AECOM

Periodic Structural Stability Assessment Report

Lower AQC Impoundment
La Cygne Generating Station

Evergy Metro, Inc.

October 2021

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Tables

Appendices

1. Introduction

1.1 Purpose

The purpose of this Periodic Structural Stability Assessment Report is to document whether the Lower AQC Impoundment at the Evergy Metro, Inc. (Evergy) La Cygne Generating Station continues to meet the requirements of 40 CFR §257.73(d) of the Coal Combustion Residuals (CCR) Rule[1]. The Lower AQC Impoundment is an existing CCR surface impoundment as defined by 40 CFR §257.53.

1.2 Regulatory Requirements

In accordance with the CCR Rule, this assessment documents whether the design, construction, operation, and maintenance of the Lower AQC Impoundment is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein. The assessment must, at a minimum, document whether the Lower AQC Impoundment has been designed, constructed, operated, and maintained in accordance with 40 CFR §257.73(d) referenced below. The periodic assessment must also identify any structural stability deficiencies associated with the Lower AQC Impoundment in addition to recommending corrective measures. If a deficiency or a release is identified during the periodic assessment, the owner or operator unit must remedy the deficiency or release as soon as feasible and prepare documentation detailing the corrective measures taken.

This Periodic Structural Stability Assessment Report has been completed by October 11, 2021, five years after the Initial Structural Stability Assessment Report. Periodic structural stability assessments shall be prepared every five years. The date of completing the initial assessment is the basis for establishing the deadline to complete the first periodic assessment.

Regulatory Citation: 40 CFR §257.73(d) Periodic structural stability assessments. (1) The owner or operator of the CCR unit must conduct initial and periodic structural stability assessments and document whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein. The assessment must, at a minimum, document whether the CCR unit has been designed, constructed, operated, and maintained with:

(i) Stable foundations and abutments;

(ii) Adequate slope protection to protect against surface erosion, wave action, and adverse effects of sudden drawdown;

(iii) Dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit;

(iv) Vegetated slopes of dikes and surrounding areas not to exceed a height of six inches above the slope of the dike, except for slopes which have an alternate form or forms of slope protection;

(v) A single spillway or a combination of spillways configured as specified in paragraph (d)(1)(v)(A) of this section. The combined capacity of all spillways must be designed, constructed, operated, and maintained to adequately manage flow during and following the peak discharge from the event specified in paragraph (d)(1)(v)(B) of this section.

(A) All spillways must be either:

(1) Of non-erodible construction and designed to carry sustained flows; or

(2) Earth- or grass-lined and designed to carry short-term, infrequent flows at non-erosive velocities where sustained flows are not expected.

(B) The combined capacity of all spillways must adequately manage flow during and following the peak discharge from a:

(1) Probable maximum flood (PMF) for a high hazard potential CCR surface impoundment; or

(2) 1000-year flood for a significant hazard potential CCR surface impoundment; or

(3) 100-year flood for a low hazard potential CCR surface impoundment.

(vi) Hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit that maintain structural integrity and are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation of the hydraulic structure; and

(vii) For CCR units with downstream slopes which can be inundated by the pool of an adjacent water body, such as a river, stream or lake, downstream slopes that maintain structural stability during low pool of the adjacent water body or sudden drawdown of the adjacent water body.

(2) The periodic assessment described in paragraph (d)(1) of this section must identify any structural stability deficiencies associated with the CCR unit in addition to recommending corrective measures. If a deficiency or a release is identified during the periodic assessment, the owner or operator unit must remedy the deficiency or release as soon as feasible and prepare documentation detailing the corrective measures taken.

1.3 Brief Description of Impoundment

The La Cygne Generating Station is a coal-fired power plant located near La Cygne in Linn County, Kansas. The Station is located approximately 6.25 miles east of the city of La Cygne and is bordered to the west by La Cygnes Lake. The Lower AQC Impoundment is located on plant property. A site Location Map showing the area surrounding the station is in Figure 1 of Appendix A. The unit has initiated closure in-place.

1.3.1 Design Operation and Construction

The Lower AQC Impoundment was commissioned in 1973. The Impoundment was constructed with embankments having with an approximate maximum height of 24 feet high and a crest elevation of 864.0 feet[2]. The embankments have approximately 2.5 horizontal to 1.0 vertical side slopes. The impoundment has a water surface area of approximately 56.1 acres at the normal operating elevation of 860.0 feet.

1.3.2 Outlet Structures

The Lower AQC Impoundment is designed as a non-discharge unit. The emergency overflow spillway at the northwest corner of the Lower AQC Impoundment consists of a 120-foot-wide earth embankment with 5 horizontal to 1 vertical side slopes and an existing invert elevation of 862.3 feet. The water from the emergency spillway discharges directly into the discharge canal.

1.4 Assessment Approach

This periodic structural stability assessment was performed to document the design, construction, operation, and maintenance of the impoundment is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein. The analyses used: the Initial Structural Stability Assessment, subsurface information collected from recent and historic subsurface investigations and laboratory testing data; reviews of historical construction[2]; engineering drawings; site inspections by Evergy personnel; inspections of hydraulic structures; and geotechnical evaluations conducted by AECOM[3]. The following sections summarize the evaluations performed and the results from the analyses.

Table 1 cross references 40 CFR §257.73(d) with the assessment section.

Table 1. CCR Rule Cross Reference Table

Report Section	Title	CCR Rule Reference
2.1	Foundations and Abutments	§257.73 (d)(1)(i)
2.2	Slope Protection	§257.73 (d)(1)(ii)
2.3	Dike Compaction	§257.73 (d)(1)(iii)
2.4	Spillways	§257.73 (d)(1)(v)(A) and (B)
2.5	Stability and Structural Integrity of Hydraulic Structures	§257.73 (d)(1)(vi)
2.6	Downstream Slope Inundation/Stability	§257.73 (d)(1)(vii)
2.7	Structural Stability Deficiencies	§257.73 (d)(2)

2. Structural Stability Assessment

Regulatory Citation: 40 CFR §257.73(d)(1); Conduct initial and periodic structural stability assessments and document whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein.

A periodic structural stability assessment has been performed to document that the design, construction, and operation of the Lower AQC Impoundment is consistent with good engineering practices. The results of the structural stability assessment are discussed in the following sections.

2.1 Foundations and Abutments

CCR unit has been designed, constructed, operated, and maintained with stable foundations and abutments.

The stability of the foundations and abutments was evaluated using soil data from field investigations and reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by Evergy personnel. Additionally, slope stability analyses[3] were performed by AECOM to evaluate slip surfaces passing through the foundations and abutments. No changes to the foundation soils of this unit have been made over the past five years.

Based on this evaluation, stable foundations and abutments were designed and constructed at the Lower AQC Impoundment, and operational and maintenance procedures are appropriate to maintain the stable conditions. Therefore, the Lower AQC Impoundment meets the requirements presented in §257.73(d)(1)(i).

2.2 Slope Protection

CCR unit has been designed, constructed, operated, and maintained with adequate slope protection to protect against surface erosion, wave action and adverse effects of sudden drawdown.

The adequacy of slope protection was evaluated by reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by Evergy personal. The downstream slopes of the impoundment cannot be inundated by the pool of an adjacent water body; consequently, the downstream slopes are not subject to sudden drawdown[3].

No significant changes to the slope protection for this unit have been made over the past five years[4]. Based on this evaluation, adequate slope protection is present at the Lower AQC Impoundment, and operational and maintenance procedures are appropriate to protect against surface erosion and wave action. Therefore, the Lower AQC Impoundment meets the requirements in §257.73(d)(1)(ii).

2.3 Dike Compaction

CCR unit has been designed, constructed, operated, and maintained with dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit.

The density of the dike materials was evaluated using soil data from field investigations and reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by Evergy personal. Additionally, slope stability analyses[3] were performed by AECOM to evaluate slip surfaces passing through the dikes over the range of expected loading conditions as defined within the section §257.73.

No significant changes to the dike compaction, design, construction, operation, or maintenance of this unit have been made over the past five years that would detrimentally change the structural stability of this unit[4]. Based on this evaluation, the original design and construction of the Lower AQC Impoundment included sufficient dike compaction. The operational and maintenance procedures at the Lower AQC

Impoundment are appropriate for maintaining compaction of the dikes. Therefore, the Lower AQC Impoundment meets the requirements in §257.73(d)(1)(iii).

2.4 Spillways

CCR unit has been designed, constructed, operated, and maintained with a single spillway or a combination of spillways configured as specified in paragraph (A) and (B):

(A) all spillways must be either: (1) of non-erodible construction and designed to carry sustained flows; or (2) earth- or grass-lined and designed to carry short-term, infrequent flows at non-erosive velocities where sustained flows are not expected;

(B) the combined capacity of all spillways must adequately manage flow during and following the peak discharge from a:

(1) probable maximum flood (PMF) for a high hazard potential CCR surface impoundment
(2) 1000-year flood for a significant hazard potential CCR surface impoundment; or
(3) 100-year flood for a low hazard potential CCR surface impoundment

The spillway was evaluated by reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by Evergy personal. Additionally, hydrologic and hydraulic analyses were completed by Burns & McDonnell to evaluate the capacity of the spillway relative to inflow estimated for the 100-year flood event for the low hazard potential Lower AQC Impoundment[5].

Based on this evaluation, the spillway was designed and constructed from non-erodible material and adequately manage flow during peak discharge conditions resulting from a 100-year flood event. The operational and maintenance procedures at the Lower AQC Impoundment are appropriate for maintaining the functionality of the spillway. Therefore, the Lower AQC Impoundment meets the requirements in §257.73(d)(1)(v)(A) and (B).

2.5 Stability and Structural Integrity of Hydraulic Structures

CCR unit has been designed, constructed, operated, and maintained with hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit that maintain structural integrity and are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation of the hydraulic structure.

The structural stability and integrity of the hydraulic structures were evaluated by reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by Evergy personal.

Based on this evaluation, the spillway was designed and constructed and are operated and maintained in a manner where they are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris. Additionally, the spillway maintains structural integrity during the expected range in loading conditions. Therefore, the Lower AQC Impoundment meets the requirements in §257.73(d)(1)(vi).

2.6 Downstream Slope Inundation/Stability

CCR unit designed, constructed, operated and maintained with, for CCR units with downstream slopes which can be inundated by the pool of an adjacent water body, such as a river, stream or lake, downstream slopes that maintain structural stability during low pool of the adjacent water body or sudden drawdown of the adjacent water body.

The downstream slopes of the Lower AQC Impoundment are not susceptible to inundation by the pool of an adjacent water body. Therefore, the requirements listed in §257.73(d)(1)(vii) are not applicable to the Lower AQC Impoundment.

2.7 Structural Stability Deficiencies

Identify any structural stability deficiencies associated with the CCR unit in addition to recommending corrective measures. If a deficiency or a release is identified during the periodic assessment, the owner or operator unit must remedy the deficiency or release as soon as feasible and prepare documentation detailing the corrective measures taken.

No structural stability deficiencies were identified. Consequently, the Lower AQC Impoundment meets the requirements of §257.73(d)(2), so no corrective actions are required.

3. Limitations

Background information, design basis, and other data have been furnished to AECOM by Evergy, which AECOM has used in preparing this report. 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 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 observed by AECOM or provided by Evergy. 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 Periodic Structural Stability Assessment Report 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.

4. Certification Statement

CCR Unit: Evergy La Cygne Generating Station, Lower AQC Impoundment

I, Jeremy Thomas, being a Registered Professional Engineer in good standing in the State of Kansas, 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 Periodic Structural Stability Assessment Report dated October 8, 2021, which includes all pages in Sections 1 and 2, was conducted in accordance with the requirements of 40 CFR § 257.73(d).

Jeremy Thomas
Printed Name

October 8, 2021
Date

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5. References

1. U.S. Environmental Protection Agency, Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments, 40 CFR §257. Federal Register 80, Subpart D, April 17, 2015.

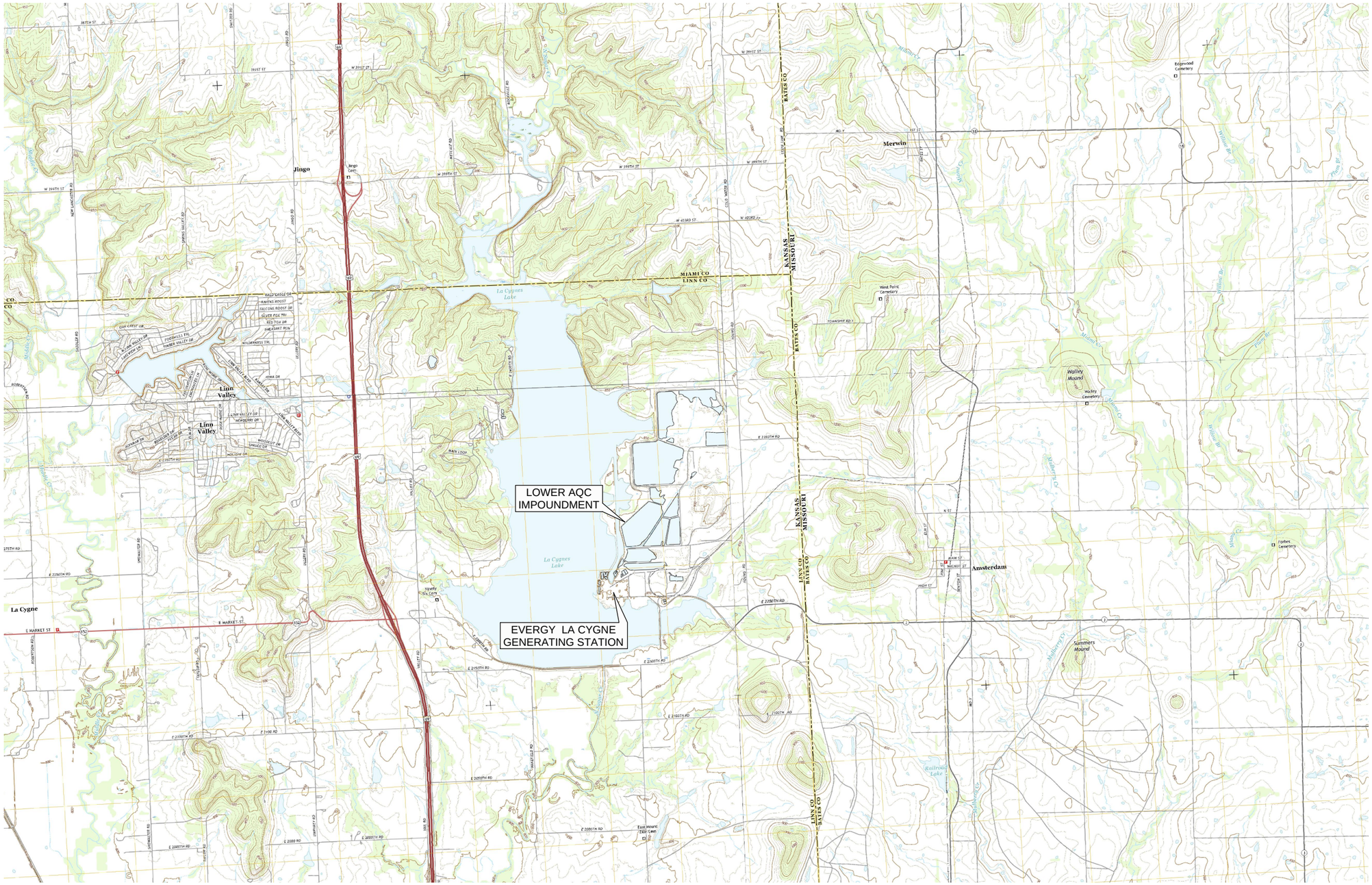
2. AECOM, History of Construction Report, Lower AQC Impoundment, La Cygne Generating Station, Kansas City Power & Light Company, dated October 2016.

3. AECOM, Geotechnical Report, Lower AQC Impoundment, La Cygne Generating Station, Kansas City Power & Light Company, dated October 2016.

4. Burns & McDonnell, CCR Ditch Reroute Issued for Construction Drawings, La Cygne Generating Station, Evergy, dated June 2020.

5. Burns & McDonnel, Periodic Inflow Design Flood Control System Plan, Lower AQC Impoundment, La Cygne Generating Station, Evergy Metro, Inc., dated October 2021.

Appendix A Figures



SOURCE: 2015 USGS 7.5 MINUTE QUADRANGLES: NEW LANCASTER-KS, BIOCURT-KS, AMORET-MO, AND DREXEL-MO.

AECOM 2380 McGee Street, Suite 200 Kansas City, Missouri 64108	EVERGY METRO, INC. RE-CERTIFICATION REPORT - LOWER AQC IMPOUNDMENT	Project Number 60660588	Date AUG. 2021
	LOCATION AND SITE VICINITY MAP	Checked by JMT	Figure No. 1