COLETO CREEK POWER, LLC
Fannin, Texas

COAL COMBUSTION RESIDUALS
PRIMARY ASH POND
PERIODIC HAZARD POTENTIAL
CLASSIFICATION ASSESSMENT
5-Year Periodic Update

COLETO CREEK POWER PLANT
FANNIN, TEXAS

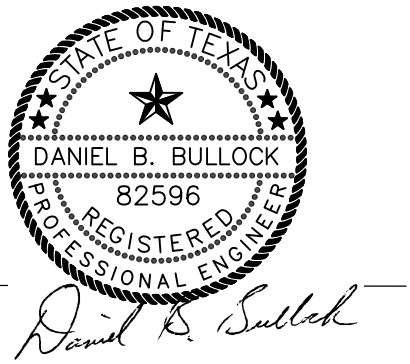
October 11, 2021

Bullock, Bennett & Associates, LLC
Engineering and Geoscience
Registrations: Engineering F-8542, Geoscience 50127
www.bbaengineering.com

Certification Statement 40 C.F.R. § 257.73(a) and 30 T.A.C. § 352.731- Hazard Potential Classification Assessment

CCR Unit: Coleto Creek Power, LLC; Coleto Creek Power Plant; Coleto Creek Primary Ash Pond

I, Daniel Bullock, being a Registered Professional Engineer in good standing in the State of Texas, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this assessment report has been prepared in accordance with the accepted practice of engineering. I certify, for the above referenced CCR Unit, that the information contained in the Hazard Potential Classification Assessment, dated October 11, 2021, meets the requirements of 40 C.F.R. § 257.73(a) and 30 T.A.C. § 352.731.



Daniel B. Bullock, P.E. (TX 82596)

10-11-2021

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1.0 INTRODUCTION

Coleto Creek Power Plant is located at 45 FM 2987 just outside the city of Fannin in Goliad County, Texas. The power plant consists of one coal-fired boiler. Bottom ash and fly ash, or coal combustion residuals (CCR), generated in the boiler are either shipped off-site for beneficial re-use or managed in an on-site CCR surface impoundment (Coleto Creek Primary Ash Pond). Figures 1 and 2 provide site location maps showing the Primary Ash Pond configuration.

In April 2015, the Environmental Protection Agency (EPA) promulgated rules (40 C.F.R. Part 257, Subpart D) to address potential risks associated with operating CCR surface impoundments at coal-fired power plants. The State of Texas subsequently codified 30 T.A.C. Chapter 352, which incorporated 40 C.F.R. §257 by reference, to address CCR management in surface impoundments and landfills. This report has been prepared to specifically address the requirements for periodic Hazard Potential Classification Assessments to be performed every 5 years as identified in 40 C.F.R. § 257.73(a)(2) and 30 T.A.C. § 352.731.

2.0 PERIODIC HAZARD POTENTIAL CLASSIFICATION ASSESSMENT

According to 30 T.A.C. § 352.731 and 40 C.F.R. § 257.73(a)(2) by reference, the owner and operator of a CCR surface impoundment must assign a hazard potential classification to each operating unit. For the purposes of the CCR rule, hazard potential classification means "the possible adverse incremental consequences that result from the release of water or stored contents due to failure of the diked CCR surface impoundment or mis-operation of the diked CCR surface impoundment or its appurtenances." The impoundment must be classified as high hazard, significant hazard, or low hazard. Each hazard potential classification is defined as follows under § 257.53:

1) *High hazard potential CCR surface impoundment* means a diked surface impoundment where failure or mis-operation will probably cause loss of human life.

2) *Low hazard potential CCR surface impoundment* means a diked surface impoundment where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the surface impoundment owner's property.

3) *Significant hazard potential CCR surface impoundment* means a diked surface impoundment where failure or mis-operation results in no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns.

In 2010 the United States Environmental Protection Agency (USEPA) contracted CDM to perform a site assessment of the Primary Ash Pond at the Coleto Creek Power Plant. As part of the assessment, CDM assigned the pond with a Low Hazard classification (CDM, 2011).

Subsequent to the CDM report findings, AECOM was contracted by the plant to perform geotechnical studies to further evaluate the structural stability of the CCR surface impoundments. AECOM implemented a subsurface investigation and performed a geotechnical stability evaluation, a liquefaction assessment, and hydraulic analysis. AECOM also performed an independent hazard assessment of the Primary Ash Pond and Secondary Pond. The results of that assessment supported the initial CDM classification of Low Hazard. The initial Potential Hazard Class assessment performed in 2016 in accordance with the federal CCR rules also concluded that the Primary Ash Pond is a Low Hazard surface impoundment (BBA, 2018).

2.1 Dam Breach Analysis

The Coleto Creek Primary Ash Pond is the only CCR-regulated surface impoundment at the Coleto Creek Power Plant and is therefore subject to the Hazard Potential Classification Assessment under the CCR rules. Because the Primary Ash Pond is hydraulically connected to, and is separated by a dike system from, the Secondary Pond, it is necessary to include the Secondary Pond when evaluating potential failure scenarios as noted below. Although the Secondary Pond is not a CCR-regulated unit, it is subject to operational and safety standards established by the Texas Commission on Environmental Quality (TCEQ) in its Dam Safety rules (30 T.A.C. Part 1 Chapter 299).

Bullock, Bennett & Associates (BBA) performed a dam breach analysis of the Primary Ash Pond and Secondary Pond to support the loss of life, and environmental and economic impact analyses. The Primary Ash Pond and Secondary Pond combined have a maximum storage capacity of approximately 4,000 acre-ft and a maximum dike height for the Secondary Pond of approximately 39 feet above adjacent lake level of 101 feet MSL. Construction was completed in 1978 and the effective water storage capacity in the Primary Ash Pond has diminished with the placement of CCR over time. According to topography and bathymetric survey data collected in August 2021, the water storage capacity in the Primary Ash Pond has been reduced to approximately 1,390 acre-ft at the maximum dike crest height while the water capacity of the Secondary Pond is estimated at 200 acre-ft.

The Primary Ash Pond and Secondary Pond are located next to the Coleto Creek Reservoir which was constructed to serve as a cooling pond for the Power Plant. The reservoir is divided into a “hot” side and a “cool” side. The ponds are located immediately adjacent to the hot side of the lake. The hot side of the lake is created from Sulphur Creek behind Dike No. 1 (Dike No. 1 Lake) which is connected to Turkey Creek behind Dike No. 2 (Dike No. 2 Lake) by a secondary flume. Water from these lakes then flows into Main Lake which is the cool side. Decant water from the Secondary Pond can be combined with other plant water then routed through TCEQ-approved Outfall 003 to the hot side of the lake. Cool water is pumped into the Power Plant from the Main Lake.

GBRA provided area-capacity tables for the Coleto Creek Reservoir and Dike Lake Nos. 1 and 2. These tables are presented as attachments in Appendix A. Dike No. 1 Lake consists of

approximately 164 acres at the normal operating elevation of 101 feet MSL. Dike No. 2 Lake is approximately 429 acres at the normal operating elevation of 101 feet MSL. The two Dike Lakes are separated from Coleto Creek Reservoir by splitter dikes with an approximate elevation of 102 feet MSL (GBRA, 2016). Coleto Creek Reservoir covers an area of approximately 2,652 acres at a normal operating elevation of 98 feet MSL (GBRA, 2016). Coleto Creek Power, LLC reportedly controls the lake up to an elevation of 104 feet MSL. An area map showing the relative locations of the Primary Ash Pond, Secondary Pond, Dike Lakes, and Coleto Creek Reservoir is presented as Figure 1.

For the purposes of this evaluation, a conservatively worst-case dam breach scenario was developed assuming that the breach was due to overtopping of the surface impoundment dikes and that the breach occurs in the shared Primary Ash Pond and Secondary Pond dike and subsequently in the Secondary Pond dike adjacent to Coleto Creek Reservoir, releasing the entire water contents of both ponds. This scenario allows for the greatest quantity of pond decant water to be released.

An evaluation of potential water and residual solids flow paths was performed to support the loss of life, environmental, and economic evaluations. Surface elevation cross-sections assembled from Google Earth™ profiles of the areas adjacent to the pond dikes were reviewed to estimate the potential flow path of the released water and solids. As shown in Figure 1, the wet side of the ponds are bound by the Evaporation Pond followed by Dike No. 1 Lake on the north-northwest, Dike No. 1 Lake on the northeast corner, and the primary plant discharge flume on the east. The surface elevation of the terrain that bounds the east side of the discharge flume appears to extend to approximately elevation 132 feet. The flume channel, therefore, appears to be located within a larger basin bounded to the west by the Primary Ash Pond and Secondary Pond dikes (approximate elevation 140 feet) and to the east by land mass (approximate elevation 132 feet). The distance between the dike on the west side of the basin and land mass high points on the east side appears to be approximately 300 feet. The flume channel and basin would route flow from an east-side breach of the dike to the hot side of the lake. Released water and solids, therefore, would initially flow to the hot side of the lake regardless of the location of the breach. From there, water levels would increase one foot (the amount of available freeboard behind Dike No. 1 and Dike No. 2 lakes) then flow into the Main Lake. Eventually all water would be released into the Main Lake.

Using the tables provided by GBRA, a one-foot increase in the Main Lake elevation requires an additional approximately 2,720 acre-feet of water. The estimated maximum volume of discharge from the Primary Ash Pond and Secondary Pond is approximately 1,590 acre-feet of water, resulting in a water surface elevation change on the reservoir of approximately seven inches. A seven-inch change in water surface elevation is considered to be nominal and would not result in the loss of major infrastructure elements or disrupt lifeline facilities.

2.2 Loss of Life Evaluation

The Primary Ash Pond and Secondary Pond are located apart from the active industrial areas of the Power Plant. Two fly-ash silos are located adjacent to the southwest border of the Primary Ash Pond and loading of trucks for off-site transport and beneficial reuse of the fly ash regularly occurs at this location. These silos and truck loading operations are adjacent to the southwest limits of the Primary Ash Pond, which is filled with dry and compact CCRs, and any catastrophic failure of the impoundment in this area is unlikely. If a failure were to occur, it would probably be located on the "wet" side of the pond, including the northern or eastern dikes for both the Primary Ash Pond and Secondary Pond (see Figure 1). There are no regular or active plant operations that occur downstream of those areas where personnel would be expected to be present in the event of a catastrophic failure of the dike. There are no residences or other off-site manned operations immediately downstream of the ponds. As noted in Section 2.1 the Dike 1, Dike 2, and Main Lakes would absorb the released water and raise reservoir levels a nominal amount (less than a foot). Loss of life in the event of a catastrophic failure of the surface impoundment dike system, therefore, is considered to be improbable.

2.3 Economic and/or Environmental Loss Evaluation

Additional consideration was given to the impacts of the water quality from a large volume discharge from Primary Ash Pond and Secondary Pond into the Coleto Creek Reservoir. Using the volume ratio of pond water (approximately 1,590 acre-feet) that could potentially be discharged into the Coleto Creek Reservoir to the existing volume of water in the reservoir (approx. 31,280 acre-feet at elevation 98 feet msl), the impacts to the water quality are minimal (31,280 acre-feet/1,590 acre-feet = ~20 dilution factor of analytes in the Primary Ash Pond water). Discharge of Secondary Pond water is currently allowed to the Coleto Creek Reservoir under Permit No. WQ002159000 (TCEQ, 2010).

Currently, the coal combustion by-products are sluiced into the Primary Ash Pond. The assumed ratio of solids-to-water is approximated at 20%-to-80%. The solids settle out of solution and the water decants to the surface. As the solids settle out of solution, they consolidate. Additionally, based on field observations the ash "sets up" similar to cement, becoming very hard and massive. The expected flow of any unconsolidated solids from the Primary Ash Pond is believed to be minimal.

For the sake of conservatism, it is assumed that a volume of ash equivalent to six months of production (assuming no recycling) is disposed in the Primary Ash Pond that may not be consolidated and may flow should a breach occur. Under these assumptions, there is potential for approximately 45,000 cubic yards (approximately 28 acre-feet) of ash flow. The ash volume would be in solution with the decant water, displacing an equal volume of the decant water. This ash would be expected to be contained within the hot side of the lake. Impacts would therefore be primarily limited to the owner's property.

2.4 Hazard Potential Classification

Based on a review of previous studies, analytical data, ash production/recycling volumes, available impoundment capacities, available lake capacities, observed current conditions at the site, assumptions, and other factors, the Coleto Creek Primary Ash Pond is classified as a Low Hazard Potential impoundment.

3.0 REFERENCES

Bullock Bennett & Associates, LLC (BBA). (2018). *Coal Combustion Residuals Surface Impoundment History of Construction and Initial Hazard Potential Assessment, Structural Integrity Assessment, and Safety Factor Assessment (Rev. 1).*

CDM. (March 2011). *Assessment of Dam Safety of Coal Combustion Surface Impoundments Coleto LP, LLC Coleto Creek Power, LP.*

GBRA. (2013). *Coleto Creek Watershed River Secments, Descriptions and Concerns.* (G.-B. R. Authority, Ed.) Retrieved from Guadalupe-Blanco River Authority Web site: http://www.gbra.org/documents/publications/basinsummary/2013j.pdf

TCEQ. (January 2007). *Hydrologic and Hydraulic Guidelines for Dams in Texas.* Dam Safety Program, Texas Commission on Environmental Quality.

FIGURES

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APPROXIMATE SCALE: 1" = 3000'

0 750 1500 3000

SOURCE: AERIAL PHOTO PROVIDED BY BING, PHOTO TAKEN 2021.

STATE OF TEXAS
DANIEL B. BULLOCK
82596
REGISTERED
PROFESSIONAL ENGINEER

10-11-2021

Coleto Creek Power, LLC

Figure 1

SITE LOCATION MAP

PROJECT: 21424-1	BY: RCAD-RR	DATE: OCT 2021	CHECKED: DBB

Bullock, Bennett & Associates, LLC
Engineering and Geoscience
Texas Registrations: Engineering F-8542, Geoscience 50127

Plot Date: 10/11/21 - 1:23pm, Plotted by: Admin
Drawing Path: K:\clients\bba\Coleto Ck\21424-1\, Drawing Name: C-ST-PL103.dwg

N

APPROXIMATE SCALE: 1" = 1000'

0 500 1000 2000

SOURCE: AERIAL PHOTO PROVIDED BY BING, PHOTO TAKEN 2021.

STATE OF TEXAS
DANIEL B. BULLOCK
82596
REGISTERED
PROFESSIONAL ENGINEER

10-11-2021

Coleto Creek Power, LLC

Figure 2

PRIMARY ASH POND LOCATION MAP

PROJECT: 21424-1	BY: RCAD-RR	DATE: OCT 2021	CHECKED: DBB

Bullock, Bennett & Associates, LLC
Engineering and Geoscience
Texas Registrations: Engineering F-8542, Geoscience 50127

Plot Date: 10/11/21 - 1:22pm, Plotted by: Admin
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APPENDIX A

Guadalupe-Blanco River Authority Lake Area-Capacity Summaries

TABLE 1

COLETO CREEK RESERVOIR
AREAS AND CAPACITIES
INITIAL CONDITIONS*

Elev.	0	1	2	3	4	5	6	7	8	9
					AREA IN ACRES					
50									0	9
60	18	26	34	42	50	60	80	100	120	145
70	170	200	239	277	314	351	397	442	495	547
80	599	679	758	835	910	984	1087	1189	1299	1408
90	1504	1650	1796	1940	2084	2230	2369	2514	2652	2787
100	2918	3077	3255	3461	3698	3954	4207	4458	4706	4949
110	5190	5531	5910	6324	6763	7234	7734	8229	8725	9223
120	9723									
					CAPACITY IN ACRE-FEET					
50									0	4
60	18	40	70	108	154	209	279	369	479	611
70	769	954	1174	1432	1727	2060	2434	2853	3322	3843
80	4416	5055	5774	6570	7442	8389	9425	10,563	11,807	13,160
90	14,617	16,194	17,917	19,786	21,798	23,955	26,254	28,695	31,277	33,996
100	36,849	39,846	43,012	46,370	49,949	53,744	57,855	62,187	66,769	71,597
110	76,667	82,027	87,747	93,863	100,406	107,409	114,807	122,878	131,354	140,328
120	149,800									

*Areas and capacities of impoundments behind Dike Nos. 1 and 2 are not included in this tabulation.

TABLE 2

COLETO CREEK PROJECT
AREAS AND CAPACITIES
SULPHUR CREEK BEHIND DIKE NO. 1
INCLUDING FLUME NO. 1

Elev.	0	1	2	3	4	5	6	7	8	9
					AREA IN ACRES					
70								0	1	2
80	3	5	7	10	14	18	22	26	31	36
90	49	56	64	73	82	90	101	113	126	138
100	151	164	178	193	207	223	240	259	279	303
110	329	358	388	419	455	499	540	590	641	699
120	770									
					CAPACITY IN ACRE-FEET					
70									0	2
80	4	8	14	23	35	51	71	95	123	157
90	199	251	311	379	456	542	638	745	865	997
100	1141	1299	1470	1656	1856	2071	2303	2553	2822	3113
110	3429	3773	4146	4550	4987	5464	5984	6549	7165	7835
120	8570									

TABLE 3

COLETO CREEK PROJECT
AREAS AND CAPACITIES
TURKEY CREEK BEHIND DIKE NO. 2
INCLUDING FLUME NO. 2

Elev.	0	1	2	3	4	5	6	7	8	9
					AREA IN ACRES					
70		0	1	3	6	9	13	18	24	31
80	38	46	55	65	76	88	101	115	130	146
90	167	184	200	217	234	250	270	293	322	355
100	391	429	467	506	545	583	623	663	705	748
110	791	831	882	947	1032	1118	1206	1291	1374	1458
120	1537									
					CAPACITY IN ACRE-FEET					
70		0	0	2	7	14	25	41	62	89
80	124	166	216	276	347	429	523	631	754	892
90	1048	1224	1416	1624	1850	2092	2352	2634	2942	3281
100	3654	4064	4512	4998	5524	6089	6691	7334	8018	8744
110	9513	10,324	11,181	12,096	13,086	14,161	15,323	16,572	17,905	19,321
120	20,819									