



ACTIVE COAL COMBUSTION RESIDUALS LANDFILL ANNUAL INSPECTION REPORT

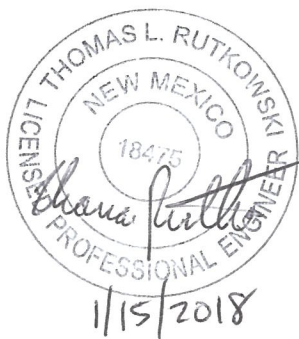
Escalante Generating Station



REPORT

Submitted to: Tri-State Generation and Transmission Association, Inc.
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Westminster, Colorado 80234

Submitted by: Golder Associates Inc.
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January 15, 2018

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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 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 prescribes 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. Golder's visual observations took place on December 13, 2017. This report is the third 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 270-megawatt, coal-fired electric generation plant. The site 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 in 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 18 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 commenced at the east end of the facility and is progressing 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 inactive CCR disposal facility on the north end. The outer embankment slopes for the facility are designed at a slope ratio of 3 horizontal to 1 vertical.

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 2015).
- Design and operational information for the facility (Metric Corporation 2006).
- The Fugitive Dust Control Plan for the facility (Golder 2015).
- The Run-on and Run-off Control System Plan for the facility (Golder 2016a).
- The Closure and Post-closure Care Plans for the facility (Golder 2016b and Golder 2016c).
- The previous (second) annual inspection report for the facility (Golder 2017).
- Weekly inspection forms documenting weekly inspections conducted by qualified persons employed by Tri-State between December 28, 2016, and December 21, 2017.

This is the third annual inspection performed by a professional engineer licensed in the State of New Mexico for compliance with 40 CFR 257.84(b)(1). Signs of actual or potential structural weakness were not identified during the previous annual inspections.

Observations from the weekly inspections conducted by qualified Tri-State personnel are recorded on inspection forms, which are maintained in the site operating record. Observations of minor erosion rills on the embankment slopes were noted on the weekly inspection forms throughout the reporting period, but a significant change in the severity of the rills was not identified. Observations of animal burrows were also noted in some of the weekly inspection reports. Repair work that took place in May 2017 to address the animal burrows was noted in the corresponding weekly report.

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. During Golder's site observations, the geometry of the facility was found to be in general conformance with the design. Since the previous annual inspection, the CCR deposition area has moved west, adjacent to the northern half of the deposition area that was being used previously. The previous deposition area has been left at interim grades as placement of CCRs proceeds westward. As such, the current CCR deposition area is topographically lower than the deposition area that was being used during the previous annual inspection. This is the only significant change in facility geometry that was noted during the site observations.

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 CCR placement data provided by Tri-State, Golder estimates that the volume of CCRs contained within the facility is 800,000 cubic yards through December 31, 2017.

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. Visual observations of the facility conducted on December 13, 2017, are described in Section 3. Our review of the weekly inspection forms completed between December 28, 2016, and December 21, 2017, indicates that no changes affecting the stability or operation of the facility were identified during the weekly inspections.

3.0 VISUAL OBSERVATION

3.1 Overview

40 CFR 257.84(b)(1)(ii) requires the annual inspection to include visual observation 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 December 13, 2017. 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 A.

3.3.1 Deposition Area

The deposition area was observed to be in good condition. Signs of ground movement, such as sloughing or sliding, cracking, subsidence, or bulging, were not observed in the deposition area. Deposition of CCRs was occurring at the time of the visual observation. The deposition methodology appeared to be appropriate. Appropriate grading had been established to collect contact water 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 Photograph 2.



Photograph 2: Typical Deposition Area Condition

3.3.2 Embankment Crest

The embankment crest was observed to be in good condition. Cracking that would be indicative of ground movement was not observed along the embankment crest. Low areas that would be indicative of differential settlement were not observed along the embankment crest. The typical condition of the embankment crest is depicted in Photograph 3.



Photograph 3: Typical Embankment Crest Condition

3.3.3 Embankment Slopes

The embankment slope along the east side of the facility was observed to be in fair condition. Signs of ground movement, such as sloughing or sliding, cracking, subsidence, or bulging, were not observed on the east embankment slope. Significant or excessive erosion or slope deterioration was not observed on the east embankment slope. Small animal burrows were observed in two locations on the east embankment slope, as shown in Appendix A. The animal burrows do not pose a threat to structural stability. Native vegetation is being established on the east embankment slope, but establishment of a mature vegetative community is challenging given the climatic conditions at the site. Unusually poor vegetative growth (relative to the other portions of the east embankment slope) was observed in one location on the east embankment slope, as shown in Appendix A. The area of poor vegetative growth did not appear to be caused by a stability-related issue and does not pose a threat to structural stability. Woody vegetation was not observed on the east embankment slope. The typical condition of the east embankment slope is depicted in Photograph 4. Animal burrows observed on the east embankment slope are shown in Photograph 5.



Photograph 4: Typical East Embankment Slope Condition



Photograph 5: Animal Burrows on East Embankment Slope

The embankment slope along the south side of the facility was observed to be in fair condition. Signs of ground movement, such as sloughing or sliding, cracking, subsidence, or bulging, were not observed on the south embankment slope. Significant or excessive erosion or slope deterioration was not observed on the south embankment slope, but minor erosion rills were observed across much of the south embankment slope. The minor erosion does not pose a threat to structural stability. Native vegetation is being established on the south embankment slope, but establishment of a mature vegetative community is challenging given the climatic conditions at the site. Unusually poor or thriving vegetative growth was not observed on the south embankment slope, but there was generally less vegetative coverage on the south embankment slope than on the east embankment slope (likely due to the southern exposure/aspect). Woody vegetation was not observed on the south embankment slopes. The typical condition of the south embankment slope is depicted in Photograph 6.



Photograph 6: Typical South Embankment Slope Condition

3.3.4 Embankment Toe

The embankment toe was observed to be in good condition. Signs of seepage, such as springs or boggy areas, were not observed along the embankment toe. The typical condition of the embankment toe is depicted in Photograph 7.



Photograph 7: Typical Embankment Toe Condition

3.3.5 Storm Water Control Features

The storm water control features at the facility were observed to be in good 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. Relatively large shrubs were observed to be growing in the flow path. The shrubs do not pose a threat to structural stability, but they should be removed periodically to help maintain the channel's flow capacity. The typical condition of the run-on control channel is depicted in Photograph 8.



Photograph 8: 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. Appearances of actual or potential structural weakness of the facility were not identified. 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, continued establishment of appropriate vegetation on embankment slopes, and control and containment of contact water.

We appreciate the opportunity to provide Tri-State with this annual inspection report for the active CCR facility at Escalante Generating Station.

GOLDER ASSOCIATES INC.



Thomas L. Rutkowski, PE
Associate and Senior Consultant



Jason E. Obermeyer
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.
- Golder Associates Inc. (2016a). Escalante Generating Station Active Coal Combustion Residuals Landfill Run-on and Run-off Control System Plan. Plan prepared for Tri-State Generation and Transmission Association, Inc. October.
- Golder Associates Inc. (2016b). Escalante Generating Station Active Ash Landfill Closure Plan. Plan prepared for Tri-State Generation and Transmission Association, Inc. October.
- Golder Associates Inc. (2016c). Escalante Generating Station Active Ash Landfill Post-closure Plan. Plan prepared for Tri-State Generation and Transmission Association, Inc. October.
- Golder Associates Inc. (2017). Coal Combustion Residuals Landfill Annual Inspection Report, Escalante Generating Station. Report prepared for Tri-State Generation and Transmission Association, Inc. January 18.
- 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 (2015). Discharge Permit Modification, Escalante Generating Station, DP-206. February 10.

**APPENDIX A
ANNUAL INSPECTION FORM**



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

Inspection Date: December 13, 2017	Inspection Time: 10:30am to 12:00 pm	Legend: Y Yes N No NI Not inspected NA Not applicable RA Requires action
Inspector(s): Tom Rutkowski, PE	Title(s): Senior Consultant	
Reviewer: Jason Obermeyer	Title: Senior Engineer	

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. Minor erosion rills on the east and south embankment slopes.	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: Dry, no precipitation in the last five days

2. Briefly describe wind (calm, breezy, windy, gusty) and weather (cold, warm, cloudy, sunny) conditions during the inspection: Calm, sunny, mild (~40°F)

C. Facility Access

1. Are facility access roads in good condition?	Y	N	NI	NA	RA	If N and/or RA, please elaborate.
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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)? See page 3

2. Do you observe signs of ground movement in the fill area?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
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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.
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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.
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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.
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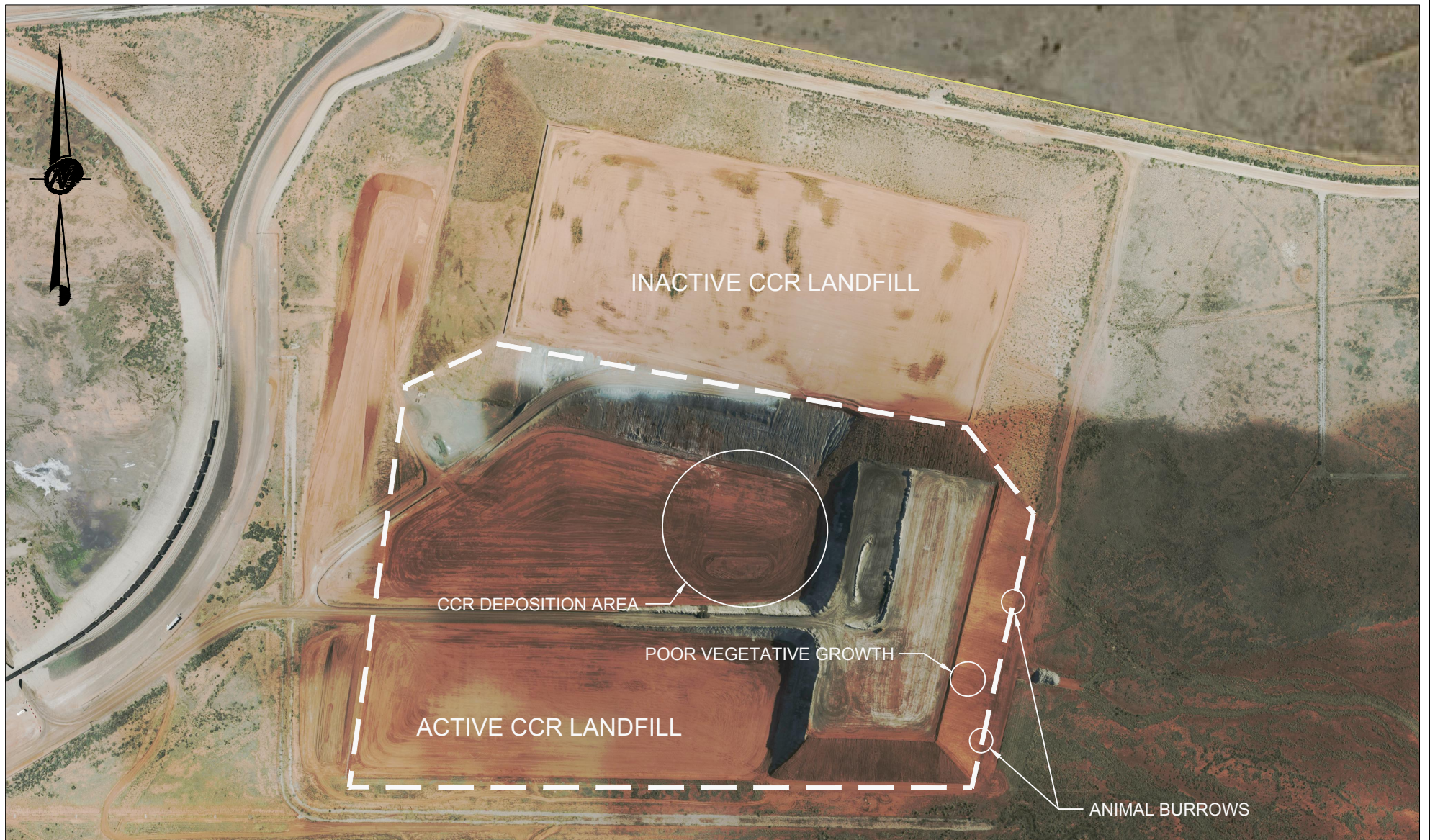
E. Embankment Crest

1. Do you observe cracks along the embankment crest?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
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2. Do you observe differential settlement (low areas) along the embankment crest?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
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3. Are the roads around and on the facility in good condition?	Y	N	NI	NA	RA	If N and/or RA, please elaborate.
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F. Exterior Slopes						
1. Briefly describe ground conditions (wet, dry, soft, firm). North: N/A East: Dry, firm South: Dry, firm West: N/A						
2. Do you observe signs of movement or instability on the exterior slopes? If Y, please circle those that apply: Slough or Slide Cracking Subsidence Bulging	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
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.						
F.4. An area of poor vegetative growth was observed on the east embankment slope (see page 3). Site personnel indicated that the embankment slopes were reseeded in the summer of 2017 to promote additional vegetative coverage. The area of poor vegetative growth should be monitored and reseeded if appropriate. The area of poor vegetative growth is not currently of concern for stability of the embankment slope.						
F.5. A few burrows were observed in each of the locations shown on page 3. The burrows are not currently of concern for stability of the embankment slope.						



ANNUAL INSPECTION FORM

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