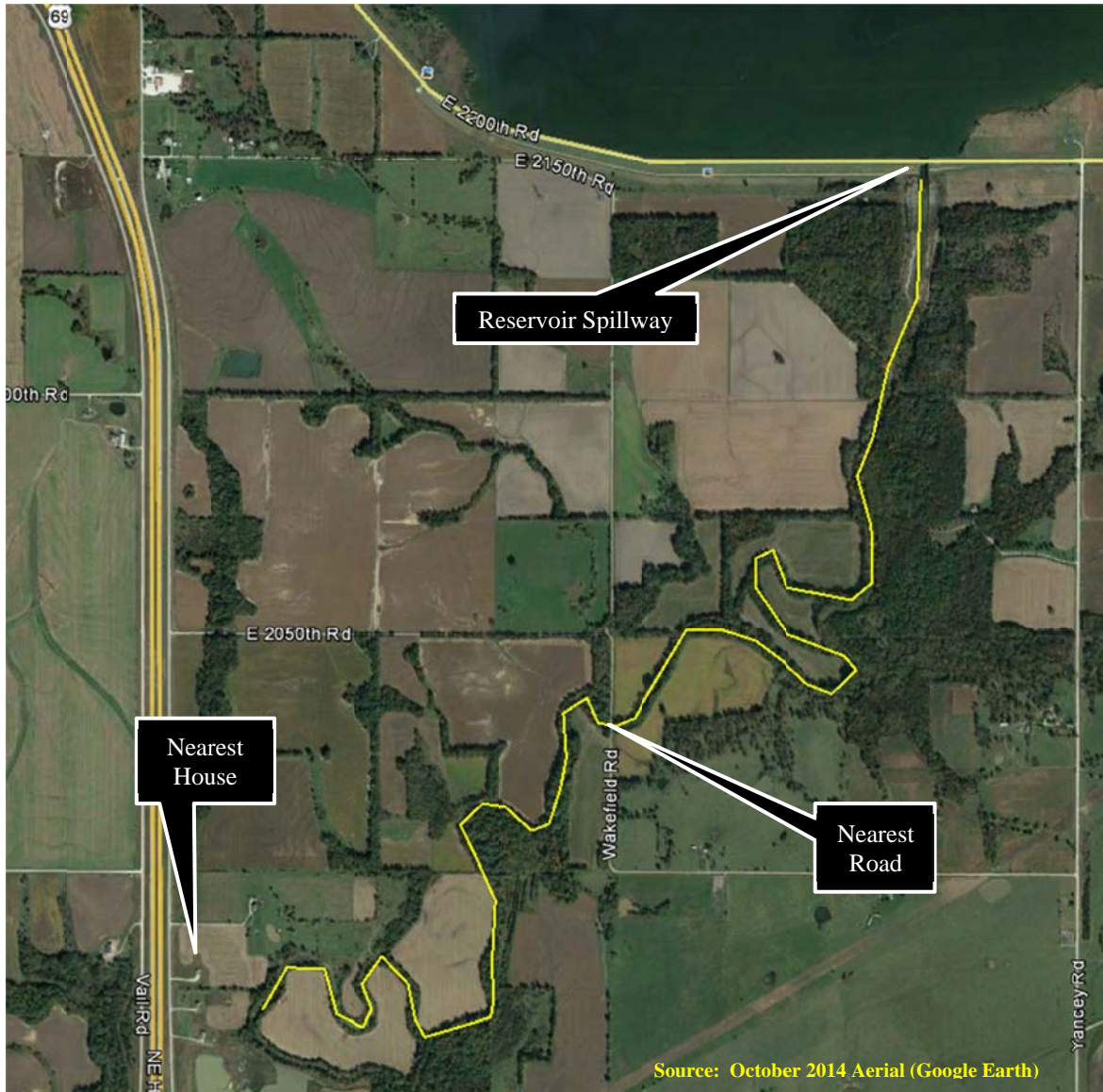
The worst case failure would be a catastrophic failure of the Upper AQC impoundment into the Lower AQC impoundment causing a subsequent catastrophic failure of the Lower AQC impoundment. While most of the water has been removed from the Upper AQC impoundment and is not present to move the CCR waste out of the impoundment, for the breach analysis, SCS assumed the entire volume of the two impoundments was released into the Cooling Water Reservoir.

The surface area of the cooling water reservoir, at the maximum operating level during a design storm event (Elev 847 msl) is 3,350 acres, resulting in more than 23,450 acre-feet of storage between the maximum operating level and the dam crest.

The total storage capacity of the Upper and Lower AQC Impoundments is approximately 7,748 and 1,550 acre-feet, respectively. As the storage capacity of the Cooling Water Reservoir is approximately 2.5 times larger than the total volume of CCR and water storage, SCS has determined the Cooling Water Reservoir will contain a catastrophic release from both of the AQC impoundments.

In the Dewberry Report³ prepared for the EPA, Dewberry staff reviewed a Breach Impact Analysis for the site, prepared by URS and KCP&L, analyzing a catastrophic failure during a maximum precipitation event. The Dewberry report reached the same conclusion as SCS; “Dewberry was able to make the determination that if a catastrophic failure were to happen each AQC Pond would overflow into the La Cygne Generating Station Cooling Water Reservoir. This structure has adequate capacity to absorb the release from a catastrophic failure.”

Figure 2 – Downstream Environment



SECTION 3.0 SCS HAZARD POTENTIAL ASSESSMENT

The 2004 Federal guidelines for dam safety classification system 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.

| Table 4 - FEMA Federal Guidelines for Dam Safety Hazard Classification | | |
|---|---------------------------|--|
| | 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 La Cygne Generating Station Lower AQC 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 property. Based on this assessment, SCS believes the appropriate hazard classification for the La Cygne Generating Station Lower AQC Impoundment is **LOW**. Below is the table summarizing the hazard assessment of the La Cygne Generating Station Lower AQC Impoundment.

| Table 5 - Lower AQC Impoundment Dam Safety Hazard Classification | | |
|---|---------------------------|---------------------------------------|
| | 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 Kansas, and that the initial Hazard Potential Classification Assessment for the Lower AQC Impoundment located at the La Cygne 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.



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Kansas Professional Engineer
License No. 14136

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. United States Army Corps of Engineers, 1979, *Recommended Guidelines for Safety Inspection of Dams ER 1110-2-106*.
3. Dewberry & Davis, LLC, June 2011, *Coal Combustion Waste Impoundment Round 7 - Dam Assessment Report, La Cygne Generating Station, Bottom Ash Settling, Upper and Lower AQC Ponds, Kansas City Power & Light Company, La Cygne, Kansas*.