



 **SAN MIGUEL ELECTRIC COOPERATIVE, INC.**

**San Miguel Electric Station
Atascosa County, Texas**

CCR Impoundment Inspection Report

January 15, 2016

HDR Project No. 272108

Texas P.E. Firm Registration No. F-754



[Handwritten signature]
1/15/16

Contents

Summary of Findings.....	1
Background.....	2
Equalization Pond	4
Crest	4
Upstream Embankment.....	4
Downstream Embankment.....	5
Ash Water Transport Ponds A and B.....	7
Crest	7
Upstream Embankment.....	8
Downstream Embankment.....	9
FGD Sludge Pond	12

Attachment 1: Inspection Checklists

Summary of Findings

An inspection of Coal Combustion Residual (CCR) impoundments was completed at the San Miguel Steam Electric Station located in Atascosa County, Texas, on December 17, 2015. The following is a summary list of critical and moderate action items observed during the inspection:

Equalization Pond

- Upstream embankment wave erosion
- Upstream embankment bushes/trees
- Downstream embankment bushes/trees

Ash Water Transport Ponds A and B

- Upstream embankment wave erosion
- Upstream embankment bushes/trees
- Upstream embankment erosion gullies
- Downstream embankment bushes/trees
- Downstream embankment seepage
- Downstream embankment erosion gullies

FGD Sludge Pile

- No critical or moderate items noted

Background

The Coal Combustion Residuals (CCR) impoundments at the San Miguel Steam Electric Station were visually inspected for features which could undermine the integrity of the containment systems. Items which could potentially affect the integrity of the structure are then documented in this report and recommendations are given for corrective action.

The Texas Commission of Environmental Quality has published guidelines for the safe operation and maintenance of impoundments entitled “Guidelines for Operation and Maintenance of Dams in Texas”. The general guidance given in this manual was used as a basis for inspecting the impoundments and in the development of action items. The inspection observed and documented conditions of the upstream embankment, crest and downstream embankment of each impoundment as applicable.

This report provides action items to San Miguel based on their relative priority for implementation and communicates that priority by assigning it either a “Critical Item”, “Moderate Item” or “Minor Item” classification to each action item identified.

“Critical Items” are items that are crucial to the integrity of the impoundment and require immediate attention such as:

- An impoundment about to be overtopped or is overtopping
- An impoundment about to be breached (by progressive erosion, slope failure or other circumstance)
- An impoundment showing signs of piping or internal erosion indicated by cloudy seepage
- Evidence of excessive seepage such as a saturated embankment or seepage on the downstream face of the impoundment
- New embankment slides, structural cracking or sinkholes

“Moderate Items” are items that should be addressed at the earliest opportunity and before the next inspection. Moderate items include:

- Remove all underbrush and trees from the impoundment and establish good grass cover
- Fill animal burrows
- Restore and reseed eroded areas and gullies on impoundment
- Repair defective valves, pipes, walkways, structural foundations and other appurtenant features

“Minor Items” are items which will require continual maintenance on a routine basis or require additional inspections and monitoring throughout the year to determine if the item needs to be addressed before it becomes a more serious problem. “Minor Items” include:

- Small leaks/seepage from transmission pipes
- Minor erosion rills
- Mowing of grass/vegetation on embankments
- Moist soils at downstream toe of embankments

- Vehicle rutting on crest

Inspections of the San Miguel Steam Electric Station CCR Impoundments occurred on December 17, 2015. The inspections were performed by:

- Lane Williams, San Miguel Electric Cooperative, Inc.
- Dave Vogt, HDR Engineering, Inc.

The last formal inspection of San Miguel's CCR impoundments occurred on February 1, 2010.

The CCR impoundments at San Miguel contain liquids, sludges, slurries and/or solid process and waste materials resulting from the combustion of coal. The CCR impoundments inspected at this steam electric station were (Figure 1):

- Equalization Pond
- Ash Water Transport Ponds A and B
- FGD Sludge Pond



Figure 1: San Miguel CCR Impoundments

A storm event of 0.38 inches occurred on December 13, 2015. The inspection was performed on December 17, 2015. During the inspection, the ground was moist with areas of standing water.

Equalization Pond

The Equalization Pond is located approximately 1,500 feet east of the plant. The Equalization Pond has a 25-acre surface area and can store approximately 410 acre-feet. The pond is used primarily as a relief for the Ash Transport Ponds by providing additional storage capacity for water or CCR material and by providing make-up water to the system. The pond has a minimum 18-inch freeboard and was observed to have a 21-inch freeboard on the day of inspection.

Crest

In general, the crest of the pond appeared to be in good condition.

MINOR ITEM: The crest of the impoundment had areas with moderate rutting from vehicular traffic (Figure 2) in localized areas around the pond.

Recommendation 1: Repair damaged areas and grade to drain.

Recommendation 2: Discourage vehicular traffic from driving on impoundment crests after storm events.



Figure 2: Crest Rutting

Upstream Embankment

MODERATE ITEM: Wind/Wave Erosion is occurring at the water line of the pond (Figure 3).

Recommendation 1: Continue to monitor erosion to protective cover over liner and place riprap, erosion matting or concrete revetment if erosion persists.



Figure 3: Wind/Wave Erosion Gullies

MODERATE ITEM: Bushes and trees are growing around the interior of the pond (Figure 4).

Recommendation 1: Remove undesirable vegetation (bushes) from upstream embankment. Repair surface areas disturbed during removals.

Recommendation 2: Apply herbicide to vegetation within pond and monitor for impacts to liner.



Figure 4: Vegetation Growing in Pond

Downstream Embankment

In general, the downstream embankment appeared to be in good condition and well vegetated (Figures 5 and 6).



Figure 5: Downstream Embankment



Figure 6: Downstream Embankment

MODERATE ITEM: Small trees/bushes are growing on the downstream embankment (Figures 7 and 8).

Recommendation 1: Remove undesirable vegetation. Repair surface in areas disturbed by removals.



Figure 7: Tree on Downstream Embankment



Figure 8: Bush on Downstream Embankment

MINOR ITEM: Water is ponding in low areas or depressions around the toe of the downstream embankment (Figures 9 and 10). It is assumed the water was from recent storm activities, but this could also represent water migrating from the pond. The surface soils and slopes adjacent to the ponded areas appear largely unaffected/intact.

Recommendation 1: Continue to monitor this area, especially during dry (rain free) periods to determine if this is storm water or water migrating from the pond.

Recommendation 2: Provide compacted cohesive soil and grade to eliminate the ponding area.



Figure 9: Ponded Water Toe of Embankment



Figure 10: Ponded Water Toe of Embankment

Ash Water Transport Ponds A and B

There are two ash impoundments situated to the south of the electric plant and each has an approximate surface area of 13 acres. Ash Water Transport Pond A is located to the north of Ash Water Transport Pond B. The excess ash from the electric plant is deposited in these impoundments and the water in the impoundments is used to cool the plant by a recirculation method. The two ash impoundments are connected at the eastern end via a small weir structure. The two ash impoundments and equalization basin were built in 1977. Each pond can hold approximately 216 acre-feet. On the day of the inspection, the surface elevation of the pond was 2 inches above the 18 inch freeboard elevation.

Crest

In general, the crest of the pond appeared to be in good condition.

MINOR ITEM: The crest of the impoundment had areas with moderate rutting from vehicular traffic (Figure 11) in localized areas around the pond.

Recommendation 1: Repair damaged areas and grade to drain.

Recommendation 2: Discourage vehicular traffic from driving on impoundment crests after storm events.



Figure 11: Crest Rutting

Upstream Embankment

MODERATE ITEM: Wind/Wave Erosion is occurring at the water line of the pond (Figure 12).

Recommendation 1: Continue to monitor erosion to protective cover over the clay liner and place riprap, erosion matting or concrete revetment if erosion persists.



Figure 12: Wind/Wave Erosion Gullies

MODERATE ITEM: Bushes and trees are growing around the interior of the pond (Figures 13 and 14).

Recommendation 1: Remove undesirable vegetation (bushes) from upstream embankment. Repair surface areas disturbed during removals.

Recommendation 2: Apply herbicide to vegetation within pond and monitor for impacts to liner.



Figure 13: Vegetation Growing in Pond



Figure 14: Vegetation Growing in Pond

MODERATE ITEM: Erosion gullies (Figure 15) were found on the embankment in isolated areas around the perimeter of the disposal area.

Recommendation 1: Scarify and re-grade areas impacted by erosion gullies. Place cohesive fill as needed to achieve uniform surface grades. Compact any fill and re-graded soils. Re-seed. Lightly loosen uppermost soils during re-seeding to facilitate re-vegetation.

Recommendation 2: Place riprap or stone in areas of concentrated flow.

Recommendation 3: Continue to monitor for erosion.



Figure 15: Erosion Gully

Downstream Embankment

In general, the downstream embankment appeared to be in good condition and well vegetated (Figure 16).



Figure 16: Downstream Embankment

MODERATE ITEM: Small trees/bushes are growing on the downstream embankment (Figure 17).

Recommendation 1: Remove woody vegetation. Repair surface in areas disturbed by removals.



Figure 17: Tree/Bush on Downstream Embankment

MINOR ITEM: Water is ponding around the toe of the downstream embankment (Figure 18). It is assumed the water was from recent storm activities, but this could also represent water migrating from the pond.

Recommendation 1: Continue to monitor this area, especially during dry (rain free) periods to determine if this is storm water or water migrating from the pond.

Recommendation 2: Provide compacted cohesive soil and grade to eliminate the ponding area.



Figure 18: Ponded Water Toe of Embankment

MODERATE ITEM: Water appears to be seeping from the toe of the downstream embankment of Ash Transport Pond A (Figure 19) along the western edge. The water was not cloudy nor was it flowing on the day of observation. Soils in the adjacent areas are wet and appeared saturated.

Recommendation 1: Initiate investigation recommendations provided by HDR in a memorandum dated 4/28/2015 to determine the root cause and course of action to address the seepage and the potential slope instability.

Recommendation 2: Continue to monitor seepage for turbidity or signs of slope distress. Consult an engineer if conditions deteriorate.



Figure 19: Toe Seep on Downstream Embankment

MODERATE ITEM: An erosion gully (Figure 20) was found on the embankment at the northwest corner of Ash Transport Pond A.

Recommendation 1: Scarify and re-grade areas impacted by erosion gullies. Place cohesive fill as needed to achieve uniform surface grades. Compact any fill and re-graded soils. Re-seed. Lightly loosen uppermost soils during re-seeding to facilitate re-vegetation.

Recommendation 2: Place riprap or stone in areas of concentrated flow.

Recommendation 3: Continue to monitor for erosion.



Figure 20: Erosion Gully

FGD Sludge Pile

The FGD Sludge Pile (Pile) is approximately 0.25 acres in size and receives Flue Gas Desulfurization (FGD) scrubber material from the plant via a conveyor system (Figure 21). Approximately once per day, a front end loader places the FGD material into haulers which then take the material to the landfill for disposal.

The Pile relies on clayey soils under the pile to protect the groundwater rather than a constructed or manufactured liner. SMEC has placed two monitoring wells adjacent to the pile to identify if there is any possible migration of constituents of concern into the ground.

A concrete wall partially contains the Pile. On the day of the inspection, it was noted that there is evidence of corrosion on the wall and structural cracks (Figure 21). A misting system is mounted to the conveyor built to minimize fugitive dust emissions from the Pile.



Figure 21: FGD Sludge Pile

Storm water runoff from the Pile flows to an unlined drainage channel which conveys the water to the Lignite Yard Retention Pond.



Figure 22: FGD Sludge Pile

ATTACHMENT 1
Inspection Checklists

IMPOUNDMENT INSPECTION CHECKLIST

Impoundment: Equalization Pond			Date: 12/17, 2015	Weather: Sunny										
Inspected By: Lane Williams, SMEC and Dave Vogt, HDR			Last Inspection Date:											
Element	Item	Component	Current Observations	Change From Last Inspection					Action					
				Similar	Improved	Deteriorated	Unknown		OK	Critical	Moderate	Minor	Monitor	
Crest	1	Surface Cracking					X		X					
	2	Animal Burrows					X		X					
	3	Crest Sinks					X		X					
	4	Horizontal Alignment					X		X					
	5	Ruts/Puddles					X					X		
	6	Vegetation					X		X					
	7	Trees					X		X					
	8	Piezometer Readings												
	9	Piezometer Condition												
Upstream Embankment and Cap Area	10	Erosion					X		X					
	11	Vegetation/Trees					X				X			
	12	Berm Slide, Slough					X		X					
	13	Slope Protection					X				X			
	14	Berm Sinks					X		X					
	15	Animal Burrows					X		X					
	16	Abutment Contact					X		X					
	17	Erosion					X		X					
	18	Vegetation					X		X					
	19	Trees					X		X					
	20	Drains					X		X					
21	Berm Bulges					X		X						
Downstream Embankment	22	Wet Areas/Seepage					X							X
	23	Estimated Seepage Rate					X		X					
	24	Seepage Description					X		X					
	25	Toe Drain Status					X		X					
	26	Berm Slide/Slough					X		X					
	27	Abutment Contact					X		X					
	28	Animal Burrows					X		X					
	29	Erosion					X		X					
	30	Unusual Movement					X		X					
	31	Vegetation					X				X			
	32	Trees					X				X			
	33	Piezometer Reading					X							
	34	Piezometer Condition					X							

Comments and Photo Information:
 Minor Item: Crest Rutting
 Moderate Item: Wind/Wave Erosion on Upstream Embankment
 Moderate Item: Upstream Embankment Vegetation
 Moderate Item: Downstream Embankment Vegetation

IMPOUNDMENT INSPECTION CHECKLIST

Impoundment: Ash Transport Ponds A and B			Date: 12/17, 2015	Weather: Sunny										
Inspected By: Lane Williams, SMEC and Dave Vogt, HDR			Last Inspection Date:											
Element	Item	Component	Current Observations	Change From Last Inspection					Action					
				Similar	Improved	Deteriorated	Unknown		OK	Critical	Moderate	Minor	Monitor	
Crest	1	Surface Cracking					X		X					
	2	Animal Burrows					X		X					
	3	Crest Sinks					X		X					
	4	Horizontal Alignment					X		X					
	5	Ruts/Puddles					X					X		
	6	Vegetation					X		X					
	7	Trees					X		X					
	8	Piezometer Readings												
	9	Piezometer Condition												
Upstream Embankment and Cap Area	10	Erosion					X				X			
	11	Vegetation/Trees					X				X			
	12	Berm Slide, Slough					X		X					
	13	Slope Protection					X		X					
	14	Berm Sinks					X		X					
	15	Animal Burrows					X		X					
	16	Abutment Contact					X		X					
	17	Erosion					X		X					
	18	Vegetation					X		X					
	19	Trees					X		X					
	20	Drains					X		X					
21	Berm Bulges					X		X						
Downstream Embankment	22	Wet Areas/Seepage					X				X			
	23	Estimated Seepage Rate					X		X					
	24	Seepage Description					X		X					
	25	Toe Drain Status					X		X					
	26	Berm Slide/Slough					X		X					
	27	Abutment Contact					X		X					
	28	Animal Burrows					X		X					
	29	Erosion					X				X			
	30	Unusual Movement					X		X					
	31	Vegetation					X				X			
	32	Trees					X				X			
	33	Piezometer Reading					X							
	34	Piezometer Condition					X							

Comments and Photo Information:
 Minor Item: Crest Rutting
 Moderate Item: Wind/Wave Erosion on Upstream Embankment
 Moderate Item: Upstream Embankment Vegetation
 Moderate Item: Upstream Erosion Gullies
 Moderate Item: Downstream Embankment Vegetation
 Moderate Item: Downstream Seepage
 Moderate Item: Downstream Erosion Gullies