REPORT

COAL COMBUSTION RESIDUALS LANDFILL ANNUAL INSPECTION REPORT

Escalante Generating Station

Submitted to: Tri-State Generation and Transmission Association, Inc.
1100 West 116th Avenue
Westminster, Colorado 80234

Submitted by: Golder Associates Inc.
44 Union Boulevard, Suite 300
Lakewood, Colorado 80228

TAMMY L. RAUEN
NEW MEXICO
20818
PROFESSIONAL ENGINEER

Tammy Rauen
1/15/16

January 18, 2016

1533418CCR

A world of capabilities delivered locally

Golder Associates

Table of Contents

List of Figures

List of Appendices

1.0 INTRODUCTION

1.1 Background

Golder Associates Inc. (Golder) has prepared this annual inspection report for Tri-State Generation and Transmission Association, Inc. (Tri-State) to summarize our review of available information and visual observation of the active disposal facility for coal combustion residuals (CCRs) at Escalante Generating Station. The facility classifies as an existing CCR landfill in the Code of Federal Regulations (CFR) under 40 CFR 257. The intent of Golder's review of available information and visual observation was to satisfy the requirements of 40 CFR 257.84(b)(1), which entails periodic completion of these activities by a qualified professional engineer to verify that the design, construction, operation, and maintenance of the facility are consistent with recognized and generally accepted good engineering practice. The discussion presented in this report is limited to the active CCR disposal facility at Escalante Generating Station and does not include consideration of the inactive CCR disposal facility at the site. This report is the initial annual inspection report for the facility under 40 CFR 257.84(b)(1).

This report presents a description of the facility (Section 1), a summary of Golder's review of available information about the facility (Section 2), the findings from Golder's visual observation of the facility (Section 3), and Golder's conclusions and recommendations (Section 4).

1.2 Facility Description

Escalante Generating Station is a 250-megawatt, coal-fired electric generation plant. It is located approximately 4.2 miles northwest of Prewitt, New Mexico. Tri-State currently generates fly ash, bottom ash, and flue gas desulfurization (FGD) material at Escalante Generating Station and disposes these materials at the facility. The facility is one of several site features regulated by the New Mexico Environmental Department (NMED), Ground Water Quality Bureau, under Discharge Permit DP-206. Filling began at the facility in 2009, and CCRs have been deposited over approximately 12 acres to date. The total facility footprint is approximately 54 acres.

The facility is located immediately south of the inactive CCR disposal facility at the site. Placement of CCRs is currently occurring at the east end of the facility, with future placement planned to progress westward as design grades or interim grades are reached. As the height of the fill increases, CCRs are being placed such that they abut ("piggy back") the cover system for the inactive CCR disposal facility on the north end. The outer embankment slopes for the facility are designed at 3 horizontal to 1 vertical. No benches are currently in place. The current configuration of the facility is shown on the figure included in Appendix A.

2.0 REVIEW OF AVAILABLE INFORMATION

2.1 Information Reviewed

40 CFR 257.84(b)(1)(i) requires the annual inspection to include a review of information regarding the status and condition of the facility, including files available in the operating record. Golder reviewed information provided by Tri-State as part of our effort to verify that the design, construction, operation, and maintenance of the facility are consistent with recognized and generally accepted good engineering practice. The information Golder reviewed includes the following:

- Ground Water Discharge Permit Modification DP-206, which authorizes operation of the facility (New Mexico Environment Department 2010).
- Design and operational information for the facility (Metric Corporation 2006).
- The fugitive dust control plan for the facility (Golder Associates Inc. 2015).
- Weekly inspection forms documenting weekly inspections conducted by qualified persons employed by Tri-State between October 22, 2015, and December 15, 2015.

This report describes the initial annual inspection, so no previous annual inspection reports were available for Golder to review.

2.2 Changes in Facility Geometry

40 CFR 257.84(b)(2)(i) requires the annual inspection report to include a summary of changes in facility geometry since the previous annual inspection. Since this report describes the initial annual inspection, such a summary is not practical. The current facility configuration is reflected on the figure included in Appendix A and may serve as the reference point for a description of the changes in facility geometry in next year's annual report.

2.3 Volume Contained in the Facility

40 CFR 257.84(b)(2)(ii) requires the annual inspection report to include an estimate of the volume of CCRs contained within the facility at the time of the inspection. Based on historical information and survey data provided by Tri-State, Golder estimates that the volume of CCRs contained within the facility is 675,000 cubic yards as of the date of issuance of this report.

2.4 Changes Affecting Stability or Operation

40 CFR 257.84(b)(2)(iv) requires the annual inspection report to include a summary of changes that may have affected the stability or operation of the facility since the previous annual inspection. Since this report describes the initial annual inspection, such a summary is not practical. Visual observations of the facility conducted on September 22 and 23, 2015, are described in Section 3 and provide a reference point for a description of changes that potentially affect stability or operation in next year's annual report. Our review of the weekly inspection forms completed between October 22, 2015, and December 9, 2015,

indicates that changes affecting the stability or operation of the facility have not been detected during the weekly inspections.

3.0 VISUAL OBSERVATION

3.1 Overview

40 CFR 257.84(b)(1)(ii) requires the annual inspection to include a visual inspection of the facility that is intended to identify signs of distress or malfunction. 40 CFR 257.84(b)(2)(iii) requires the annual inspection report to include a description of appearances of structural weakness at the facility, in addition to existing conditions that are disrupting or have the potential to disrupt the operation and safety of the facility. These requirements are addressed in this section.

3.2 Visual Observation Terminology

Terms used in this section are defined as follows:

Condition of Facility Component

Good:	A condition that is generally better than the minimum expected condition based on the design criteria and maintenance performed at the facility.
Fair:	A condition that is generally consistent with the minimum expected condition based on the design criteria and maintenance performed at the facility.
Poor:	A condition that is generally worse than the minimum expected condition based on the design criteria and maintenance performed at the facility.

Severity of Deficiency

Minor:	An observed deficiency where the current condition is worse than the minimum expected condition but does not currently pose a threat to structural stability.
Significant:	An observed deficiency where the current condition is worse than the minimum expected condition and could pose a threat to structural stability if it is not addressed.
Excessive:	An observed deficiency where the current condition is worse than the minimum expected condition and either hinders the ability of an inspector to evaluate the facility component or poses a threat to structural stability.

3.3 Findings

Golder conducted a visual observation of the facility on September 22 and 23, 2015. Golder observed the condition of the deposition area, embankment slopes, embankment crest, embankment toe, and storm water control features. The annual inspection form is included in Appendix B.

3.3.1 Deposition Area

The deposition area was observed to be in good condition. No signs of ground movement, such as sloughing or sliding, cracking, subsidence, or bulging, were observed in the deposition area. Deposition of CCRs was occurring at the time of the visual observation. The deposition methodology appeared to be appropriate. Contact water was being collected within the deposition area. A berm that was several feet in height was in place around the perimeter of the deposition area to prevent migration of contact water

out of the deposition area. Fugitive dust was being adequately controlled at the time of the visual observation. The typical condition of the deposition area is depicted in Figure 1.

Figure 1: Typical Deposition Area Condition

3.3.2 Embankment Crest

The embankment crest was observed to be in good condition. No cracking indicative of ground movement was observed along the embankment crest. No low areas indicative of differential settlement were observed along the embankment crest. The typical condition of the embankment crest is depicted in Figure 2.

Figure 2: Typical Embankment Crest Condition

3.3.3 Embankment Slopes

The embankment slopes were observed to be in fair condition. No signs of ground movement, such as sloughing or sliding, cracking, subsidence, or bulging, were observed on the embankment slopes. No evidence of significant or excessive erosion or slope deterioration was observed on the embankment slopes. The embankment slopes had not been vegetated at the time of the visual observation, so no unusual vegetative growth or woody vegetation was observed on the embankment slopes. No signs of animal burrowing were observed on the embankment slopes. At the time of the visual observation, soil cover had been placed over the exposed CCRs in some areas of the embankment slopes. However, sufficient soil resources had not yet been placed to fully cover the embankment slopes. Tri-State indicated that additional soil would be obtained for this purpose as part of the ongoing cover soil recovery and conservation process. The typical condition of the embankment slopes is depicted in Figure 3.

Figure 3: Typical Embankment Slope Condition

3.3.4 Embankment Toe

The embankment toe was observed to be in good condition. No signs of seepage, such as springs or boggy areas, were observed at the embankment toe. At the time of the visual observation, the embankment toe had been cleared recently to facilitate placement of soil cover on portions of the embankment slopes. The typical condition of the embankment toe is depicted in Figure 4.

Figure 4: Typical Embankment Toe Condition

3.3.5 Storm Water Control Features

The storm water control features at the facility were observed to be in fair condition. At the time of the visual observation, the only permanent storm water control feature at the facility was a run-on control channel that is designed to convey storm water from west to east along the south end of the facility. The run-on control channel is armored with riprap. It had relatively large shrubs growing in the flow path, and periodic shrub removal may be needed to maintain proper functionality. However, the shrubs do not pose a threat to structural stability. The typical condition of the run-on control channel is depicted in Figure 5.

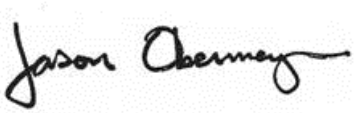
Figure 5: Typical Storm Water Channel Condition

4.0 CONCLUSIONS AND RECOMMENDATIONS

Golder completed an annual inspection of the active disposal facility for CCRs at Escalante Generating Station to address the requirements of 40 CFR 257.84. No signs of distress or malfunction of the facility were observed, and no appearances of actual or potential structural weakness of the facility were identified. Based on our visual observations, improvements to the run-on and run-off controls at the facility will be needed. These improvements will be identified in the initial run-on and run-off control system plan, which is to be completed on or before October 17, 2016, in accordance with 40 CFR 257.81(c). Facility maintenance activities that should be carried out as the need is indicated by weekly inspections conducted in accordance with 40 CFR 257.84(a) include control of burrowing animals, repair of erosion damage on embankment slopes, establishment of appropriate vegetation on embankment slopes, and control and containment of ash contact water.

GOLDER ASSOCIATES INC.

Tammy L. Rauen, P.E.
Senior Project Engineer



Jason E. Obermeyer, P.E.
Associate and Senior Engineer

5.0 REFERENCES

Golder Associates Inc. (2015). Escalante Generating Station Coal Combustion Residuals Fugitive Dust Control Plan. Plan prepared for Tri-State Generation and Transmission Association, Inc. October.

Metric Corporation (2006). Scrubber Sludge/Fly Ash Landfill Expansion Plan for the Tri-State Escalante Generating Station. Plan prepared for Tri-State Generation and Transmission Association, Inc. August 14.

New Mexico Environment Department (2010). Discharge Permit Modification, Escalante Generating Station, DP-206. August 13.

APPENDIX A
EXISTING CONDITIONS MAP

LEGEND

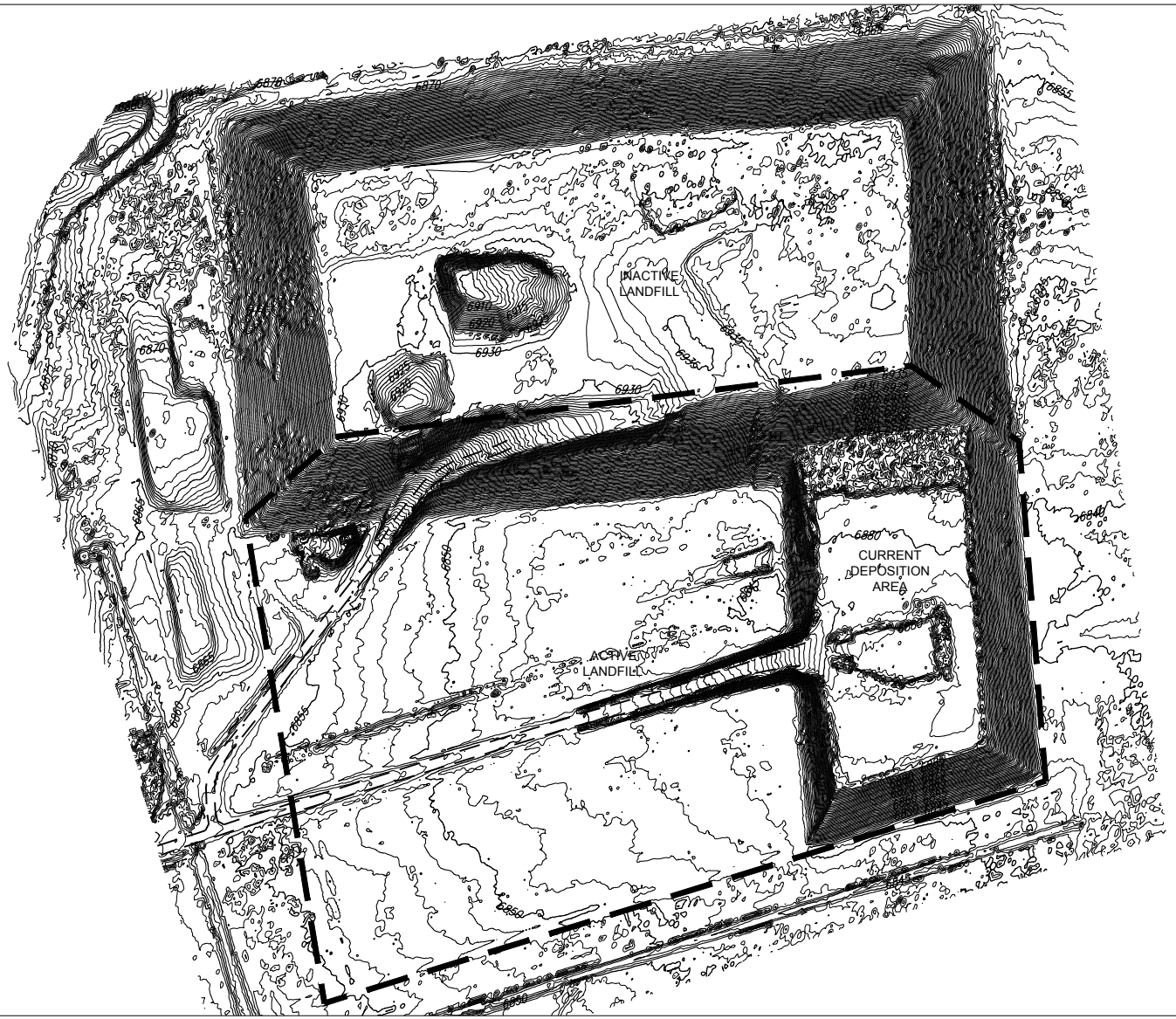
6870 EXISTING TOPOGRAPHY (1-FOOT CONTOURS)

ROAD

APPROXIMATE LIMITS OF ACTIVE LANDFILL

REFERENCE

EXISTING TOPOGRAPHY DATED SEPTEMBER 21, 2015, PROVIDED BY TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION, INC.



0 200 400

1" = 400' FEET

CLIENT

TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION
1100 WEST 116TH AVENUE
WESTMINSTER, COLORADO 80234

CONSULTANT

Golder Associates

YYYY-MM-DD	2016-01-15
DESIGNED	JEO
PREPARED	JEO
REVIEWED	TLR
APPROVED	RRJ

PROJECT

ESCALANTE GENERATING STATION
COAL COMBUSTION RESIDUALS LANDFILL
ANNUAL INSPECTION REPORT

TITLE

EXISTING CONDITIONS

PROJECT NO. 1533418CCR

REV. B

FIGURE A-1

APPENDIX B
ANNUAL INSPECTION FORM

TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION
ESCALANTE GENERATING STATION ACTIVE CCR LANDFILL
ANNUAL INSPECTION FORM

Inspection Date: September 22 to 23, 2015	**Inspection Time:** Various	**Legend:** Y Yes; N No; NI Not inspected; NA Not applicable; RA Requires action
Inspector(s): Tammy Rauen, PE Jason Obermeyer, PE	**Title(s):** Senior Project Engineer Senior Engineer	
Reviewer: Ron Jorgenson	**Title:** Senior Practice Leader	

Instructions: Complete each part of the annual inspection form. Indicate areas of concern on the plan view on page 3. Elaborate on deficiencies in Section J.

A. Previous Open Items						
1. Please list open items from the previous inspection form (Section I.) and indicate whether or not the open items have been resolved:						
a.	Y	N	NI	NA	RA	If N and/or RA, please elaborate.
b.	Y	N	NI	NA	RA	If N and/or RA, please elaborate.
c.	Y	N	NI	NA	RA	If N and/or RA, please elaborate.
B. Atmospheric Conditions						
1. Briefly describe precipitation conditions (rainy, dry, snowy) or notable precipitation events over the last five days: No rain during inspection; rain on 9/20 and 9/21/15						
2. Briefly describe wind (calm, breezy, windy, gusty) and weather (cold, warm, cloudy, sunny) conditions during the inspection: Breezy, partly cloudy, cool						
C. Facility Access						
1. Are facility access roads in good condition?	Y	N	NI	NA	RA	If N and/or RA, please elaborate.
D. Fill Area						
1. Where are ash and/or other materials currently being deposited (indicate on the plan view on page 3 or write N/A)?						
2. Do you observe signs of ground movement in the fill area?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
If Y, please circle those that apply: Slough or Slide Cracking Subsidence Bulging						
3. Do you observe ponded water in the fill area (if Y, sketch on the plan view on page 3)?	Y	N	NI	NA	RA	If RA, please elaborate.
4. Does it appear that fugitive dust (fill area and roads) is being adequately controlled?	Y	N	NI	NA	RA	If N and/or RA, please elaborate.
5. Are controls in place to keep ash contact water from migrating away from the landfill?	Y	N	NI	NA	RA	If N and/or RA, please elaborate.
E. Embankment Crest						
1. Do you observe cracks along the embankment crest?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
2. Do you observe differential settlement (low areas) along the embankment crest?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
3. Are the roads around and on the facility in good condition?	Y	N	NI	NA	RA	If N and/or RA, please elaborate.

F. Exterior Slopes						
1. Briefly describe ground conditions (wet, dry, soft, firm). North: Soft East: Soft South: Soft West: Soft						
2. Do you observe signs of movement or instability on the exterior slopes?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
If Y, please circle those that apply: Slough or Slide Cracking Subsidence Bulging						
3. Do you observe signs of excessive erosion or slope deterioration?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
4. Do you observe unusual vegetative growth (thriving or poor growth) or woody vegetation?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
5. Do you observe animal burrows on the exterior slopes?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
G. Embankment Toe						
1. Do you observe signs of seepage (springs or boggy areas) at the embankment toe?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
2. Do you observe ash outside of the disposal footprint?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
H. Storm Water Controls						
1. Are run-on control features (ditches) in good condition?	Y	N	NI	NA	RA	If N and/or RA, please elaborate.
I. Open Items						
1. Please list unresolved items from previous annual inspections (RA in Section A.) and new items identified during the annual inspection (RA in Sections B. through H.):						
a.						
b.						
c.						
d.						
e.						

J. Elaboration

Identify the specific item number (for instance, F.2.) and elaborate on each deficiency or issue identified during the annual inspection. Attach documentation (photographs or sketches) if practical.

A.1. This is the initial annual inspection, so annual inspection forms from previous years do not exist.

C.1. Roads are wet, slick, and rutted in some places due to the recent precipitation. Repairs may be needed when the roads dry out.

400 0 400 800
SCALE FEET

ANNUAL INSPECTION FORM

TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION
ESCALANTE GENERATING STATION ACTIVE CCR LANDFILL

Inspection Date: September 22 and 23, 2015