

US EPA ARCHIVE DOCUMENT

MEMORANDUM

SUBJECT: EPA Comments on draft revision "Coal Combustion Residue Impoundment Round 12 – Dam Assessment Report: Martin Lake Steam Electric Plant; Fly Ash Dike."

FROM: EPA

DATE: February 7, 2014

NO COMMENTS

From: [Warren Samuelson](#)
To: [Englander, Jana](#)
Subject: RE: Comment Request on Coal Ash Site Assessment Round 12 Draft Reports – Luminant Generation Co., LLC – Martin Lake Steam Electric Station
Date: Monday, February 10, 2014 8:27:09 AM

Jana:

The Texas Dam Safety program does not have any comments. The coal ash sites are not in the dam safety program.

Warren D. Samuelson, P. E.
Manager, Dam Safety Section
TCEQ
512/239-5195

From: Englander, Jana [mailto:Englander.Jana@epa.gov]
Sent: Friday, February 07, 2014 4:46 PM
To: Mustafa, Golam; Vargo, Steve; Warren Samuelson
Cc: Hoffman, Stephen; Dufficy, Craig; Kelly, PatrickM; Englander, Jana
Subject: FW: Comment Request on Coal Ash Site Assessment Round 12 Draft Reports – Luminant Generation Co., LLC – Martin Lake Steam Electric Station

Dear All,

We would like to offer Texas and EPA Region 6 an opportunity to comment on the Draft Assessment Report on the Coal Combustion Residual Impoundment located at the facility below. Please let me know if you intend to comment or have any questions. Comments would be appreciated within 30 calendar days of receipt of this email. Thank you!
Regards,

Jana

Jana Englander
Office of Resource Conservation and Recovery,
Materials Recovery Waste Management Division
Energy Recovery and Waste Disposal Branch
U.S. Environmental Protection Agency
703-308-

From: Englander, Jana
Sent: Friday, February 07, 2014 5:40 PM
To: Mireles, Kimberly; Spicer, Gary
Cc: Hoffman, Stephen; Dufficy, Craig; Kelly, PatrickM; Englander, Jana
Subject: Comment Request on Coal Ash Site Assessment Round 12 Draft Reports – Luminant Generation Co., LLC – Martin Lake Steam Electric Station

Dear Ms. Mireles,

The draft assessment report for Luminant Generation Co., LLC – Martin Lake Steam Electric Station is ready for review. EPA would appreciate it if you would review and submit your comments on this report to us within 30 calendar days of receipt of this email. **Please confirm receipt of this email and send your comments to:**

Mr. Stephen Hoffman
US Environmental Protection Agency (5304P)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

If you are using overnight or hand delivery mail, please use the following address:

Mr. Stephen Hoffman
US Environmental Protection Agency
Two Potomac Yard
2733 South Crystal Drive
5th Floor, N-5237
Arlington, VA 22202-2733

You may also provide your comments by e-mail to hoffman.stephen@epa.gov and englander.jana@epa.gov.

You may assert a business confidentiality claim covering all or part of the information requested, in the manner described by 40 C. F. R. Part 2, Subpart B. Information covered by such a claim will be disclosed by EPA only to the extent and only by means of the procedures set forth in 40 C.F.R. Part 2, Subpart B. If no such claim accompanies the information when EPA receives it, the information may be made available to the public by EPA without further notice to you. If you wish EPA to treat any of your response as “confidential” you must so advise EPA when you submit your response.

The draft report can be accessed at the secured link below. **The secured link will expire on February 14, 2014.**

Here is the link for the report:

<http://www.hightail.com/download/eINKM25JWIRsMHIFQk1UQw>

Please let me know if you have trouble accessing the report or have any questions/requests.

Respectfully,

Jana Englander

Jana Englander
Office of Resource Conservation and Recovery,
Materials Recovery Waste Management Division
Energy Recovery and Waste Disposal Branch
U.S. Environmental Protection Agency

703-308-8711

From: [Spicer, Gary](#)
To: [Hoffman, Stephen](#); [Englander, Jana](#)
Cc: [Mireles, Kimberly](#); [Duncan, David](#); [Jeanes, Ricky](#)
Subject: RE: Comment Request on Coal Ash Site Assessment Round 12 Draft Reports - Luminant Generation Co., LLC - Martin Lake Steam Electric Station
Date: Sunday, March 09, 2014 9:48:56 PM
Attachments: [Luminant Comments2 - Luminant Martin Lake CCW MU DRAFT Report v4.pdf](#)

Mr. Hoffman & Ms Englander,

Attached is our marked-up comments for the **Coal Combustion Residue Impoundment Round 12 - Dam Assessment Report *Martin Lake Steam Electric Station***.

I tried several times to send this e-mail with the full report, but since I was at a remote location (not in the office) I was unable to complete the transfer due to the large size. Since we had no comments in the appendices, the attached file has had all of the appendices removed. If you need the entire file, I will be back in the office on Wednesday and can send it then.

We have tried very hard to make our comments in a manner that can be readily followed, although the Adobe format is limiting. Please let me know if you have any questions or need additional information. I can be reached either by e-mail at this address, or by telephone at 214-875-8299.

Gary L. Spicer
Luminant Power
Environmental Services
Office 214-875-8299

From: Englander, Jana [mailto:Englander.Jana@epa.gov]
Sent: Friday, February 07, 2014 4:41 PM
To: Mireles, Kimberly; Spicer, Gary
Cc: Hoffman, Stephen; Dufficy, Craig; Kelly, PatrickM; Englander, Jana
Subject: Comment Request on Coal Ash Site Assessment Round 12 Draft Reports – Luminant Generation Co., LLC – Martin Lake Steam Electric Station

Dear Ms. Mireles,

The draft assessment report for Luminant Generation Co., LLC – Martin Lake Steam Electric Station is ready for review. EPA would appreciate it if you would review and submit your comments on this report to us within 30 calendar days of receipt of this email. **Please confirm receipt of this email and send your comments to:**

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You may also provide your comments by e-mail to hoffman.stephen@epa.gov and englander.jana@epa.gov.

You may assert a business confidentiality claim covering all or part of the information requested, in the manner described by 40 C. F. R. Part 2, Subpart B. Information covered by such a claim will be disclosed by EPA only to the extent and only by means of the procedures set forth in 40 C.F.R. Part 2, Subpart B. If no such claim accompanies the information when EPA receives it, the information may be made available to the public by EPA without further notice to you. If you wish EPA to treat any of your response as "confidential" you must so advise EPA when you submit your response.

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Here is the link for the report:

<http://www.hightail.com/download/eINKM25JWIRsMHIFQk1UQw>

Please let me know if you have trouble accessing the report or have any questions/requests.

Respectfully,

Jana Englander

Jana Englander
Office of Resource Conservation and Recovery,
Materials Recovery Waste Management Division
Energy Recovery and Waste Disposal Branch
U.S. Environmental Protection Agency
703-308-8711

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Coal Combustion Residue Impoundment

Round 12 - Dam Assessment Report

Martin Lake Steam Electric Plant

Coal Combustion Residuals Impoundments

Luminant

Tatum, Texas

Prepared for:

United States Environmental Protection Agency
Office of Resource Conservation and Recovery

Prepared by:

Dewberry Consultants, LLC
Fairfax, Virginia



Under Contract Number: EP-09W001727

February 2014

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INTRODUCTION, SUMMARY CONCLUSIONS AND RECOMMENDATIONS

The release of over five million cubic yards from the Tennessee Valley Authority's Kingston, Tennessee facility in December 2008, which flooded more than 300 acres of land, damaging homes and property, is a wake-up call for diligence on coal combustion residue disposal units. We must marshal our best efforts to prevent such catastrophic failure and damage. A first step toward this goal is to assess the stability and functionality of the ash impoundments and other units, then quickly take any needed corrective measures.

This assessment of the stability and functionality of the three CCR management units, (Ash Disposal Ponds, impoundments PDP-4 and PDP-5) at Martin Lake Steam Electric Plant is based on a review of available documents and on the site assessment conducted by Dewberry personnel on September 25, 2012. We initially found the supporting technical documentation inadequate (Section 1.1.3). However, additional studies were provided later that addressed the inadequacy. As detailed in Section 1.2.4, there is one recommendation based on field observations that may help to maintain a safe and trouble-free operation.

In summary, the Martin Lake Steam Electric Plant impoundments are rated as SATISFACTORY for continued safe and reliable operation.

PURPOSE AND SCOPE

The U.S. Environmental Protection Agency (EPA) is embarking on an initiative to investigate the potential for catastrophic failure of Coal Combustion Surface Impoundments (i.e., management unit) from occurring at electric utilities in an effort to protect lives and property from the consequences of a dam failure or the improper release of impounded slurry. The EPA initiative is intended to identify conditions that may adversely affect the structural stability and functionality of a management unit and its appurtenant structures (if present); to note the extent of deterioration (if present), status of maintenance and/or a need for immediate repair; to evaluate conformity with current design and construction practices; and to determine the hazard potential classification for units not currently classified by the management unit owner or by a state or federal agency. The initiative will address management units that are classified as having a Less-than-Low, Low, Significant or High Hazard Potential ranking. (For Classification, see pp. 3-8 of the 2004 Federal Guidelines for Dam Safety)

In February 2009, the EPA sent letters to coal-fired electric utilities seeking information on the safety of surface impoundments and similar facilities that receive liquid-borne material that store or dispose of coal combustion residue. This letter was issued under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 104(e), to assist the Agency in assessing the structural stability and functionality of such

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management units, including which facilities should be visited to perform a safety assessment of the berms, dikes, and dams used in the construction of these impoundments.

EPA requested that utility companies identify all management units including surface impoundments or similar diked or bermed management units or management units designated as landfills that receive liquid-borne material used for the storage or disposal of residuals or by-products from the combustion of coal, including, but not limited to, fly ash, bottom ash, boiler slag, or flue gas emission control residuals. Utility companies provided information on the size, design, age and the amount of material placed in the units. The EPA used the information received from the utilities to determine preliminarily which management units had or potentially could have High Hazard Potential ranking.

The purpose of this report is **to evaluate the condition and potential of residue release from management units and to determine the hazard potential classification**. This evaluation included a site visit. Prior to conducting the site visit, a two-person team reviewed the information submitted to EPA, reviewed any relevant publicly available information from state or federal agencies regarding the unit hazard potential classification (if any) and accepted information provided via telephone communication with the management unit owner. Also, after the field visit, additional information was received by Dewberry about the Martin Lake Steam Electric Plant CCR management units that were reviewed and used in preparation of this report.

Factors considered in determining the hazard potential classification of the management units(s) included the age and size of the impoundment, the quantity of coal combustion residuals or by-products that were stored or disposed of in these impoundments, its past operating history, and its geographic location relative to down gradient population centers and/or sensitive environmental systems.

This report presents the opinion of the assessment team as to the potential of catastrophic failure and reports on the condition of the management unit(s).

LIMITATIONS

The assessment of dam safety reported herein is based on field observations and review of readily available information provided by the owner/operator of the subject coal combustion residue management unit(s). Qualified Dewberry engineering personnel performed the field observations and review and made the assessment in conformance with the required scope of work and in accordance with reasonable and acceptable engineering practices. No other warranty, either written or implied, is made with regard to our assessment of dam safety.

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APPENDIX A

- Doc 01: Critical Impoundment Inspection Report for Martin Lake SES, April 19, 2012 by HDR
- Doc 02: Luminant Martin Lake SES, Reline East Ash Disposal Pond, Tatum, Texas Geotechnical Investigation
- Doc 03: Luminant Martin Lake SES, Vertical Expansion of Permanent Disposal Ponds 1, 2 and 3 Tatum Texas
- Doc 04: Critical Impoundment Inspection Report for Martin Lake SES, March 16, 2011 by Mark W. Kelly P.E.
- Doc 05: Area 3 Shift Log (9-25-12 and 9-24-12)
- Doc 06: Texas Pollutant Discharge Elimination System Permit
- Doc 07: Soil and Liner Evaluation Report for PDP-5
- Doc 08: Process Flow Diagrams
- Doc 09: Martin Lake Dam Information
- Doc 10: Texas Department Transportation Rain Fall information
- Doc 11: PDP-5 Typical Cross Section Drawing No 139-E001-305 C-27
- Doc 12: Ash Disposal System Ash Ponds Plan Drawing No 2915-1-311400

APPENDIX B

- Doc 13: Dam Inspection Check List Form – Ash Disposal Pond
- Doc 14: Dam Inspection Check List Form – PDP-4
- Doc 15: Dam Inspection Check List Form – PDP-5

APPENDIX C

- DOC 16: Ash and Scrubber Ponds and Permanent Disposal Pond #4, Stability Investigation Report, Luminant Martin Lake Power Plant, Rusk Count, Texas, Golder Associates, December, 2012

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1.0 CONCLUSIONS AND RECOMMENDATIONS

1.1 CONCLUSIONS

Conclusions are based on visual observations from a one-day site visit, September 25, 2012, and review of technical documentation provided by Luminant.

1.1.1 Conclusions Regarding the Structural Soundness of the Management Unit(s)

The dike embankments appear to be structurally sound based on Dewberry engineers' observations during the site visit. Initially documentation of slope stability Factors of Safety under static and seismic conditions for one Permanent Disposal Pond (PDP-5) and Ash Disposal Pond East Cell was the only information provided for review. Subsequent to the site inspection, Luminant provided Dewberry a stability analysis report that included PDP-4, and a reanalysis of the Bottom Ash Pond, East Cell, and Emergency Sludge Cells. HDR conducted a 'Soil and Liner Evaluation Report' for PDP-5, (See Appendix A, Doc 07) certifying that the liner has been constructed as designed in accordance with the issued permit and in general compliance with the regulations. Golder Associates performed slope stability studies for the other coal combustion waste management units (See Appendix C, Doc 16).

Based on the documentation of slope stability factors of safety for the cells (East Cell, West Cell and Emergency Sludge Cell) in the Ash Disposal Pond and PDP-4 and PDP-5, the slope stability of the coal combustion waste management units is satisfactory.

1.1.2 Conclusions Regarding the Hydrologic/Hydraulic Safety of the Management Unit(s)

The Ash Disposal Ponds and Permanent Disposal Ponds (PDPs), which do not receive off-site runoff, appear to have adequate hydrologic/hydraulic safety against design rainfall events. This conclusion is based on review of furnished technical information and Dewberry engineers' simple calculations to check capacity of the Ash impoundments to safely contain design rainfall over the area of the ponds.

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1.1.3 Conclusions Regarding the Adequacy of Supporting Technical Documentation

The supporting technical documentation is fair. No documentation of either hydrologic or hydraulic safety for any of the impoundments was provided. Slope stability documentation was provided and considered adequate.

1.1.4 Conclusions Regarding the Description of the Management Unit(s)

The description of the management units provided by the owner was an accurate representation of what Dewberry observed in the field.

1.1.5 Conclusions Regarding the Field Observations

Dewberry staff was provided access to all areas in the vicinity of the management units required to conduct a thorough field observation. The visible parts of the embankment dikes and outlet structure were observed to have no signs of overstress, significant settlement, shear failure, or other signs of instability although visual observations were hampered by the presence of thick vegetation in some areas. Embankments appear structurally sound. There are no apparent indications of unsafe conditions or conditions needing remedial action.

The impoundments do not have outlet structures (i.e., there is no discharge to the environment). Sluice water and storm water falling into the impoundments are directed to the Ash Disposal Ponds before being pumped back to the power plant for reuse.

During the field observations burrowing animal (e.g. ~~ground hogs~~) holes were observed in the embankments. The animals should be removed and the holes should be filled.

rodents or armadillos
↓
ground hogs

1.1.6 Conclusions Regarding the Adequacy of Maintenance and Methods of Operation

The current maintenance and methods of operation appear to be adequate for the coal combustion residuals management units. There was no evidence of significant embankment repairs or prior releases observed during the field inspection.

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1.1.7 Conclusions Regarding the Adequacy of the Surveillance and Monitoring Program

The surveillance program appears to be adequate. The PDP-4 and PDP-5 dikes are instrumented. Based on the size of the dikes, the portion of the impoundment currently used to store wet ash and slag, the history of satisfactory performance and the current inspection program, piezometric data is not needed at this time.

1.1.8 Classification Regarding Suitability for Continued Safe and Reliable Operation

Based on the technical information provided and the findings of the field observations, impoundments PDP-4, PDP-5, and the Bottom Ash Disposal Pond are each rated SATISFACTORY at Martin Lake Steam Generating Plant for continued operation.

1.2 RECOMMENDATIONS

1.2.1 Recommendations Regarding the Structural Stability

No recommendations appear warranted at this time.

1.2.2 Recommendations Regarding the Hydrologic/Hydraulic Safety

No recommendations for remedial work to ensure hydrologic/hydraulic safety appear warranted at this time.

1.2.3 Recommendations Regarding the Supporting Technical Documentation

No recommendations appear warranted at this time.

1.2.4 Recommendations Regarding the Field Observations

Based on the field observations, a maintenance recommendation is:

- Control all burrowing animals (e.g. ~~ground hogs~~ ^{rodents or armadillos}) and appropriately fill-in burrows in the embankments around the ponds. The burrows were also noted in the two annual inspection reports; see Appendix A – Docs 01 and 04.

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1.3 PARTICIPANTS AND ACKNOWLEDGEMENT

1.3.1 List of Participants

Gary Spicer, Luminant
Mark Kelly, Luminant
Michael McLaren P.E., Dewberry
Joseph P. Klein, III, P.E., Dewberry
Golam Mustafa, USEPA
Patrick Kelly, USEPA
Karla Henson, Luminant
Randy Fletcher, Luminant
Razen Thomas, Luminant
Isaac Turner, Luminant
John Dawson, Luminant

1.3.2 Acknowledgement and Signature

We acknowledge that the management units referenced herein have been assessed on September 25, 2012.

Michael McLaren, P.E.

Joseph P. Klein, III, P.E.

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2.0 DESCRIPTION OF THE COAL COMBUSTION RESIDUE MANAGEMENT UNIT(S)

2.1 LOCATION AND GENERAL DESCRIPTION

Martin Lake Steam Electric Plant is located in the northeast corner of Texas approximately 3.9 miles southwest of Tatum, Texas in Rusk County. ~~Martin Lake~~ borders the plant on the north, east and south sides. See Figure 2.1-1 for the location of the facility on an USGS topographic map. The facility is a coal-fired electric generating station featuring 3 Units that total 2,250 megawatts. The three units were brought on line in 1977, 1978 and 1979.

Martin Creek Reservoir (a.k.a. Martin Lake)

The facility currently maintains three impoundments. On the east side of the plant is the Ash Disposal Pond. This pond has three cells (East, West and Emergency Sludge). The cells are separated by interior dikes. The Ash Disposal Pond receives sluiced ash from the plant. Two additional ponds are located on the west side of the plant, Permanent Disposal Pond (PDP)-4 and PDP-5.

Below is a summary of the impoundments.

Ash Disposal Pond:

- *The Emergency Sludge Pond (ESP):* The ESP is used to collect process water from the thickener area, as well as rain water run-off from the thickener area. This water is reused as wet-well make-up water, and can also be used as emergency make-up water in the scrubber area.
- *West Ash Pond (WAP):* The WAP is used to supply water to the bottom ash area on all units, and receives process water from the bottom ash areas, dewatering bins and the sludge area.
- *East Ash Pond (EAP):* EAP is used as a temporary containment for coal combustion residues (CCRs), such as ~~fly ash~~, bottom ash and ~~FGD solids~~.

← incidental (<5%) fly ash/FGD solids

Permanent Disposal Ponds (i.e., Desilting Basins):

- *PDP-4:* PDP-4 is used to collect solid disposal from the plant, as well as solids dredged from the ESP or WAP Ponds. ← since 2011
- *PDP-5:* PDP-5 has only been in operation ~~for a year~~. It is used to collect solid disposal from the plant, as well as solids dredged from Ash Disposal Pond.

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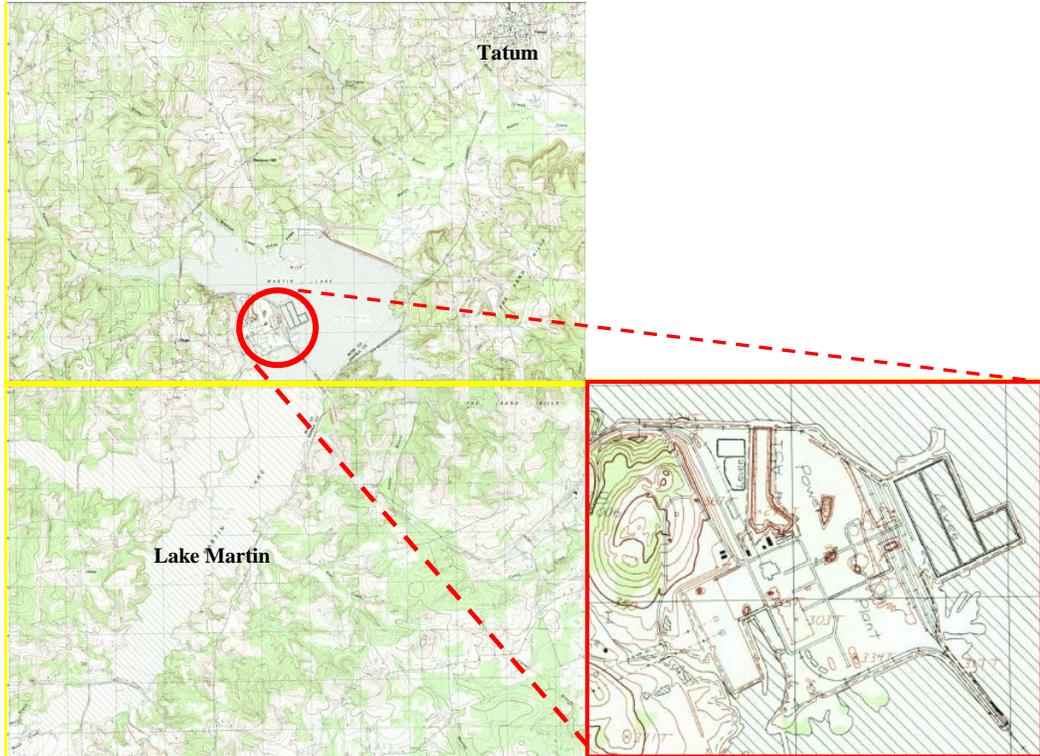


Figure 2.1-1 Plant location

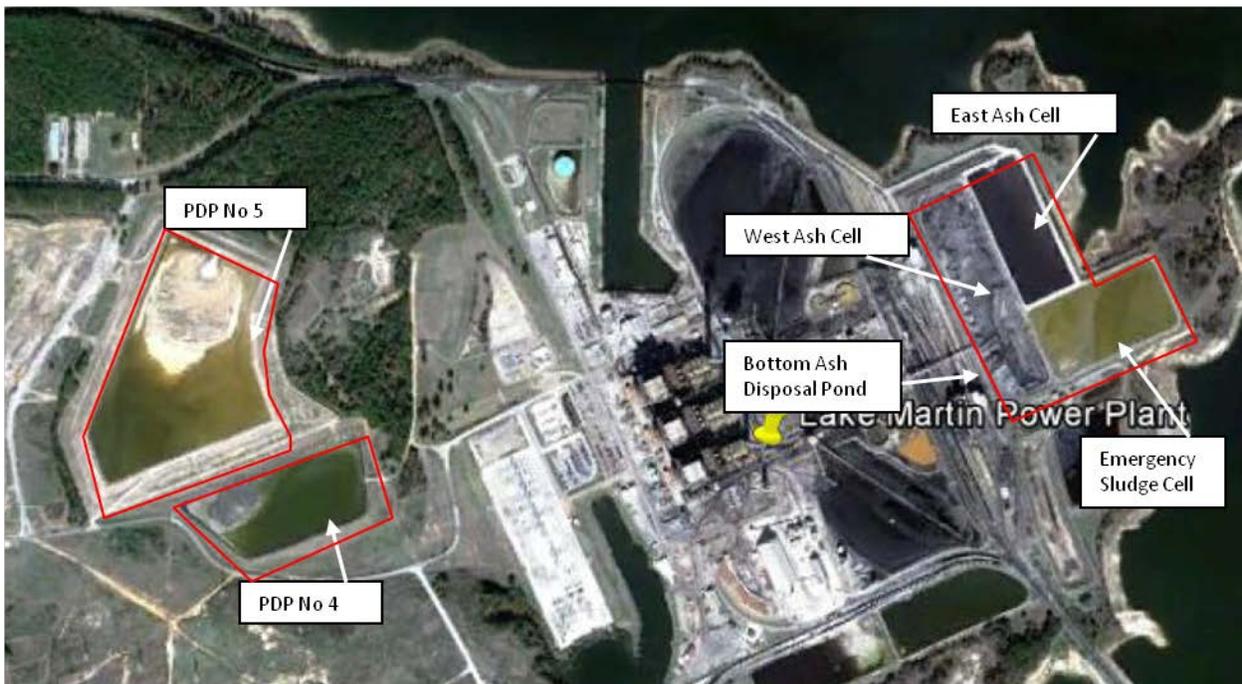


Figure 2.1-2 Impoundment locations.

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	Bottom Ash Disposal Pond (3 Cells)	PDP 4	PDP 5
Dam Height (ft)	25	20	15
Crest Width (ft)	16	20	15
Length (ft)	4,600	3,600	4,950
Side Slopes (upstream) H:V	2.5:1	3:1	3:1
Side Slopes (downstream) H:V	2.5:1	4:1	4:1

2.2 COAL COMBUSTION RESIDUE HANDLING

2.2.1 Fly Ash

The Martin Lake Steam Electric Plant currently operates three coal fired electrical power generating Units. Fly ash is collected at the base of each stack by electrostatic precipitators. The collected ash is stored in hoppers and conveyed pneumatically to a silo. Periodically ash from the silo is loaded into trucks for sale, or ~~off-site disposal.~~

2.2.2 ~~into train cars for off-site disposal~~

Bottom ash is collected in hoppers beneath the boilers. A jet pump and sluice method is used to draw material from the hoppers through a crusher and sluice gate before sluicing the crushed material to the ~~Ash Disposal Pond.~~

~~Bottom ash hoppers for dewater, from there the water goes to the Ash Disposal ponds.~~

2.2.3 Boiler Slag

Boiler slag is collected in the hoppers with the bottom ash.

2.2.4 Flue Gas Desulfurization Sludge

Flue gas desulfurization sludge is generated by the plant. The sludge is directed to one of two thickener bins and then to an underflow tank. The solids are removed and land filled offsite. See Doc 08 for additional information.

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2.3 SIZE AND HAZARD CLASSIFICATION

According to documentation provided by Luminant, Ash Disposal Pond has 3 individual cells with a maximum capacity of 557.3 acre-feet and a maximum design height for storage of 25 feet. PDP-4 has a maximum capacity of approximately 251.6 acre-feet with a maximum design height of 20 feet. PDP-5 has a maximum capacity of 190.3 acre-feet with a maximum design height for storage of 15 feet. Based on USACE ER 1110-2-106, all three impoundments are classified as small-sized impoundment considering dam height and small size considering storage capacity.

Table 2.2a: USACE ER 1110-2-106 Size Classification		
Category	Impoundment	
	Storage (Ac-ft)	Height (ft)
Small	50 and < 1,000	25 and < 40
Intermediate	1,000 and < 50,000	40 and < 100
Large	> 50,000	> 100

For all three impoundments, loss of human life is not expected. If failure occurred, ash would remain on Luminant property. Luminant reported that if the sluice pipe broke that a release would be controlled by drainage measures and would not be released to the environment. However, a major release could discharge coal combustion residuals into Martin Lake. Although the lake is owned by Luminant, a State Park provides public access for recreational purposes. A release into the lake is expected to have economic and environmental impacts. Therefore a Significant hazard potential classification is given to impoundments PDP-4, PDP-5, and the Ash Disposal Pond.

reservoir was built and

reservoir

Table 2.2b: FEMA Federal Guidelines for Dam Safety Hazard Classification		
	Loss of Human Life	Economic, Environmental, Lifeline Losses
Low	None Expected	Low and generally limited to owner
Significant	None Expected	Yes
High	Probable. One or more expected	Yes (but not necessary for classification)

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2.4 AMOUNT AND TYPE OF RESIDUALS CURRENTLY CONTAINED IN THE UNIT(S) AND MAXIMUM CAPACITY

The CCW management units receive bottom ash and boiler slag. Flue gas desulfurization (fgd) sludge is generated by the plant and directed to one of two thickener bins and then to an underflow tank. The fgd solids are removed and landfilled offsite. See Doc. 08 for additional information.

	Ash Disposal Pond (3 Cells)	PDP 4	PDP 5
Surface Area (acre)¹	36.68	15.34	32.94
Current Storage Capacity (cubic yards)²	676,400	324,800	290,700
Current Storage Capacity (acre-foot)²	419 ³	201	180
Total Storage Capacity (cubic yards)¹	1,026,868	405,994	306,000
Total Storage Capacity (acre-foot)	557.3	251.6	190.3
Crest Elevation (feet)¹	330	360	406
Normal Pond Level (feet)¹	328	354.9	404

¹ Critical Impoundment Inspection Report April 19, 2012

² Information provided by Luminant after site visit.

³ West Cell is predominately dry, ash being removed.

2.5 PRINCIPAL PROJECT STRUCTURES

2.5.1 Earth Embankment

PDP-4

PDP-4 is constructed of on-site soils. The top of embankment elevation is 360 ft. The normal water elevation is 354.9 ft. The interior side slopes of the basin is 3 horizontal (H) to 1 vertical (V). The perimeter dike embankment is highest at 20 ft above the outside toe and has an exterior slope that has a 4:1 slope. The exterior slopes are covered with grass and weeds.

The interior side slopes are indicated on construction drawings as having a 3-foot clay layer.

The design also includes a bottom liner and drain consisting of a 5-foot thick sand drainage blanket between a 2-foot thick clay cover above and a 1-foot thick clay base layer. The drainage blanket discharges to a 10-inch diameter perforated pipe at the inside tow of the embankment.

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PDP-5

PDP-5 is constructed of on-site soils. The top of embankment elevation is 406 ft. The normal water elevation is 354.9 ft. The interior side slopes of the basin is 3 horizontal (H) to 1 vertical (V). The perimeter dike embankment is highest at 15 ft above the outside toe and has an exterior slope that has a 4:1 slope. The exterior slopes are grass covered with isolated denuded areas. (The impoundment was constructed in 2011 and the grass has not germinated in isolated areas). PDP-5 was constructed over top of the closed impoundments PDP-1, 2 and 3. Prior to the construction of PDP-5 a 3 ft clay layer was placed over top the closed ponds below the new berm. Portions of the embankment were constructed over the existing ash fill. (Appendix A Doc 11 – PDP-5 Typical Cross Section).

On the bottom the liner is indicated to consist of the following in descending order:

1. 0.5 ft protective cover;
2. 2 ft clay layer (beneath the new berm is a 3 ft clay layer).

On the side slopes the liner is indicated to consist of:

1. 3 ft clay layer.

The clay liner was designed to be installed and compacted in 6 inch lifts.

Ash Disposal Pond

The Ash Disposal Pond was constructed of native clay soils. The Ash Disposal Pond contains three individual cells separated by interior dikes. The top of embankment elevation is 330 ft. The normal water elevation is 327 ft. The interior side slopes of the basin are 2.5 horizontal (H) to 1 vertical (V). The perimeter dike embankment is highest at 25 ft above the outside toe and has an exterior slope that has a 2.5:1 slope. The exterior slopes are grass and weeds. Soil cement is placed to protect the embankment where the exterior slope of the embankments come in contact with Martin Lake. (Appendix A - Doc 12 Ash Disposal System Ash Ponds Plan).

On the bottom the liner is indicated to consist of the following in descending order:

1. 4 inch revetment mat;
2. 60-mil HDPE liner;
3. 1.5 ft clay layer.

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On the side slopes the liner is indicated to consist of:

1. 4 inch revetment mat;
2. 60-mil HDPE liner;
3. 3 ft clay layer.

2.5.2 Outlet Structures

Water from each cell in the Ash Disposal Pond is pumped through suction hoses located at the bottom of each cell. Water is pumped to a valve chamber for routing to the plant for recycling. Water is pumped from PDP-5 to PDP-4. Water from PDP-4 is recycled back to the plant.

2.6 CRITICAL INFRASTRUCTURE WITHIN FIVE MILES DOWN GRADIENT

The Martin Lake Electric Steam Plant is located on the west side of Martin Lake. The town of Tatum is located northeast of the Plant approximately 4 miles (See Figure 2.6-1). Typical critical infrastructures in the town are fire house stations, schools and medical facilities. Other than the town of Tatum the surrounded area is rural. Topography in the area slopes to the northeast toward Tatum. Martin Lake was formed by the construction of an earth filled dam in 1974. The crest of the dam is approximately 321 ft with a normal lake elevation of 306 ft. The emergency spillway elevation is at 312 ft. Based on the size of the impoundments, and site topographic conditions, a release due to failure or misoperation of the impoundments is not expected to impact critical infrastructure facilities.

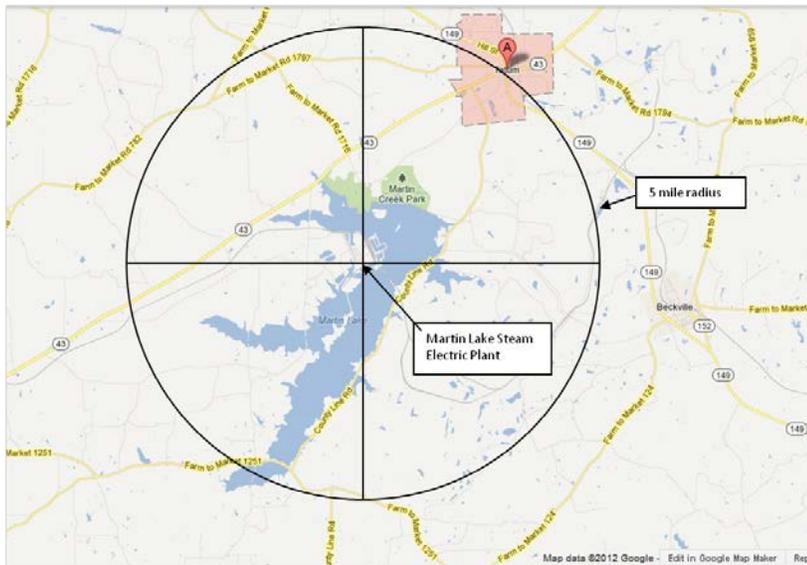


Figure 2.6-1: Critical Infrastructures within a 5 mile radius of the facility.

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3.0 SUMMARY OF RELEVANT REPORTS, PERMITS, AND INCIDENTS

3.1 SUMMARY OF REPORTS ON THE SAFETY OF THE MANAGEMENT UNIT

Luminant provided a copy of the “Critical Impoundment Inspection Report” dated March 16, 2011. (See Appendix A - Doc 01) The report included a visual inspection of the inner and outer berms, crest for vegetative cover, erosion, misalignment, slides, settlements, damage and erosion, seeps, cracks and lining condition. No significant deficiencies were noted. Items were identified to be repaired and monitored.

3.2 SUMMARY OF LOCAL, STATE, AND FEDERAL ENVIRONMENTAL PERMITS

Discharge from the impoundment is regulated by the Texas Commission on Environmental Quality (TCEQ) and the impoundment has been issued a Texas Pollutant Discharge Elimination System Permit (~~TPDES~~). Permit No. WO0001784000 was issued June 18, 2009 (See Appendix A – Doc 02)

3.3 SUMMARY OF SPILL/RELEASE INCIDENTS

TPDES

Data reviewed by Dewberry did not indicate any spills, unpermitted releases, or other performance related problems with the dam over the last 10 years. Luminant stated that no significant release of CCR has occurred.

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4.0 SUMMARY OF HISTORY OF CONSTRUCTION AND OPERATION

4.1 SUMMARY OF CONSTRUCTION HISTORY

4.1.1 Original Construction

The facility is a coal-fired electric generating station featuring 3 units that total 2,250 megawatts. The three Units were brought on line in 1977, 1978 and 1979. PDP-4 was constructed in 1982. PDP-5 was constructed in 2011. No information was provided for the original construction dates of the Ash Disposal Ponds. However, the East Cell was re-lined in 2011.

4.1.2 Significant Changes/Modifications in Design since Original Construction

No information was provided on significant changes or modifications in the original design since construction.

4.1.3 Significant Repairs/Rehabilitation since Original Construction

The information provided to Dewberry revealed two significant repairs and new construction. Impoundments PDP 1, 2 and 3 were closed and PDP-5 was constructed on top of the impoundments in 2010/2011. E TTL Engineers and Consultants Inc. designed the new pond. Liner composition was provided in Section 2.5; see Appendix a Doc 03 for additional design information.

In the early- to mid-1980s, evidence of significant seepage was reported. The Ash Disposal Pond was upgraded with a new liner and revetment system. The upgrade consisted of a new drainage net and HDPE liner over the bottom of the impoundment, and new compacted clay liner with an HDPE cover over the interior slopes of the embankments. A 4-inch thick cement mesh revetment was placed along the embankment interior slopes.

The East Cell of Ash Disposal Pond was relined in 2009/2010. E TTL Engineers and Consultants Inc. designed the new liner for the East Cell. Liner composition was provided in Section 2.5; see Appendix a Doc 02 for additional design information.

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4.2 SUMMARY OF OPERATIONAL PROCEDURES

4.2.1 Original Operational Procedures

Data describing the original operating procedures were not provided to Dewberry for review.

4.2.2 Significant Changes in Operational Procedures and Original Startup

No information was provided to Dewberry concerning significant changes in the operational procedures or from the original startup.

4.2.3 Current Operational Procedures

Currently the Ash Disposal Pond receives slurried bottom ash and boiler slag into the pond. As ash settles out and fills a cell, the ash is excavated and hauled to an off-site, permitted disposal facility. See Appendix A Doc 08 (Process Flow Diagrams) for additional information. The water from the ash pond cells is recycled back to the plant via submersible pumps.

PDP-5 receives and stores sluiced fly ash during non-typical operations. The PDP-5 outlet is a 500-gallons-per-minute submersible pump located at the south end of the impoundment. The pump riser and discharge pipe are supported on a steel pier.

Discharge from PDP-5 is directed into PDP-4. The primary function of PDP-4 is to receive and store discharge from PDP-5. PDP-4 can also receive and store fly ash during non-typical operations. The PDP-4 outlet consists of a submersible pump at the east end of the impoundment. The pump discharges to pipe supported on a floating pier. The outlet discharge is pumped to the plan for recycling.

4.2.4 Other Notable Events since Original Startup

No additional information was provided to Dewberry concerning notable events impacting the operation of the impoundment.

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5.0 FIELD OBSERVATIONS

5.1 PROJECT OVERVIEW AND SIGNIFICANT FINDINGS

Dewberry personnel Michael McLaren, P.E. and Joseph Klein, P.E. performed a site visit on September 25, 2012 in company with the participants, listed in Section 1.3.

The site visit began 8:30 AM. The weather was sunny and warm. Photographs were taken of conditions observed. Please refer to the Dam Inspection Checklist in Appendix C. Selected photographs are included here for ease of visual reference. All pictures were taken by Dewberry personnel during the site visit.

The overall assessment of the PDP-5, PDP-5 and Bottom Ash Disposal Pond embankments was that they are each in satisfactory condition and no significant findings were noted.

5.2 EARTH EMBANKMENT ASH DISPOSAL POND

5.2.1 Crest

The crest of the embankment had no signs of significant depressions, tension cracks or other indications of settlement or shear failure. Figures 5.2.1-1 through 5.2.3-3 shows the typical crest conditions along the embankments.



Figure 5.2.1-1 Ash Pond West Cell south Dike crest.

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Martin Lake

Figure 5.2.1-2 Ash Disposal Pond East cell Dike. ~~Lake Martin~~ is shown to the left of the dike.



Figure 5.2.1-3 West-East Ash Disposal Pond interior dike.

5.2.2 Upstream/Inside Slope

The interior slopes appear stable and maintained. There were no observed scarps, sloughs, bulging, cracks, depressions or other indications of slope instability. Figures 5.2.2-1 and 5.2.2-2 show representative sections of the embankment.

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Figure 5.2.2-1 West cell interior slope.



Figure 5.2.2-2 East cell interior slope.

5.2.3 Downstream/Outside Slope and Toe

The outside slope of the embankment appeared to have a fairly well maintained cover of grasses/weeds. No scarps, sloughs, bulging, cracks, depressions or other indications of slope instability were observed along the slope. Figures 5.2.3-2 and 5.2.3-3 show representative sections of the embankment. Figure 5.2.3-1 shows the outside slope of Ash Pond East

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cell adjacent to Martin Lake. The base of this slope is constructed with soil-cement.



Figure 5.2.3-1 Ash Disposal Pond East cell exterior slope south end. Martin Lake right of the embankment.



Figure 5.2.3-2 Ash Disposal Pond Emergency Sludge cell north exterior slope.

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Figure 5.2.3-3 Ash Disposal Pond West cell south dike exterior slope.

5.2.4 Abutments and Groin Areas

There were no observed scarps, sloughs, bulging, cracks, depressions or other indications of slope instability at dike abutments and groin areas of the Ash Disposal Pond.



Figure 5.2.4-1 Typical exterior groin in the Ash Disposal Pond.

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5.3 EARTH EMBANKMENT PDP-4

5.3.1 Crest

The crest of the embankment had no signs of significant depressions, tension cracks or other indications of settlement or shear failure.



Figure 5.2.1-2 PDP-4 south crest.

5.3.2 Upstream/Inside Slope

Inside slope of the PDP-4 Pond is lined with a HDPE protective cover over a 3 foot thick compacted clay layer. The slopes appear stable and well maintained. There were no observed scarps, sloughs, bulging, cracks, depressions or other indications of slope instability.

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Figure 5.2.2-1 PDP-4 east interior slope.

5.3.3 Downstream/Outside Slope and Toe

The outside slope of the PDP-4 Pond embankment appeared to have a satisfactorily maintained cover of grasses/weeds. No scarps, sloughs, bulging, cracks, depressions or other indications of slope instability were observed along the slope. Figure 5.3.3-1 shows a section of the PDP-4 Pond outside slope.



Figure 5.3.3-1 Typical exterior slope at PDP-4

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5.3.4 Abutments and Groin Areas

There were no observed scarps, sloughs, bulging, cracks, depressions or other indications of slope instability at dike abutments and groin areas of the PDP-4 Pond. Evidence of potential animal burrows was observed in isolated locations. Such burrows may weaken the structural integrity of the embankments.



Figure 5.3.4-1 Typical groining area at PDP-4 Pond. Potential rodent burrow lower left quadrant.

5.4 EARTH EMBANKMENT PDP-5

5.4.1 Crest

The crest of the embankment had no signs of significant depressions, tension cracks or other indications of settlement or shear failure.

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Figure 5.3.1-1 Typical crest around PDP-5 Pond.

5.4.2 Upstream/Inside Slope

Inside slope of the PDP-5 Pond is lined with a 3-foot thick clay layer. The slopes appear stable and well maintained. There were no observed scarps, sloughs, bulging, cracks, depressions or other indications of slope instability.



Figure 5.2.2-3 PDP-5 north interior slope.

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5.4.3 Outside Slope and Toe

The outside slope of the PDP-5 Pond embankment appeared to have a satisfactorily maintained cover of grasses/weeds. No scarps, sloughs, bulging, cracks, depressions or other indications of slope instability were observed along the slope. Figures 5.4.3-1 shows a section of the PDP-5 Pond outside slope.



5.4.4 Abutments and Groin Areas

There were no observed scarps, sloughs, bulging, cracks, depressions or other indications of slope instability at dike abutments and groin areas of the PDP-5 Pond. Figure 5.4.4-1 shows the south groin of PDP-5.

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Figure 5.4.4-1 South groin of PDP-5.

5.5 OUTLET STRUCTURES

5.5.1 Overflow Structure

No overflow structures were noted on any of the impoundments.

5.5.2 Outlet Conduit

The outlet at all of the impoundments consist of a submersible pump at the east end of the impoundment via a SDR17 High Density Polyethylene Pipe (HDPE) smooth lined 19.5” outside diameter pipe. The water from the Ash Disposal Pond and PDP-4 is pumped to the plant for recycling. Water from PDP-5 Pond is pumped back to PDP-4.

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Figure 5.5.2-1 Outlet pump for Ash Disposal Pond.

5.5.3 Emergency Spillway

Not applicable; no emergency spillway exists at this facility.

5.5.4 Low Level Outlet

Not applicable; no low level outlet exists at this facility.

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6.0 HYDROLOGIC/HYDRAULIC SAFETY

6.1 SUPPORTING TECHNICAL DOCUMENTATION

6.1.1 Flood of Record

No documentation has been provided about the flood of record. However, the impoundments receive no off-site surface drainage. The water levels in the ponds are controlled by plant process as not by precipitation events. Thus, a flood of record for the ponds is not applicable.

In addition, there are no reported instances of plant operational problems that would have caused the pond water levels to significantly exceed the normal water levels.

6.1.2 Inflow Design Flood

According to FEMA Federal Guidelines for Dam Safety, the current practice in the design of dams is to use the Inflow Design Flood (IDF) that is deemed appropriate for the hazard potential of the dam and reservoir, and to design spillways and outlet works that are capable of safely accommodating the flood flow without risking the loss of the dam or endangering areas downstream from the dam to flows greater than the inflow. The recommended IDF or spillway design flood for a Significant hazard, small-sized structure (See section 2.2) in accordance with the USACE Recommended Guidelines for Safety Inspection of Dams ER 1110-2-106 criteria is the 100-year storm (See Table 6.1.2).

Hazard	Size	Spillway Design Flood
Low	Small	50- to 100-year frequency
	Intermediate	100-year to ½ PMF
	Large	½ PMF to PMF
Significant	Small	100-year to ½ PMF
	Intermediate	½ PMF to PMF
	Large	PMF
High	Small	½ PMF to PMF
	Intermediate	PMF
	Large	PMF

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Probable Maximum Flood (PMF)

The Probable Maximum Precipitation (PMP) is defined by the American Meteorological Society as the theoretically greatest depth of precipitation for a given duration that is physically possible over a particular drainage area at a certain time of year. The National Weather Service (NWS) further states that in consideration of the complicated processes and interrelationships in storms, PMP values are identified as estimates. The NWS has published application procedures that can be used with PMP estimates to develop spatial and temporal characteristics of a Probable Maximum Storm (PMS). A PMS thus developed can be used with a precipitation-runoff simulation model to calculate a PMF hydrograph.

No hydrologic and hydraulic documentation was provided to Dewberry for review. Martin Lake Electric Steam Plant is located on Martin ~~Lake~~ which was formed by the construction of an earth-filled dam. The dam has a normal pool elevation of 306 ft. The crest elevation of the dam is 321.5 ft with the emergency spillway elevation at 312 ft. (See Appendix A - Doc 09), based on the information reviewed. The lowest crest elevation of the impoundments is 330 feet.

A brief internet search by Dewberry found data from the Texas Department of Transportation, 2011, published rainfall data indicating the one percent probability in any given year (100-year storm) 24 hour precipitation event in Rusk County is 10.80 inches (See Appendix A – Doc 10). This is well below the 2-ft freeboard of both the Ash Disposal Pond and PDP-5; and the 5-ft freeboard of PDP-4.

Topography in the vicinity of the plant generally directs surface drainage around rather than through the plant site. Based on the elevation of the dike crests, and the area topography, storm water inflow into the impoundments is expected to be limited to direct precipitation.

6.1.3 Spillway Rating

The Impoundment Ponds do not have spillway discharges. The sole method of discharge from the impoundments is recirculation pumping to the plant.

6.1.4 Downstream Flood Analysis

Data reviewed by Dewberry did not contain a downstream flood analysis.

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6.2 ADEQUACY OF SUPPORTING TECHNICAL DOCUMENTATION

No rigorous or even simple hydrologic/hydraulic analyses have been provided for any of the impoundments. For ponds that are totally contained within perimeter dike systems and do not receive uncontrolled off-site drainage, rigorous analyses of natural flooding events are not warranted. Dewberry has provided a simple analysis for assessing the hydrologic safety of the PDP-4, PDP-5, and Ash Disposal Ponds. However, formal documentation of the hydrologic/hydraulic safety of each pond should be developed by Luminant and maintained on file for record purposes.

6.3 ASSESSMENT OF HYDROLOGIC/HYDRAULIC SAFETY

It is calculated that adequate capacity and freeboard exists to safely pass the design storm based on that fact that the ponds have a contributing drainage area equal to the surface area of the ponds. Since the water is recycled back into the plant no overflow would occur assuming all pumps remain operational.

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7.0 STRUCTURAL STABILITY

7.1 SUPPORTING TECHNICAL DOCUMENTATION

7.1.1 Stability Analyses and Load Cases Analyzed

Slope Stability reports were provided for one of the cells (East) in the Ash Disposal Pond and PDP-5 at the time of the site visit. Subsequent to the site inspection Luminant provided Dewberry a stability analysis report that included PDP-4, and a reanalysis of the Bottom Ash Pond, East Cell, and Emergency Sludge Cells.

Ash Disposal Pond (East Cell)

In 2008 Luminant retained E TTL Engineers and Consultants Inc. to perform a geotechnical investigation and slope stability analyses for the East Cell of the Ash Disposal Pond for the purpose of installing a new liner. See Appendix A Doc 02. E TTL performed field sampling, laboratory testing and slope analyses for several sections along the East Cell. The slope stability was evaluated using GSTABL7 software. Analyses included short term, long term, and seismic conditions.

In 2012 Luminant retained Golder Associates to conduct a new geotechnical investigation and slope stability analysis for the East Cell and Emergency Sludge Cell, designated in the Golder report as the West Ash Pond, and Scrubber Pond respectively. The results of the Golder analyses are used in this report, see Appendix C Doc 16.

The slope stability was evaluated using the computer program SLIDE, Version 6.019. Analyses included short term, long term, steady state with seismic.

PDP-4

The 2012 Golder geotechnical investigation and slope stability analyses included PDP-4. Slope stability was evaluated using the computer program SLIDE, Version 6.019. Analyses included short term, long term, and rapid drawdown conditions.

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PDP-5

In 2008 Luminant retained E TTL Engineers and Consultants Inc. to perform a geotechnical investigation and slope stability analyses for the construction of the PDP-5. PDP-5 was going to be constructed over the existing PDP ponds 1, 2 and 3. See Appendix A Doc 03. E TTL performed field sampling, laboratory testing and slope analyses for several sections along PDPs 1, 2 and 3 Ponds.

The slope stability was evaluated using the computer program GSTABL7 with STEDwin (short term, long term, steady state with seismic). The analysis was conducted using the modified Bishop method.

The analysis showed that groundwater would need to be controlled to have a static condition factor of safety of 1.6. If the water were to rise to the top of the new containment berms (i.e. high groundwater conditions), the factor of safety would be 1.3. The report states that if the proposed berm was constructed with a clay cover, the Factors of Safety would increase. Construction drawings provided to Dewberry for review indicate the berm was constructed with a 3-foot thick clay liner, and a 6-inch thick protective cover. See Appendix A, Doc. 11.

7.1.2 Design Parameters and Dam Materials

Ash Disposal Pond East Cell and PDP-4

Documentation provided to Dewberry for review indicated the stability analyses for Ash Disposal Pond (East Cell) and PDP-4. The material properties used in the analysis are shown in Table 7.1a.

Soil Type	Moist Unit Weight γ (pcf)	Effective Stress Parameters		Total Stress Parameters	
		Friction Angle ϕ	Cohesion c (psf)	Friction Angle ϕ	Cohesion c (psf)
Sandy Clay / Clayey Sand	125	14	1000	0	1750
Sand	120	30	0	30	0

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PDP-5

Documentation provided to Dewberry for review indicated the stability PDP-5. The material properties used in the analyses are shown in Table 7.1b. For the evaluation of steady-state conditions, the soils were evaluated using effective stress parameters. Total stress parameters for the clay are based on saturated unconfined strength derived from the consolidated undrained strengths.

Soil Type	Moist Unit Weight γ (pcf)	Effective Stress Parameters		Total Stress Parameters	
		Friction Angle ϕ	Cohesion c (psf)	Friction Angle ϕ	Cohesion c (psf)
Native Cohesionless Foundation Soils (minimum)	125	38	0	38	0
Remolded Clay Berm (CL/CH) (minimum)	120	23	200	15	500
Existing Fly Ash CCBs	90	37.5	0	37.5	0
New Fly Ash	90	37.4	0	37.4	0

7.1.3 Uplift and/or Phreatic Surface Assumptions

A Geotechnical Investigation Report contained information concerning uplift (See Appendix A Doc 02). Calculations show that a temporary underdrain system would be required during construction of the new liner in the East Cell to relieve any hydrostatic uplift pressures. Liner protection against long-term hydrostatic uplift pressures is provided by counteracting weight of materials over the liner, or ballast, including the weight of the leachate collection system, protective cover and waste.

No other uplift information was provided.

7.1.4 Factors of Safety and Base Stresses

No data pertaining to base stresses were provided to Dewberry for review.

The safety factors computed in the Geotechnical Investigations (See Appendix A Docs 02 and 03 and Appendix C Doc 16) are listed in Table 7.1.4.

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Table 7.1.4 Factors of Safety for Martin Lake

Loading Condition	Required Safety Factor (US Army Corps of Engineers)	Computed Average Safety Factor			
		PDP - 4	Emergency Sludge Pond	Ash Disposal Pond (East Cell)	PDP-5
Steady State	1.5	2.9	2.7	3.0	1.5
Seismic Loading	1.0	*	2.2	*	1.8
High Ground-Water Conditions	1.3				1.3
Rapid Drawdown	1.3	2.2	2.1	2.6	

**In Appendix C, Document 16, Golder Associates stated that slope analyses for earthquake conditions >1.5*

7.1.5 Liquefaction Potential

The Golder Associates report (Appendix C, Doc. 16) indicates that a review of soil, site, and seismic conditions concluded that the site soils are not susceptible to liquefaction. Dewberry concurs with that conclusion.

7.1.6 Critical Geological Conditions

A subsurface investigation was conducted at two of the impoundments. The results revealed that soils below the impoundments (PDP-5 and Ash Disposal Pond- East Cell) consist of primarily medium stiff to very stiff lean clay and/or fat clay with some loose to medium dense clayey sand. The deeper borings (100 feet) encountered very dense silt (ML) with hard lean clay (CL) seams.

The supplemental subsurface investigation conducted at the Ash Disposal Pond-East Cell, Emergency Sludge Pond, and PDP-4 revealed similar interbedded stiff to hard sandy clay, and firm to dense sand. Isolated zone of sand with relatively low Standard Penetration results (N-values) were reported as likely due to soil disturbance resulting from the use of hollow stem augers below the groundwater level.

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The Geologic Atlas of Texas, Tyler sheet shows the site is within the Wilcox soil group. The Wilcox Group is a thick series of non-marine sands, silty sands, clays, and gravels with some thick deposits of lignite. ¹

7.2 ADEQUACY OF SUPPORTING TECHNICAL DOCUMENTATION

Structural stability documentation is adequate.

7.3 ASSESSMENT OF STRUCTURAL STABILITY

Overall the structural stability of the PDP-4, PDP-5, Ash Disposal Pond East Cell, and Emergency Sludge Cell dams is considered **SATISFACTORY**.

¹ Geologic Atlas of Texas, Tyler Sheet – The University of Texas at Austin Bureau of Economic Geology 1975 – John T. Lonsdale Memorial Edition

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8.0 ADEQUACY OF MAINTENANCE AND METHODS OF OPERATION

8.1 OPERATING PROCEDURES

The operating procedures are adequate. All water from the ash ponds is recycled through the plant. All bottom ash material is temporarily stored on site, dewatered, and hauled off site via truck for recycling.

8.2 MAINTENANCE OF THE DAM AND PROJECT FACILITIES

Luminant conducts an annual inspection on all of their critical impoundments. Dewberry engineers reviewed two reports, March 2011 and April 2012 (See Appendix A - Docs-01 and 04). These reports did not present any serious concerns. Based on this review and the findings of our visit, operation and maintenance procedures seem to be adequate.

8.3 ASSESSMENT OF MAINTENANCE AND METHODS OF OPERATIONS

8.3.1 Adequacy of Operating Procedures

Based on the assessments of this report, operating procedures appear to be adequate.

8.3.2 Adequacy of Maintenance

Maintenance of the impounding embankments and outlet works of the Ash Disposal Ponds and the PDP Ponds appears to be generally adequate. No major maintenance issues were noted from review of the inspection reports. Based on the field observations, some minor maintenance is recommended (see Subsection 1.2.4).

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9.0 ADEQUACY OF SURVEILLANCE AND MONITORING PROGRAM

9.1 SURVEILLANCE PROCEDURES

Daily inspections are conducted by plant personnel. Inspection observations are documented on the Area 3 Shift Log visual inspection check list and report (see Appendix A - Doc 05).

Annual inspections

Luminant conducts an annual inspection of all their critical impoundments. Dewberry engineers reviewed two annual reports, March 2011 and April 2012. (See Appendix A - Docs-01 and 04) These reports did not reflect any serious concerns.

9.2 INSTRUMENTATION MONITORING

The Martin Lake Stream Electric Plant ash impoundment dikes PDP-4 and PDP-5 have a piezometric monitoring system. The data were not provided to Dewberry.

9.3 ASSESSMENT OF SURVEILLANCE AND MONITORING PROGRAM

9.3.1 Adequacy of Inspection Program

Based on the data reviewed by Dewberry, including observations during the site visit, the inspection program is adequate

9.3.2 Adequacy of Instrumentation Monitoring Program

Piezometric data, though available, is not required to determine the safety of the CCW management units.