ANNUAL SURFACE IMPOUNDMENT INSPECTION REPORT LUMINANT – MONTICELLO STEAM ELECTRIC STATION BOTTOM ASH PONDS TITUS COUNTY, TEXAS

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1.0 INTRODUCTION

Luminant Power (Luminant) operates the Monticello Steam Electric Station (MOSES) located off FM 127 approximately nine miles southwest of Mount Pleasant, Texas (see Figure 1). The MOSES consists of three coal/lignite-fired units with a combined operating capacity of approximately 1,880 megawatts. Coal Combustion Residuals (CCR) including fly ash, bottom ash, flue gas desulfurization materials, and boiler slag are generated as part of MOSES unit operation. The CCRs are transported off-site for beneficial reuse by third-parties or are managed/disposed of by Luminant at the MOSES G Ash Area in the Winfield South Mine.

The CCR Rule (40 CFR 257 Subpart D - *Standards for the Receipt of Coal Combustion Residuals in Landfills and Surface Impoundments*) has been promulgated by EPA to regulate the management and disposal of CCRs as solid waste under Resource Conservation and Recovery Act (RCRA) Subtitle D. The final CCR Rule was published in the Federal Register on April 17, 2015. The effective date of the CCR Rule is October 19, 2015.

The CCR Rule establishes operating criteria for existing CCR surface impoundments and landfills, including annual inspection requirements for all CCR units to ensure that the design, construction, operation, and maintenance of the CCR impoundment are consistent with recognized and generally accepted good engineering standards. Pastor, Behling & Wheeler, LLC (PBW) was retained by Luminant to perform the 2015 annual inspections of the CCR Units at the MOSES. This report presents the findings of the 2015 annual inspections.

1.1 Annual CCR Surface Impoundment Inspection Requirements

Section 257.83(b) of the CCR Rule specifies that annual inspections by a qualified professional engineer be performed for each CCR surface impoundment that: (1) has a dike height of five feet or more and a storage volume of 20 acre-feet or more; or (2) has a dike height of 20 feet or more. The annual CCR surface impoundment inspection for the Northeast Ash Water Retention Pond, West Ash Settling Pond, and Southwest Ash Settling Pond must include the following:

- A review of available information regarding the status and condition of the CCR unit, including files available in the operating record, such as CCR unit design and construction information required by Sections 257.73(c)(1) and 257.74(c)(1), previous periodic structural stability assessments required under Sections 257.73(d) and 257.74(d), the results of inspections by the qualified person as required under Section 257.83(a), and the results of previous annual CCR inspections (where applicable).
- A visual inspection of the CCR unit to identify signs of distress or malfunction of the impoundment and appurtenant structures, and
- A visual inspection of any hydraulic structures underlying the base of the impoundment or passing through the dike of the impoundment for structural integrity and continued safe and reliable operation.

The qualified professional engineer must prepare a report following each inspection that addresses the following:

- Any changes in geometry of the impounding structure since previous annual inspection;
- The location and type of existing instrumentation and the maximum recorded readings of each instrument since the previous annual inspection;
- The approximate minimum, maximum, and present depth and elevation of the impounded water and CCR since the previous annual inspection;
- The storage capacity of the impounding structure at the time of the inspection;
- The approximate volume of the impounded water and CCR at the time of the inspection;
- Any appearances of actual or potential structural weakness of the impoundment, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the impoundment and appurtenant structures; and
- Any other change(s) which may have affected the stability or operation of the impounding structure since the previous inspection.

1.2 MOSES Units Subject to Annual CCR Inspection Requirements

The CCR Rule defines coal combustion residuals as fly ash, bottom ash, boiler slag, and flue gas desulfurization materials generated from burning coal for the purpose of generating electricity by electric utilities and independent power producers. The annual inspection requirements of the CCR Rule apply to surface impoundments and landfills that dispose or otherwise engage in solid waste management of CCRs.

The following surface impoundments at the MOSES have been identified as CCR Units subject to the annual CCR inspection requirements:

- Northeast Ash Water Pond (NE Pond),
- West Ash Settling Pond (West Pond), and
- Southwest Ash Settling Pond (SW Pond)

These CCR Units are described in greater detail below:

<u>Bottom Ash Ponds</u>. The NE Pond, West Pond and SW Pond (collectively "Bottom Ash Ponds" or "BAPs") are located approximately 800 feet southeast of the MOSES power plant (Figure 2). The NE Pond and West Ponds share an interior embankment and are each approximately 500 feet wide, covering an area of approximately 5.5 acres and 6.6 acres, respectively. The approximately 8-acre SW Pond shares an embankment with the West Pond (North end of the SW Pond). The impoundments are constructed partially above and partially below grade and are surrounded by

engineered earthen dikes that extend approximately 10 to 20 feet above grade depending on the surrounding topography. The BAPs were originally constructed in the 1974 as a two-basin system and were subsequently segregated and relined with a 3-foot thick clay liner in 1990.

The Bottom Ash Ponds serve as settling basins to remove residual bottom ash and fines from a sump that receives the recovered sluice water associated with the dewatering bins, which is the primary bottom ash removal process at MOSES. The ponds also act as a surge basin for various water streams in the ash-water system. Water is pumped from the SW Pond, as needed, and returned for reuse in the bottom ash system. When sufficient ash has accumulated in either the NE or West Ponds, the recovered sluice water is diverted to the other pond. Ash in the inactive pond is then removed out and taken via train car to G Ash Area. Based on the design of the BAPs, minimal accumulation of solids occurs within the SW Pond.

2.0 RECORDS REVIEW

In accordance with the requirements specified in 40 CFR Part 257.83(b)(i), Luminant provided PBW with copies of the Fugitive Dust Control Plan (FDCP), weekly inspection records, available CCR unit construction drawings, and an evaluation of the structural stability of the CCR surface impoundments.

2.1 CCR Surface Impoundment Operating Records

The following sections provide a summary of the CCR FDCP and weekly surface impoundment inspection reports, which are maintained in the operating record for the CCR units.

2.1.1 CCR Fugitive Dust Control Plan

The CCR FDCP for MOSES dated October 2015 was reviewed by PBW as part of the annual CCR inspection process. The FDCP was certified by a Registered Professional Engineer on October 5, 2015, and placed into the operating record on October 16, 2015. CCR within the BAPs is managed using wet handling systems, which virtually eliminates the generation of fugitive dust. However, the MOSES CCR FDCP does include the following dust control measures:

- Water spray or fogging systems;
- Compaction;
- Vegetative cover; and
- Reduced vehicle speeds.

These dust controls shall be implemented during periodic removal of CCR solids from the BAPs. In addition, during loading of fly ash at MOSES the material is conditioned during the loading process to mitigate fugitive dust. The FDCP includes provisions to amend the plan as necessary, and the plan includes a log for citizen complaints. No citizen complaints were recorded with the FDCP at the time of the annual inspection.

2.1.1 Weekly Inspection Records

In accordance with the requirements specified in 40 CFR Part 257.83(b)(i), PBW reviewed completed weekly inspection forms for the BAPs. Luminant initiated weekly CCR inspections the week of October 12, 2015, and four weekly inspections were performed by Luminant prior to the initial Annual Inspection. No conditions with potential to result in structural weakness of the impoundment embankments or that could potentially disrupt the operation and safety of the impoundment were noted during the weekly inspections. Luminant personnel did indicate the need to address a number of

maintenance related issues including repair of a leak from an ash water transfer line that had resulted in localized erosion. Other action items noted were generally limited to routine maintenance of access roads, affixing visual markers for monitoring impoundment freeboard, and posting of signage required by the CCR regulation.

2.2 CCR Unit Design Documentation

Luminant provided PBW with the following documents that provide information concerning the design, construction and modification of the BAPs at MOSES:

- Dam Safety Assessment of CCW Impoundments (Prepared by O'Brien & Gere; dated June 3, 2015)
- CCR Study for MOSES (Prepared by Burns & McDonnell; dated July 31, 2015); and
- DRAFT 2014 Critical Impoundment Inspection Report (Prepared by Pinnacle Technical Resources, Inc.)

Section 3.0 of the Dam Safety Assessment Report summarizes the results of an available records review concerning the original design, construction, operation and inspection of the BAPs at MOSES. This report also includes the "Ash and Scubber Pond Stability Investigation Report" and an addendum prepared by Golder and Associates. Findings presented in the Dam Safety Assessment Report indicate that the original construction of a 2-basin bottom ash pond occurred in 1974. Although no original construction design or as-built drawings were available, the embankments were reportedly constructed using clayey fill (e.g. sandy clay or clayey sand) that was likely obtained from an on-site borrow source. The westernmost basin of the original 2-basin system was apparently modified in 1989 by constructing an internal embankment to segregate the west pond into two ponds (e.g. the existing West Pond and SW Pond).

The BAPs are designed as a closed-loop system using pumps for surface withdrawal of water from the surface impoundments as needed. The SW Pond was originally constructed to allow for fluid take off from a valve controlled outlet structure that discharged to a concrete chamber (transfer station) located immediately south of the SW Pond; however, the dewatering system has reportedly never been used. The control for the drainage valve is located on the manway that extends into the SW Pond from the southern embankment. The drainage control valve, piping and other components of the dewatering system are not visible and thus were not included in the annual inspection.

2.3 CCR Unit Structural Stability Assessment

Section 3.2.3 of the dam safety assessment report (O'Brien & Gere, 2015) includes a summary of stability analyses of the BAPs at MOSES that was performed by Golder and Associates. The stability analysis included an evaluation of the BAP embankments for both the long term and short term steady-

state seepage conditions using both the empty and full pond scenarios. The Golder slope stability evaluation concluded that the critical embankment slopes in the BAPs were stable under short-term and long-term conditions.

3.0 CCR SURFACE IMPOUNDMENT INSPECTION

The annual inspection of the MOSES CCR surface impoundments was performed on November 3, 2015. Brian Thomas, a registered professional engineer in the State of Texas, was accompanied by Luminant qualified persons (Jeffrey Norfleet, Tracey Lamm and Bennett Jones) during the inspection. The inspection consisted of a walking visual survey of the downstream embankments, the embankment crest, and upstream embankments of the BAPs. Current observations were recorded in the field using a handheld GPS in order to locate areas that require further monitoring and/or action to address potential areas of concern noted during the inspection (Figure 3). Photographs of the surface impoundments during the annual inspection are included as Appendix A and Figure 4 illustrates the location where each photograph was taken. The following sections summarize the results of the initial annual inspection, including specific observations related to the structural elements of the MOSES CCR surface impoundments.

3.1 Surface Impoundment – Downstream Embankment

The downstream embankments of the BAPs were generally in good condition and no visual evidence or slope movement or misalignment was noted during the inspection. With exception of areas along the north and west sides of the West Pond, the embankments were well vegetated with grasses that have been mowed to a height of less than 6-inches. The apparent beneficial use of bottom ash as fill was observed along the piping corridor on the west embankment of the West Pond. Although the relatively short slope lengths in this area have limited erosion of fill on the embankment, topsoil should be placed over this portion of the embankment to ensure adequate vegetative cover is maintained. Similar conditions were noted near the northwest corner of the West Pond; however, a former localized slope failure was noted on the surficial bottom ash placed on the slope in this area, and the localized feature does not pose a significant threat to the structural integrity of the embankment. As indicated on Figure 3, the following areas were noted for future monitoring or repair:

- Repair erosion undermining the pipe rack footing on the north side of the West Pond.
- Repair surficial rutting on the slope near the southeast corner of the NE Pond.
- Monitor wet conditions near the toe of the embankments at the following locations (Note Minor re-grading may improve drainage near the embankment toe in these areas):
 - South of the SW Pond
 - Northwest of the NE Pond along the piping corridor; and
 - Near the northeast corner of the NE Pond.
- Transfer piping impairs drainage relief near the embankment toe on the west side of both the SW Pond and West Pond as well as on the north side of the NE Pond. If removal of out-of-service piping is practicable, these areas should be re-graded to improve drainage. Otherwise

wet soil conditions should be monitored to ensure the areas dry fully during seasonally dry periods. Growth of woody vegetation should also be controlled in these areas to ensure sufficient visibility for inspection and minimize potential impacts to slope stability.

- Continue monitoring an apparent slope failure near the northeast corner of the West Pond. This area of slope instability appears related to the presence of bottom ash placed on the original embankment slope as part of an extension of the embankment to allow for placement of a piping corridor. Hence, continued monitoring is sufficient to ensure current conditions remain stable and the underlying original embankment materials remain stable.
- Monitor areas of localized erosion near the influent pipe rack to the West Pond, under the influent pipe rack for the NE Pond, and on the slope near the southwest corner of the NE Pond.

3.2 Surface Impoundment – Embankment Crest

The majority of the embankment crest is improved with a crushed aggregate access road. Access roads are generally in good conditions with limited areas of shallow ponding along the roadways, which has been noted for maintenance in recent weekly inspections. Two shallow, concrete-lined open channels are present on the common embankment between the NE and West Ponds as well as between the West and SW Ponds. These concrete-lined channels are each equipped with a sluice gate to allow for equalization of the water level between the three ponds. No visual evidence of slope failures or misalignments were noted on the crest of the embankments or associated with the concrete-lined drainage channels.

3.3 Surface Impoundment – Upstream Embankment

The upstream embankments of the NE and West Ponds are armored with concrete revetment matting, which is generally in good condition and prevents erosion of the interior slopes via either wave action or erosion from run-off. Rip rap provides similar protection of the interior slope of the SW Pond. Cattails and other aquatic vegetation are present in areas where solids have accumulated over the revetment matting in the NE and West Ponds. This vegetation does not limit inspection of the interior embankment during normal freeboard conditions and should be removed in conjunction with future removal of CCR. Limited accumulation of solids occurs in the SW Pond and aquatic vegetation present in this pond does not limit the inspection of the interior embankment during normal freeboard conditions. Management of aquatic vegetation may be considered in conjunction with lower water level conditions; however, current conditions do not warrant removal of aquatic vegetation in the West Pond.

A temporary CCR transfer area has been designated near the southeast corner of the NE Pond, and transport trucks are currently backed into place to discharge loads of CCR in to the NE Pond (Appendix A; Photograph 10). This temporary transfer area is underlain with a liner and surface runoff is towards the NE Pond. Concrete barriers are present to prevent haulage equipment from backing onto the revetment matting. Upon ceasing transfer of CCR in this area, the area should be restored and the revetment matting should be inspected for potential damage from vehicular traffic.

4.0 SUMMARY OF FINDINGS

The findings of the 2015 annual inspection of the MOSES CCR surface impoundments are summarized herein. Luminant qualified persons responsible for the weekly inspections accompanied PBW during the annual inspection to ensure that observed conditions do not represent a change in geometry of the impounding structure since previous inspection or have potential to disrupt operation and safety of the CCR unit.

4.1 Visual Observation of Embankment Alignments

Consistent with previous structural integrity evaluations, critical impoundment inspections performed on behalf of Luminant, and recently completed weekly inspections, no evidence of slope movements or misalignments that have potential to affect the structural integrity of the surface impoundment embankments were noted.

4.2 Visual Observation of Surface Impoundment Capacity

The three CCR surface impoundments at MOSES are equipped with sluice gates that allow for each of the three ponds to be hydraulically connected such that the water level elevation can be allowed to equilibrate between the BAPs. A staff plate is affixed to the walk way on the pier on the south end of the SW Pond. The staff plate has been surveyed relative to the site-specific vertical datum and is used for daily monitoring of the water level within the BAPs. A water elevation of 383.4 feet above mean sea level (MSL) was observed within the BAPs during the annual inspection. The maximum impounded elevation of water in the BAPs within the past year was at an elevation of 384 feet above mean sea level (MSL), which represents a minimum freeboard of approximately 2.5 feet. The minimum observed water elevation during the past year was 381 feet-MSL. Based on available construction data, each of the BAPs were constructed to provide the following estimated storage capacities:

- NE Pond: 100 acre-feet
- West Pond: 130 acre-feet
- SW Pond: 145 acre-feet

A visual estimate of the quantity of impounded solids present in the BAPs at the time of the annual inspection suggests that the NE and West ponds contain approximately 70 and 50 percent of available capacity, respectively. Due to the limited volume of solids discharged to the SW Pond, less than 10 percent of the available storage capacity of the SW Pond is occupied by impounded CCR. It should be noted that no soundings or other quantitative measurements were used to estimate the current volume of CCR stored within the BAPs or the volume of water currently impounded.

4.3 Surface Impoundment – Visual Observations of Structural Integrity

No conditions were observed during the annual inspection that indicate an actual or potential structural weakness of the CCR unit is present. In addition, conditions observed during the annual inspection indicate that a disruption or the potential for disruption of the operation and safety of the CCR unit is not currently anticipated. A review of weekly inspections completed to date by Luminant and the completion of the annual inspection suggest that no changes that may affect the stability or operation of impounding structure have been observed.

5.0 **RECOMMENDATIONS**

The following recommendations are based on the results of the annual CCR inspection of the MOSES Ash Pond conducted November 3, 2015:

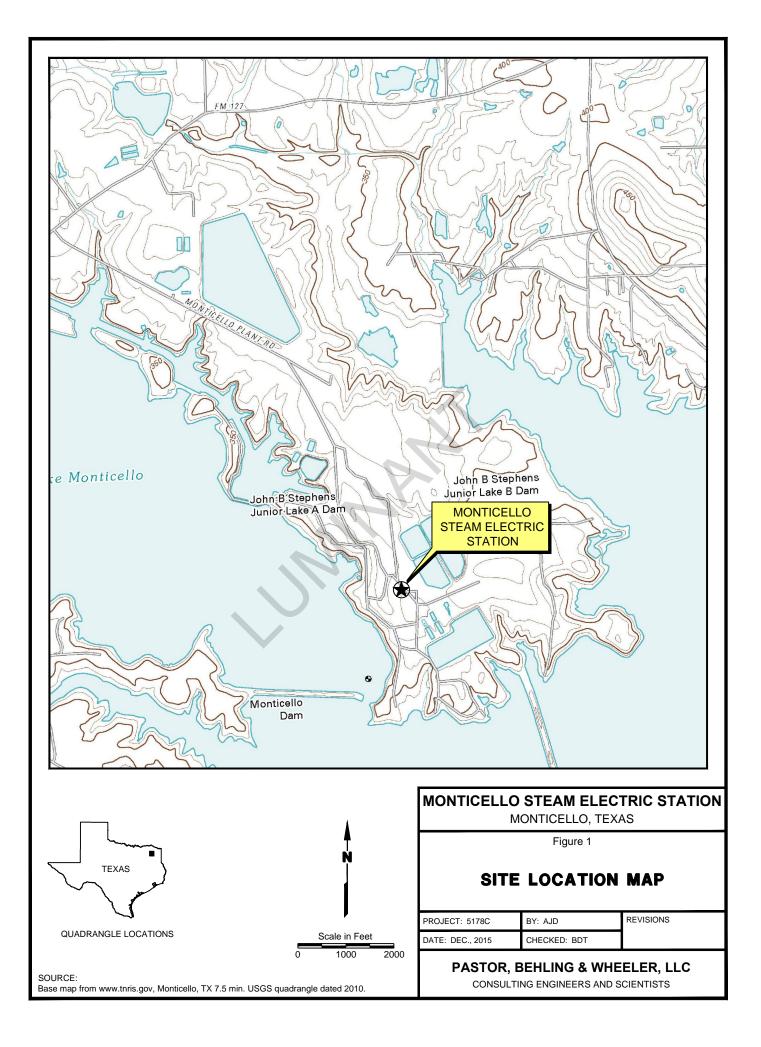
- Luminant should continue to monitor the areas of concern documented during the annual inspection and listed in Section of 3.0. However, based on a review of the slope stability assessment and the annual inspection activities presented herein, the recommended drainage improvements and minor erosion repairs do not currently pose a significant risk to the structural stability of the embankments. Hence, the recommended actions should only be completed when surface conditions are sufficiently dry to allow for equipment access without causing further damage to the areas of concern.
- This annual inspection report should be completed by filing the report in the operating record of the MOSES no later than January 19, 2016.
- The second annual inspection should be performed in November 2016 unless otherwise allowed by the rule.

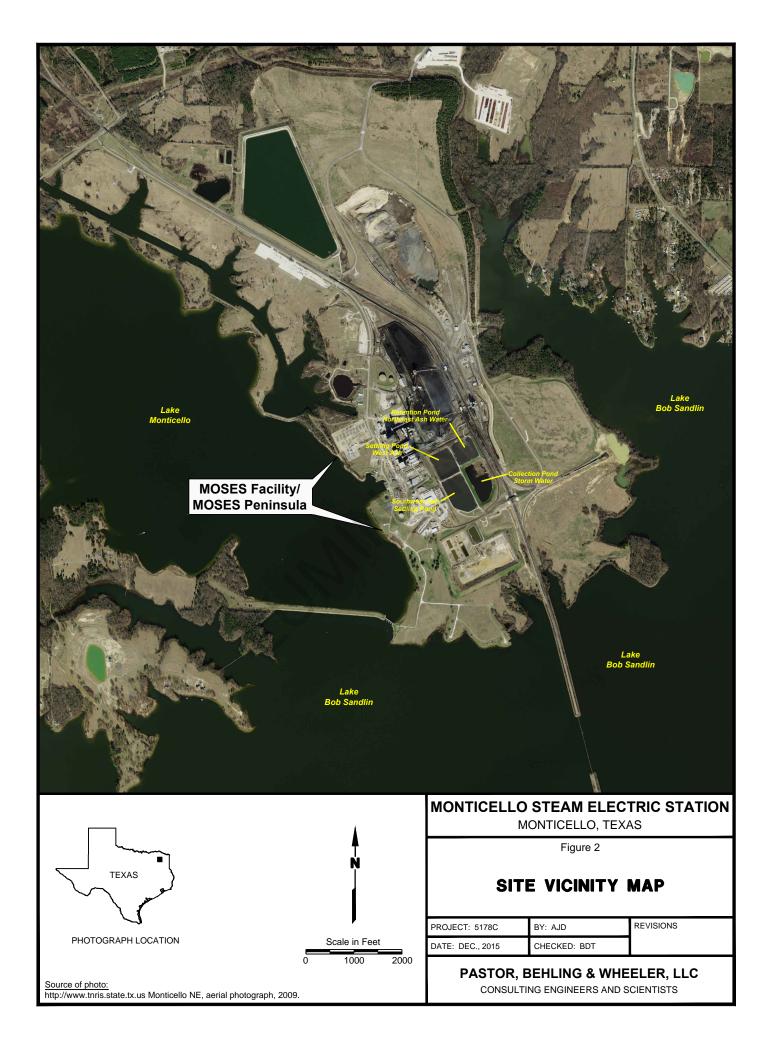
6.0 **REFERENCES**

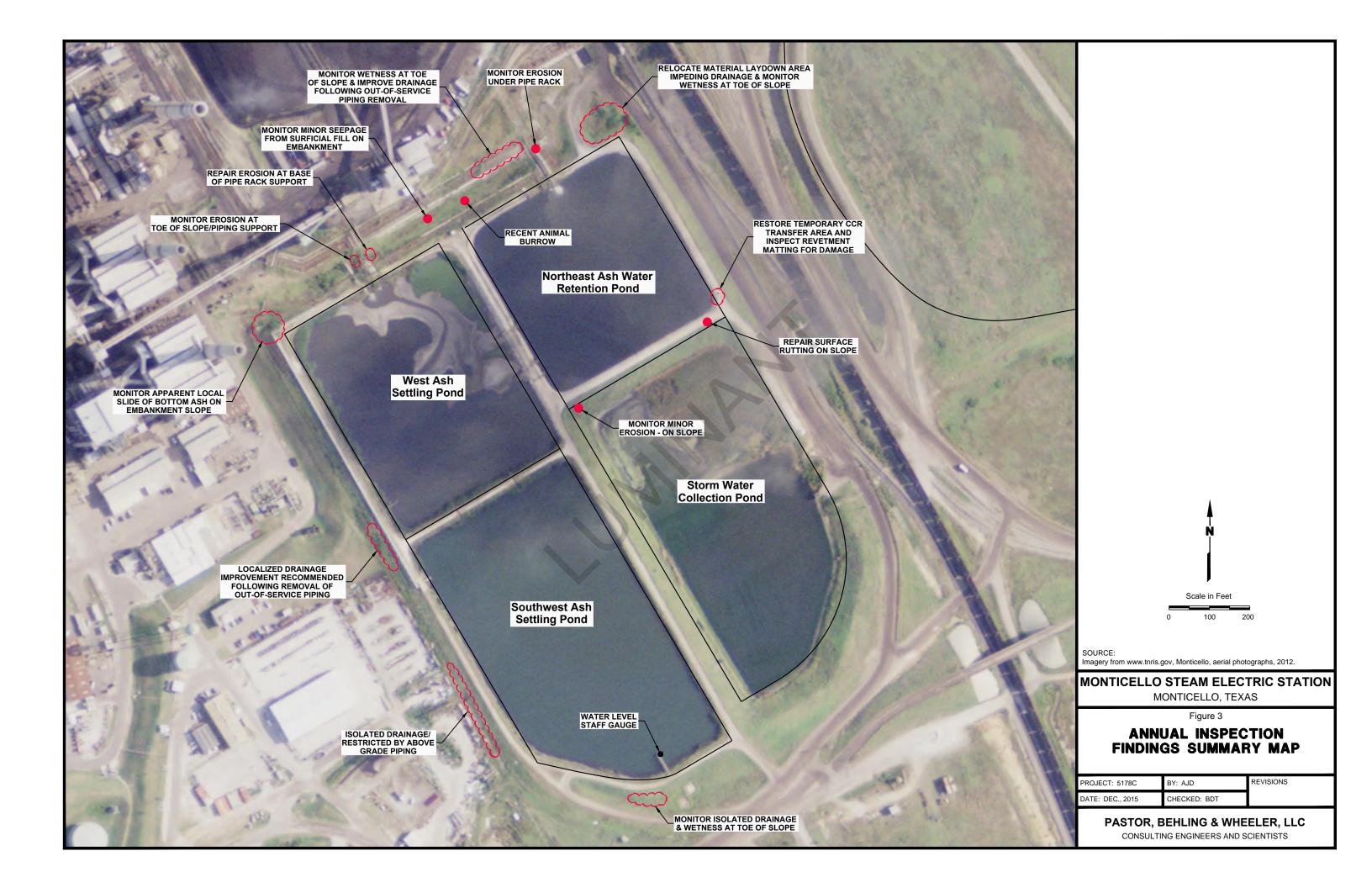
Burns & McDonnell, 2015. CCR Study for Monticello Steam Electric Station, July 31.

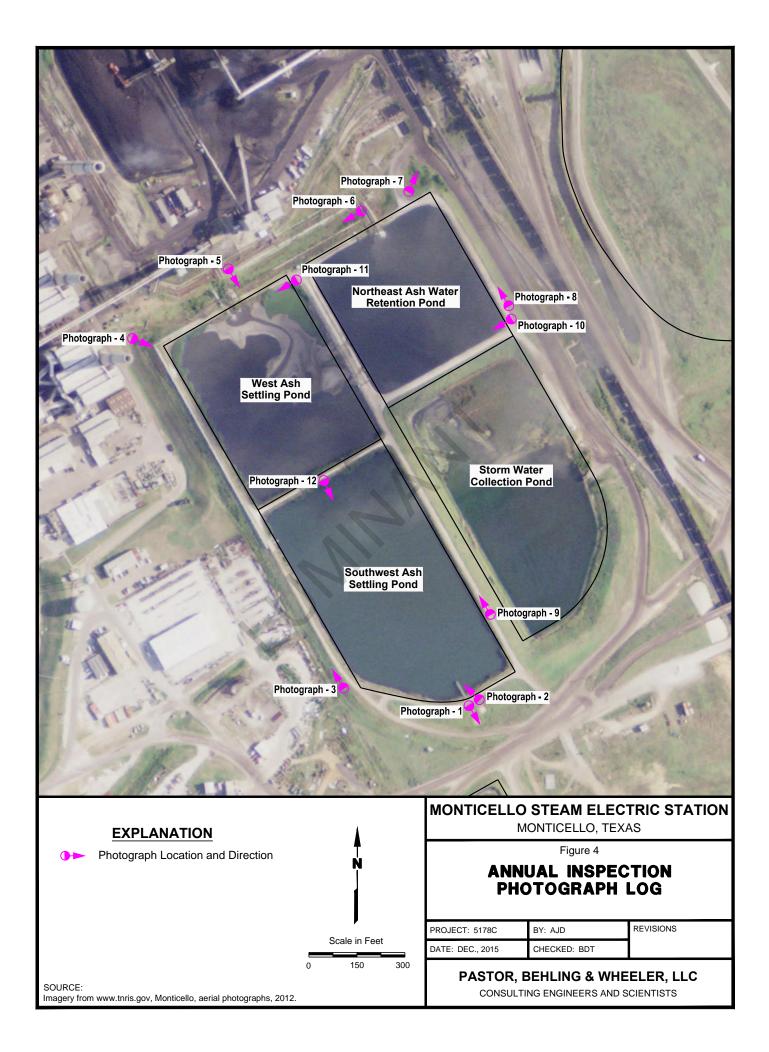
- O'Brien & Gere, 2014. Dam Safety Assessment of CCW Impoundments, Luminant Generation Co., LLC/Monticello Steam Electric Station, June 3.
- Pinnacle Technical Resources, Inc., 2014. Draft 2014 Critical Impoundment Inspection Report for *Monticello Steam Electric Station*.

FIGURES







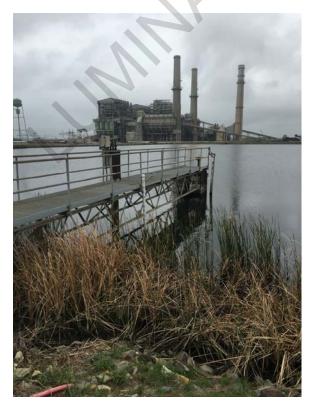


APPENDIX A

INSPECTION PHOTOGRAPHS



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 1 – (View SE) Concrete collection chamber for Pond dewatering system.	or inactive SW
PROJECT NO.	SITE NAME	Monticello Steam Electric Station– Annual Surface	DATE
5178-A		Impoundment Inspection	11/3/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 2 – (View NW) SW Pond pier/manway with s visible.	taff plate
PROJECT NO.	SITE NAME	Monticello Steam Electric Station– Annual Surface	DATE
5178-A		Impoundment Inspection	11/3/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 3 – (View NW) Downstream embankment of piping at toe. Monitor wet areas and improve drainage follo service piping removal.	
PROJECT NO.	SITE NAME	Monticello Steam Electric Station– Annual Surface	DATE
5178-A		Impoundment Inspection	11/3/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 4 – (View SE) Apparent local slope failure of bottom ash placed over original embankment material at northwest corner of West Pond.	
PROJECT NO.	SITE NAME	Monticello Steam Electric Station– Annual Surface	DATE
5178-A		Impoundment Inspection	11/3/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 5 – (View SE) Erosion undermining footing for support on north embankment of West Pond.	or pipe rack
PROJECT NO.	SITE NAME	Monticello Steam Electric Station– Annual Surface	DATE
5178-A		Impoundment Inspection	11/3/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 6 – (View SW) Piping corridor at toe of NE Pond embankment. Piping impedes toe drainage, monitor wet conditions.	
PROJECT NO.	SITE NAME	Monticello Steam Electric Station– Annual Surface	DATE
5178-A		Impoundment Inspection	11/3/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 7 – (View NE) Wet area at toe of NE Pond em Remove material laydown area and improved drainage.	ıbankment.
PROJECT NO.	SITE NAME	Monticello Steam Electric Station– Annual Surface	DATE
5178-A		Impoundment Inspection	11/3/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 8 – (View NW) View of Eastern embankment	of NE Pond.
PROJECT NO.	SITE NAME	Monticello Steam Electric Station– Annual Surface	DATE
5178-A		Impoundment Inspection	11/3/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 9 – (View NW) Crest of SW Pond embankmet water collection pond visible at right.	nt with storm
PROJECT NO.	SITE NAME	Monticello Steam Electric Station– Annual Surface	DATE
5178-A		Impoundment Inspection	11/3/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 10 – (View SW) Temporary CCR transfer area	a NE Pond.
PROJECT NO.	SITE NAME	Monticello Steam Electric Station– Annual Surface	DATE
5178-A		Impoundment Inspection	11/3/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 11 – (View SW) View of West Pond with influright.	uent piping at
PROJECT NO.	SITE NAME	Monticello Steam Electric Station– Annual Surface	DATE
5178-A		Impoundment Inspection	11/3/2015



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 12 – (View SE) Concrete-lined open channel connection between West and SW Ponds.	
PROJECT NO.	SITE NAME	Monticello Steam Electric Station– Annual Surface	DATE
5178-A		Impoundment Inspection	11/3/2015