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CLECO POWER LLC DOLET HILLS POWER STATION



STRUCTURAL STABILITY ASSESSMENT:

ASH BASIN No. 1

Prepared By:

**Providence Engineering and
Environmental Group LLC**

1201 Main Street

Baton Rouge, Louisiana 70802

(225) 766-7400

www.providenceeng.com

Project Number 002-185



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1.0 INTRODUCTION

Providence was contracted by Cleco Power LLC (Cleco) to conduct a structural stability assessment of Ash Basin No. 1 at Cleco's Dolet Hills Power Station. Recent Coal Combustion Residual (CCR) regulations at 40 CFR 257.73(d)(1) established requirements for owners and operators to conduct a structural stability assessment by a qualified professional engineer to document whether the design, construction, operation and maintenance is consistent with recognized and generally accepted good engineering practices. This assessment must, at a minimum, document whether the CCR unit has been designed, constructed, operated, and maintained with:

- Stable foundations and abutments.
- Adequate slope protection to protect against surface erosion, wave action, and adverse effects of sudden drawdown.
- Dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit.
- A single spillway or a combination of spillways designed, operated, and maintained to adequately manage flow during a 100-year flood for a low hazard potential CCR surface impoundment.
- 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.
- 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 must maintain structural stability during low pool of the adjacent water body or sudden drawdown of the adjacent water body.

The Cleco Dolet Hills Power Station is located approximately 8 miles southeast of Mansfield, DeSoto Parish, LA. A site location map showing the Dolet Hills Power Station is included as **Figure 1**.

This structural stability assessment pertains to Ash Basin No. 1 utilized for the Unit 1 coal-fired generation unit. A site map for Ash Basin No. 1 is included as **Figure 2**. Providence reviewed the construction drawings and operational plan, and reviewed the inspection and maintenance procedures with Cleco for Ash Basin No. 1.

2.0 STRUCTURAL STABILITY

Stable Foundations and Abutments

Providence modeled a short-term slope stability analysis for the pond using a scenario where the facility allows the pond to fill to the freeboard level for Ash Basin No. 1. This scenario represents the flood/heavy rainfall conditions. The new

elevation was determined using 2.5 feet of freeboard from the lowest levee crown elevation for this pond.

Based on the results of the slope stability analysis, the following minimum factors of safety were obtained:

Table 1 Short-Term Factor of Safety

Surface Impoundment	Section Number	Soil Boring No.	Water Elevation (feet NAVD 88)	Analysis	Factor of Safety
Ash Basin No. 1	Section 1	B-1	251.5	Spencer Method Circular Failure	2.78

The calculated short-term static factor of safety under maximum surcharge pool loading conditions is greater than 1.40, therefore the safety factor is adequate.

The normal operating water level in Ash Basin No. 1 ranges from 230 to 330 feet NAVD 88. These levels are significantly lower than the modeled flooded/heavy rainfall conditions.

The interior and exterior slopes of the perimeter levees are on a three horizontal to one vertical and were compacted during the construction of the levees.

Adequate Slope Protection to Protect Against Surface Erosion, Wave Action, and Adverse Effects of Sudden Drawdown

The levees have adequate slope protection against surface erosion, wave action, and adverse effects of a sudden drawdown. The levees have a minimum three-foot thick layer of clay on the interior, exterior, and crest of the levee. Vegetation is adequate on the top of the levee where it may be exposed to the elements. As part of Cleco’s operational plan, they inspect the levees weekly for any erosion due to weather, animals, or other elements and promptly correct any deficiencies.

Dikes Mechanically Compacted to a Density Sufficient to Withstand the Range of Loading Conditions in the CCR Unit

The dikes were mechanically compacted to a density sufficient to withstand the range of loading conditions for the daily operation of the unit.

A Single Spillway or a Combination of Spillways Designed, Operated, and Maintained to Adequately Manage Flow During a 100-Year Flood for a Low Hazard Potential CCR Surface Impoundment

Ash Basin No. 1 captures and retains rainfall runoff from drainage areas upstream of the basin dike. Ash Basin No. 1 is provided with a weir box and an auxiliary spillway. Normally, runoff from the drainage area of Ash Basin No. 1 is captured in the basin, mixed with sluice water, and drained at a slow rate via the weir box.

Because the drainage area of the Ash Basin No. 1 is large, an auxiliary spillway is provided for the basin to protect against overflow of the dikes during a period of high runoff when the basin has ash at the high ash elevation level. The crest elevation of the auxiliary spillway is set so that overflow of the spillway will not occur for runoffs equal to or less than the 50-year, 24-hour runoff. The spillway is designed to discharge excess rainfall due to a 100-year, 24-hour rainfall event occurring with the basin at a maximum operating water level. The elevation of the top of the dike for the Ash Basin No.1 was selected to provide 2 feet of interior freeboard above the maximum 100-year rainfall event water level.

The clear water that is discharged is pumped back or recirculated to the plant by the ash recirculation pumps and used again to sluice ash.

The Natural Resource Conservation Service (NRCS) Technical Release-55 (TR-55) rain distribution for a 100-year, 24-hour rain event would cause a precipitation depth of 10.5 inches. Based on the operating water levels and the discharge system in the pond, the facility would adequately manage the rainfall for a 100-year flood event.

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

As part of the structural evaluation, Providence was asked to determine the presence of any culverts or pipes buried in the levees of the Ash Basin No. 1. Based on the survey of the pond levees, several site inspections, review of solid waste permit files, and discussions with Cleco personnel, Providence determined that the following culverts/pipes exist within the levees surrounding the Ash Basin No. 1:

- 36" corrugated metal pipe that drains the Ash Basin No. 1.
- 4" HDPE pipe that runs from the sanitary sewer system to the Ash Basin No. 1.
- 4" carbon steel pipe for the previously operated sanitary sewer line that was cut and capped at both ends and left in place along the western levee of Ash Basin No. 1.
- 4" carbon steel pipe for the high pressure service water line was cut and capped at both ends and left in place in several locations along the western levee of Ash Basin No. 1.
- 12" HDPE Bottom Ash Sump Line was cut and left in place in several locations along the western levee of Ash Basin No. 1 along the crest. The HDPE pipe was capped off and replaced with a steel pipe above ground.

These drain pipes are in satisfactory condition and do not pose a threat to the levee system. These pipes have maintained their structural integrity and are free from

significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris. None of the known pipes lead to offsite locations on the surface or to public drainage systems or waterways or pose any significant risks to Cleco as a result of their operation.

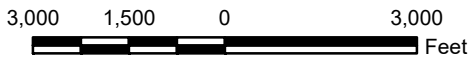
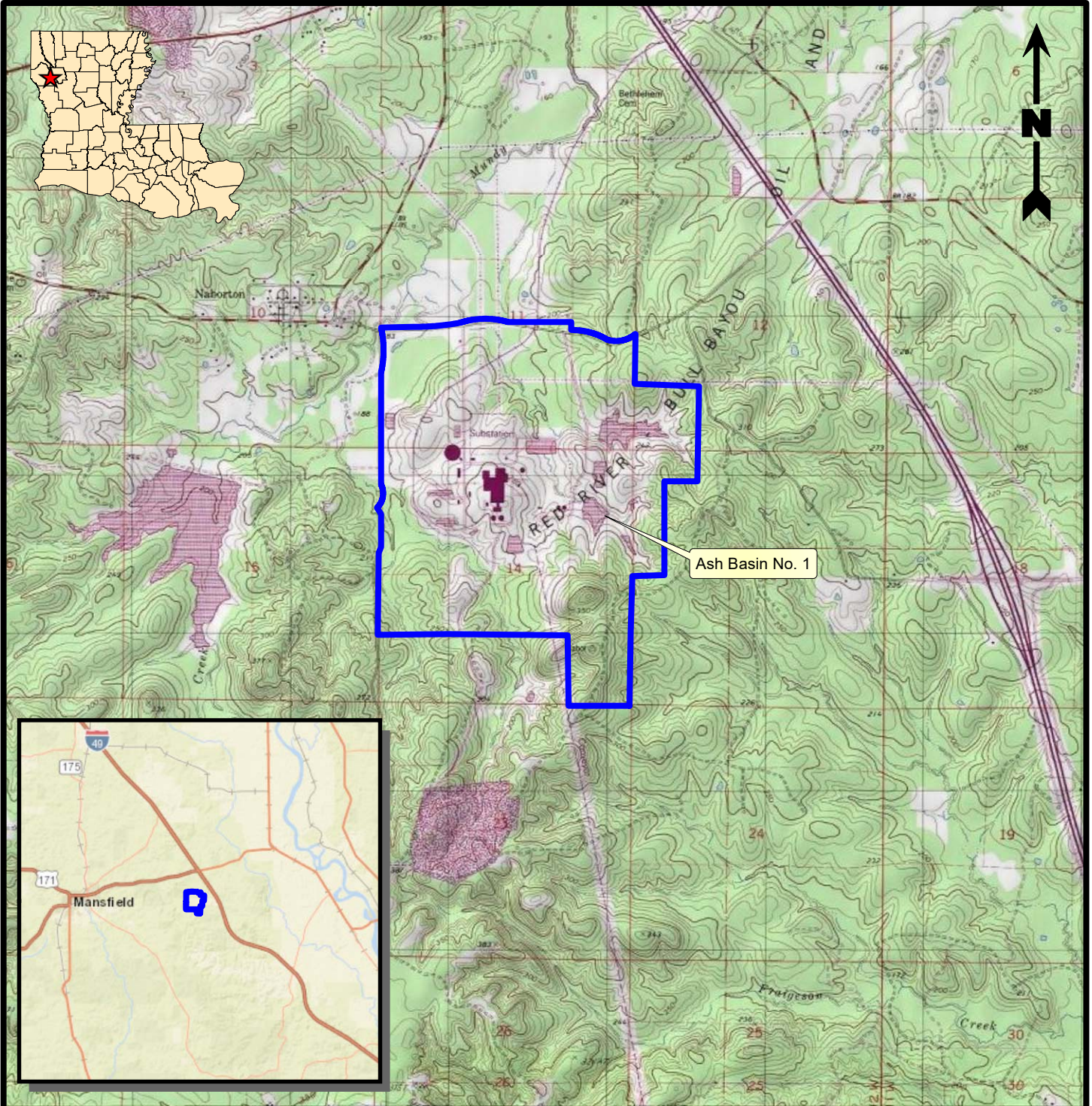
For CCR Units with Downstream Slopes Which Can Be Inundated by the Pool of an Adjacent Water Body, such as a River, Stream or Lake, Downstream Slopes that Maintain Structural Stability During Low Pool of the Adjacent Water Body or Sudden Drawdown of the Adjacent Water Body

The levees do not get inundated by surface waters from adjacent features.


3.0 CONCLUSION

Based on the results from the structural stability assessment, Ash Basin No. 1's design, construction, operation and maintenance is consistent with recognized and generally accepted good engineering practices. Ash Basin No. 1 meets the requirements at 257.73(d)(1) of the CCR regulations. **Appendix A** contains a P.E. Certification that attests to this assessment.

FIGURE 1
SITE LOCATION MAP



Legend

 Facility Boundary

Reference

Base map comprised of U.S.G.S. 7.5 minute topographic maps, "Lena, LA", "Boyce, LA", "Jericho, LA", and "Gardner, LA".

Site Location Map

Structural Stability Assessment - Ash Basin No. 1
Mansfield, DeSoto Parish, Louisiana

Cleco Power LLC
Dolet Hills Power Station



PROVIDENCE


Drawn By	LMM	10/04/16
Checked By	LMH	10/04/16
Approved By	CVH	10/04/16

Project Number	002-185	1 Figure
Drawing Number	002-185-A022	

FIGURE 2
SITE MAP

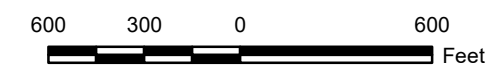


Legend

 Facility Boundary

Reference

Base map comprised of Google Earth aerial imagery from 11/06/12.



Site Map

Structural Stability Assessment - Ash Basin No. 1
Mansfield, DeSoto Parish, Louisiana

Cleco Power LLC
Dolet Hills Power Station



Drawn By	LMM	10/04/16
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Project Number		2 Figure
002-185		
Drawing Number		
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APPENDIX A
P.E. CERTIFICATION

**CLECO BRAME ENERGY CENTER
ASH BASIN NO. 1
CCR STRUCTURAL STABILITY ASSESSMENT**

PROFESSIONAL ENGINEER CERTIFICATION

I hereby certify that I have performed a structural stability assessment for Cleco's Dolet Hills Power Station Ash Basin No. 1 in accordance with the 40 CFR 257.73(d)(1) CCR requirements. This structural stability assessment has determined that Ash Basin No. 1's design, construction, operation and maintenance is consistent with recognized and generally accepted good engineering practices. It has been designed, constructed, operated, and maintained with:

- Stable foundations and abutments.
- Adequate slope protection to protect against surface erosion, wave action, and adverse effects of sudden drawdown.
- Dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit.
- A single spillway or a combination of spillways designed, operated, and maintained to adequately manage rainfall during a 100-year flood for a low hazard potential CCR surface impoundment.
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James C. Van Hoof

Name

24630

Registration No.

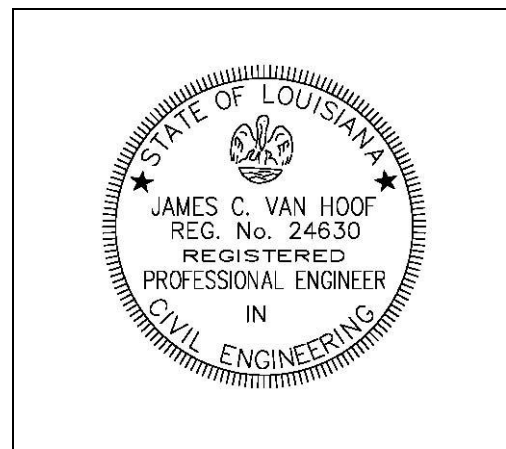
LA

State

Signature

10/16/16

Date



(Seal)