

# Initial Structural Stability Assessment, Pond E1, Reid Gardner Generating Station

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This technical memorandum contains the initial structural stability assessment for Pond E1, which was performed to satisfy the requirements of §257.73(d) of the U.S. Environmental Protection Agency's Coal Combustion Residuals (CCR) Rule. This initial assessment must be placed in the Station's operating record not later than April 17, 2018 per §257.100(e)(3)(v), §257.73(f)(1) and §257.105(f)(10). Within 30 days of placement, the State Director must be notified as required by §257.106(f)(9) and §257.106(d). Also, within 30 days of placement, the assessment must be placed on a publicly accessible Internet site per §257.107(f)(9) and §257.107(d). The initial assessment must be certified by a qualified professional engineer (§257.73(d)(3)); and per §257.73(f)(3), an assessment must be performed every 5 years starting from the date that this initial assessment is placed in the operating record. Future assessments must meet the same requirements for certification, record keeping, notification, and posting on a publicly accessible Internet site.

This initial structural stability assessment also serves as the second annual professional engineer's impoundment inspection as allowed by §257.83(b)(4)(ii). The first annual professional engineer's inspection was dated July 13, 2017. Because this structural stability assessment serves as the second annual inspection, the deadline for completing the third annual inspection will be one year from the date that this structural stability assessment is placed in the operating record. Future structural stability assessments may also serve as future annual professional engineer's inspections as allowed by the CCR Rule.

## Regulatory Background

Pond E1 is an inactive CCR surface impoundment that no longer contains CCR or a lining system and is currently being closed. A notification of intent to initiate closure was placed in the Station's operating record by December 17, 2015, and posted to the publicly accessible internet site by January 16, 2016 (CH2M, 2015). This notification was prepared to satisfy the early-closure provisions in §257.100 of the CCR Rule. However, on June 14, 2016, the United States District Court of Appeals for the District of Columbia Circuit vacated, or removed, the early-closure provisions in §257.100. On August 5, 2016, the USEPA proposed revisions to §257.100 which required inactive CCR surface impoundments to comply with all requirements applicable to existing CCR surface impoundments, including the requirement for a structural stability assessment per §257.73(d).

Pond E1 was designed, permitted, and constructed prior to the publication of the CCR Rule and in conformance with applicable State regulations. The applicable regulations included water pollution

control regulations (Nevada Administrative Code [NAC] 445A), dam safety regulations (NAC 535), and the Nevada Division of Environmental Protection (NDEP), Bureau of Water Pollution Control's (BWPC) technical guidance documents.

## Operational Background

According to record drawings, Pond E1 was originally constructed with lined earthen embankments (Jacobs, 2018a). The liner system consisted of two layers of high-density polyethylene geomembrane and interstitial leak detection and collection systems. The pond stopped receiving CCR and non-CCR waste on October 14, 2015. Because the pond contained CCR and liquids after October 14, 2015, it met the definition of an inactive CCR surface impoundment per §257.53 of the CCR Rule.

Field closure operations for Pond E1 began in September of 2016. Based on personal visual observations and record surveys, CCR and liner systems were removed from the pond by the end of 2017. The Station is no longer operational and, as a result, can no longer create wastewater. Additionally, the pond has been rendered incapable of receiving wastewater because the inlet and conveyance pipes to Pond E1 have been removed.

## Assessment of Impoundment Design and Construction Documentation

This section contains an assessment of the design and construction documentation for Pond E1, to include addressing the minimum requirements for assessment documentation listed in §257.73(d)(1)(i) thru §257.73(d)(1)(vii). Much of the design and construction documentation is contained in the Construction History for Pond E1 (Jacobs, 2018a), which includes the attachments listed below.

- U.S. Geological Survey topographic map
- Geotechnical Report used for impoundment design
- Record Drawings for closure operations
- A construction quality report
- Area Capacity Curve

### Foundation and Abutment Stability (§257.73(d)(1)(i))

The foundations and abutments of Pond E1 were designed and constructed to be stable according to information referenced in the Construction History for Pond E1, (Jacobs, 2018a). The design geotechnical report for Pond E1 contains foundation preparation recommendations such as clearing, overexcavating, backfilling, and using a geogrid (Converse Consultants, 2002). According to construction quality documents the construction occurred in substantial compliance with those recommendations (Converse Consultants, 2003).

### Slope Protection (§257.73(d)(1)(ii))

Pond E1 has been designed and built with “adequate slope protection to protect against surface erosion, wave action, and adverse effects of sudden drawdown” according to information referenced in the Construction History for Pond E1 (Jacobs, 2018a). The interior embankment slopes no longer require slope protection measures because the ponds are being closed and no longer impound water or CCR. The exterior embankment slopes are a compacted soil with enough coarse-grained particles to resist erosion. The embankment crests are protected by a road with gravel surfacing.

### Compaction (§257.73(d)(1)(iii))

Pond E1 was designed and constructed with sufficient mechanical compaction to “withstand the range of loading conditions in the CCR unit” according to the information referenced in the Construction History for Pond E1 (Jacobs, 2018a). The embankment material properties and construction methods for Pond E1 are recommended in the design geotechnical report (Converse Consultants, 2002). According to

construction quality documents the embankments were prepared in substantial compliance with those recommendations (Converse Consultants, 2003).

#### **Vegetated Slopes (§257.73(d)(1)(iv))**

The requirement for vegetated slopes does not apply to Pond E1. The interior embankment slopes no longer require vegetation or other slope protection measures because the ponds are being closed and they no longer impound water or CCR (Jacobs, 2018a). The exterior embankment slopes are protected by a compacted soil with enough coarse-grained particles to resist erosion. The embankment crests are protected by a road with gravel surfacing.

#### **Spillway (§257.73(d)(1)(v))**

Pond E1 was constructed without spillways as allowed by State dam regulations (NAC 535.240) and as described in State dam safety guidelines published by from the Nevada Division of Water Resources (State of Nevada, 2018). The guidelines state that “most effluent, process fluid and tailing impoundments are exempt from having a spillway, however, there must be diversion channels to route flood flows around the structure and/or sufficient freeboard designed into the structure to accommodate the required precipitation event.”

In order to meet the requirements of §257.73(d)(1)(v)(B) and §257.73(d)(1)(v)(B)(3) of the CCR Rule, “the combined capacity of all spillways [for Pond E1] must adequately manage flow during and following the peak discharge from a 100-year flood.” The 100-year event is relevant because the pond has been classified as having a low hazard potential (Jacobs, 2018b). The pond meets this CCR Rule requirement without using a spillway because the volumetric impoundment capacity in the pond far exceeds the volume of direct precipitation that would fall in the pond during a 100-year event (CH2M, 2016). In addition, calculations in the Inflow Design Flood Control System Plan (Jacobs, 2018c) demonstrate that flow will not enter the ponds from the 100-year flood.

#### **Hydraulic Structures (§257.73(d)(1)(vi))**

There are no hydraulic structures passing through the embankments or underlying the base of the pond.

#### **Stability of Wet Downstream Slope (§257.73(d)(1)(vii))**

Based on personal observations, the exterior side slopes of Pond E1 are stable under the rapid drawdown scenario. In 2014 the exterior side slopes were inundated by two 100+ year floods from the nearby Muddy River within a 60-day period, and they showed no signs of instability, movement, nor erosion as and after the water receded. And because the ponds are now empty, their ability to resist failure under rapid drawdown condition is even greater.

### **Impoundment Inspection**

Nathan Betts, a qualified Nevada-registered professional engineer employed by Jacobs, inspected Pond E1 on April 3, 2018. The inspection included a review of available information, a visual inspection of the impoundments, a visual inspection of hydraulic structures, and discussions with Station personnel. This section of the assessment is organized to be consistent with §257.83(b) of the CCR Rule.

#### **Available Information**

The information available regarding the status and condition of Pond E1 was reviewed on and before April 3, 2018. No discrepancies, deficiencies, or significant items were found during the review of available information. Information from the operating record and other sources was reviewed as part of this inspection, including the following items:

- The previous annual impoundment inspection (document dated July 13, 2017)
- Record Drawings for the Ponds BE Solids Removal Project (CH2M, 2018).

### Visual Inspection of CCR Units

Pond E1 was visually inspected on the morning of April 3, 2018. The inspection occurred in sunny, calm conditions with temperatures between 46 to 51 degrees Fahrenheit, 18 to 22 percent humidity, and a barometric pressure of 30.01 to 30.07 inches.<sup>1</sup>

No signs of distress or malfunctions were observed during the visual inspection of Pond E1.

### Visual Inspection of Hydraulic Structures

There are no hydraulic structures passing through the embankments or underlying the base of the pond.

### Changes in Geometry

Based on visual inspection and comparisons with the record drawings and the previous annual impoundment inspection report, there have been no changes in the geometry of Pond E1.

### Instrumentation

There is no instrumentation at Pond E1.

### Approximate Impounded Water Levels

Pond E1 was empty at the time of inspection and has not impounded water since the last inspection.

### Storage Capacity

Pond E1 is empty and has adequate capacity to impound direct precipitation. However, the pond has no capacity for impounding CCR nor other wastewater streams because the bottom liner has been removed as part of the field closure activities that began in September 2016.

### Approximate Volume of CCR

Pond E1 was empty at the time of inspection and has not impounded CCR since the last inspection.

### Structural Weaknesses

No actual or potential structural weaknesses were observed during the visual inspection of Pond E1. Also, no conditions were observed that were disrupting or have the potential to disrupt the operation and safety of the ponds and appurtenant structures.

### Changes

No changes were identified and no changes were identified that may affect the stability or operation of the ponds.

### Structural Deficiencies and Corrective Measures

This section describes structural stability deficiencies and recommended corrective measures as required by §257.73(d)(2). No structural stability deficiencies were identified as part of this assessment.

### Closing

Based on the records review and observations made during the inspection, the operations and maintenance of the ponds is “consistent with generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein” (§257.73(d)(1)). The operations and maintenance is also consistent with the original pond design. No signs of “significant

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<sup>1</sup> Data for the St. George Airport per Weather Underground website, [https://www.wunderground.com/history/airport/KSGU/2018/4/3/DailyHistory.html?req\\_city=Mesquite&req\\_state=NV&req\\_statename=Nevada&reqdb.zip=89024&reqdb.magic=1&reqdb.wmo=99999](https://www.wunderground.com/history/airport/KSGU/2018/4/3/DailyHistory.html?req_city=Mesquite&req_state=NV&req_statename=Nevada&reqdb.zip=89024&reqdb.magic=1&reqdb.wmo=99999), accessed on April 11, 2018.

deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation” of hydraulic structures was observed (§257.73(d)(1)(vi)). In addition, no signs of distress or malfunctions were observed during the site visit. No corrective actions are recommended at this time.

## Certification

This section contains the written certification by a qualified professional engineer as required by §257.73(d)(3) of the CCR Rule.

This initial structural stability assessment was conducted in accordance with the requirements of §257.73(d) of the CCR Rule.

## References

ASTM International. 2012. *D 698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> ((600 kN-m/m<sup>3</sup>))*. January.

CH2M. 2015. *Notification of Intent to Initiate Closure, Pond E1, Reid Gardner Generating Station*. December 14.

CH2M. 2016. *Ponds BE Solids Removal Design Report*. Application for Decommission, Breach, or Removal of a Dam. June 9.

CH2M. 2018. Extract from *Drawings for the Ponds B-E Solids Removal Project, Reid Gardner Station, Moapa, Nevada*. Record Drawings. February 27.

Converse Consultants. 2002. *Geotechnical Investigation, Retrofit of Ponds D & E, Nevada Power Company, Reid Gardner Station, Clark County, Nevada*. Converse Project No. 99-33111-08. May 17.

Converse Consultants. 2003. *Final Grading and Quality Assurance/Quality Control Report, Reconstruction of Ponds D & E, Reid Gardner Station, Clark County, Nevada*. Converse Project No. 99-33111-12. December 24.

Jacobs. 2018a. *Construction History, Pond E1, Reid Gardner Generating Station*. Technical Memorandum. April 11.

Jacobs. 2018b. *Initial Hazard Potential Classification Assessment, Pond E1, Reid Gardner Generating Station*. Technical Memorandum. April 13.

Jacobs. 2018c. *Inflow Design Flood Control System Plan, Pond E1, Reid Gardner Generating Station*. Report. April 13.

State of Nevada. 2018. *Dam Safety Guidelines – Spillway Design website*. <http://water.nv.gov/DamSpillwayDesign.aspx>. Division of Water Resources Dam Safety Program. Last updated February 14.