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.
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January 18, 2017

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Golder Associates

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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 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 second annual inspection report for the facility under 40 CFR 257.84(b)(1).

Presented in this report is 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. The facility 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 inactive CCR disposal facility on the north end. The outer embankment slopes for the facility are designed at 3 horizontal to 1 vertical. 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 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, Golder 2016c).
- The Landfill Expansion Project report (Tri-State 2016).
- Weekly inspection forms documenting weekly inspections conducted by qualified persons employed by Tri-State between December 15, 2015 and December 27, 2016.

This is the second annual inspection performed by a professional engineer licensed in the State of New Mexico. The 2015 annual inspection did not find signs of structural weakness or changes in geometry. The only recommendation from the 2015 inspection report was for improvements to the run-on and run-off controls at the facility, and these design features were included in the Run-on and Run-off Control System Plan completed in October 2016.

Observations from the weekly inspections are recorded on the inspection forms, which are maintained in the site operating record. Observations of minor erosion rills on the embankment slopes were first noted on the weekly inspection form on August 9, 2016. Changes in the rills were not observed through the November 29, 2016 weekly inspection. This erosion is discussed in more detail in subsequent sections.

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. The geometry of the ash disposal facility was found to be in general conformance with the design. The current facility configuration is reflected on the figure included in Appendix A. Unexpected changes in geometry such as sloughing or differential settlement were not found during the site inspection. Changes observed in the facility since the last annual inspection include placement of final cover on the embankment slopes, vegetation of the embankment slopes with a native seed mix, and construction of the embankment crest in preparation for a run-off stormwater control terrace channel as designed in the Run-on and Run-off Control System Plan for the facility (Golder 2016a).

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 740,000 cubic yards through December 31, 2016.

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 14, 2016, are described in Section 3. Our review of the weekly inspection forms completed between December 15, 2015 and December 27, 2016, 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 December 14, 2016. 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. 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. 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 2.

Figure 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 Figure 3.

Figure 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 embankment slope. Significant or excessive erosion or slope deterioration was not observed on the embankment slopes; however, minor erosion rills and small animal burrows were observed in several locations. The minor erosion and animal burrows do not pose a threat to structural stability. Native

vegetation is being established on the embankment slopes. Vegetative coverage on the embankment slopes has not yet been in place long enough for a mature vegetative community to be established. Unusually poor or thriving vegetative growth was not observed on the embankment slopes. Woody vegetation was not observed on the embankment slopes. The typical condition of the east-embankment slopes is depicted in Figure 4.

Figure 4: Typical East-embankment Slope Condition

The south-embankment slopes were observed to be in fair condition. Signs of ground movement, such as sloughing or sliding, cracking, subsidence, or bulging, were not observed on the embankment slope. Significant or excessive erosion or slope deterioration was not observed on the embankment slopes; however, minor erosion rills were observed across most of the slope. The minor erosion does not pose a threat to structural stability. Native vegetation is being established on the embankment slopes. Vegetative coverage on the embankment slopes has not yet been in place long enough for a mature vegetative community to be established. Unusually poor or thriving vegetative growth was not observed on the embankment slopes. Woody vegetation was not observed on the embankment slopes. The minor erosion rills on the south-embankment slopes are depicted in Figure 5.

Figure 5: Minor Erosion Rills on South-embankment Slope

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 at the embankment toe. The typical condition of the embankment toe is depicted in Figure 6.

Figure 6: 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. Relatively large shrubs were observed growing in the flow path. However, the shrubs do not pose a threat to structural stability. The typical condition of the run-on control channel is depicted in Figure 7.

Figure 7: Typical Storm Water Channel Condition

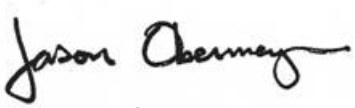
4.0 CONCLUSIONS AND RECOMMENDATIONS

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, establishment of appropriate vegetation on embankment slopes, and control and containment of ash contact water.

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

GOLDER ASSOCIATES INC.

Tammy L. Rauen, PE
Senior Project Engineer



Jason E. Obermeyer, PE
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.

Tri-State Generation and Transmission Association, Inc. (2016). Escalante Landfill Expansion Project report. December.

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

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APPENDIX A
EXISTING CONDITIONS MAP

LEGEND

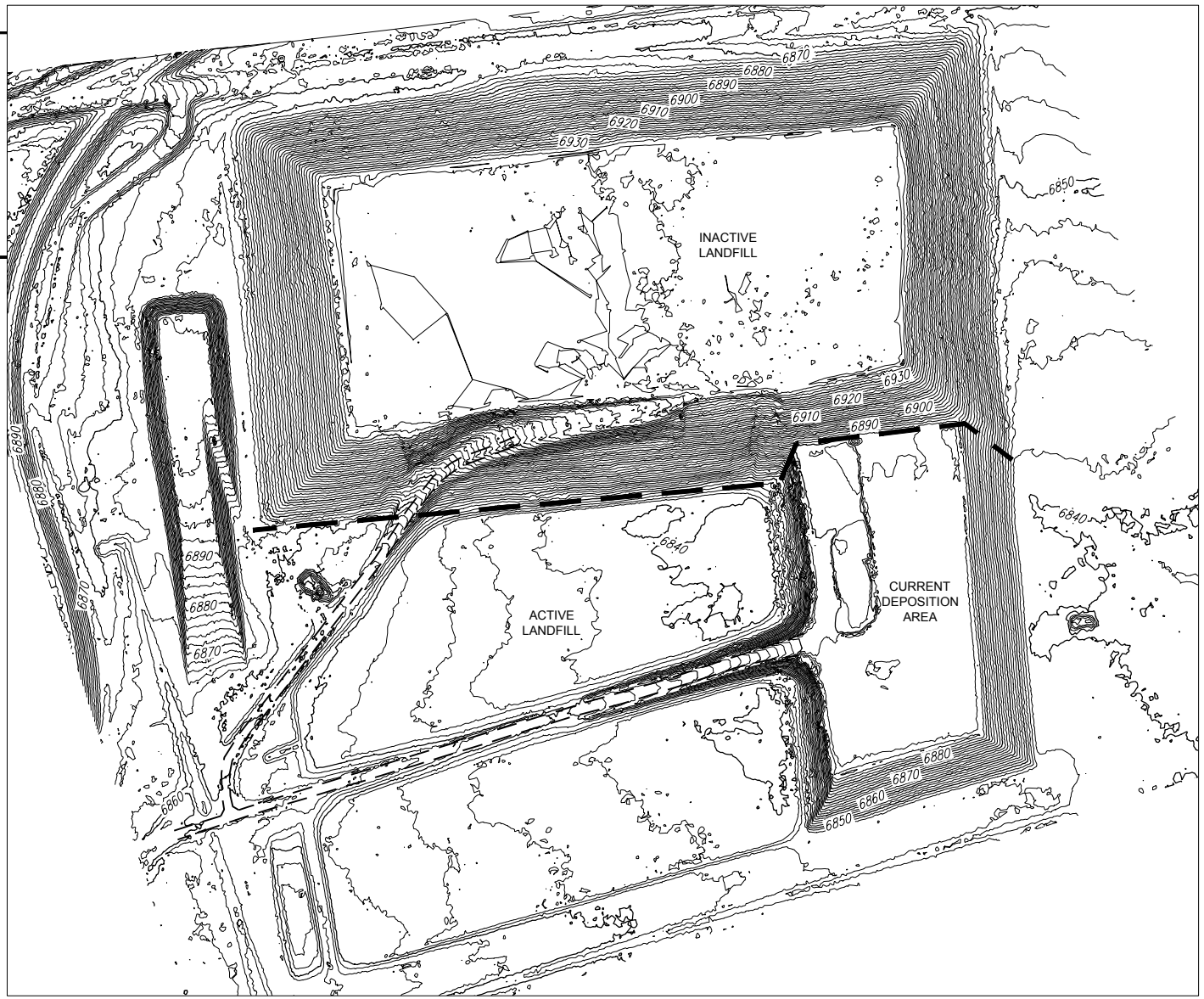
6870 EXISTING TOPOGRAPHY (1-FOOT CONTOURS)

ROAD

APPROXIMATE CURRENT BOUNDARY BETWEEN ACTIVE LANDFILL AND INACTIVE LANDFILL

REFERENCE

EXISTING TOPOGRAPHY DATED JUNE 20 AND 21, 2016, PROVIDED BY TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION, INC.



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1" = 400' FEET

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

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-01-05
DESIGNED	KAC
PREPARED	KAC
REVIEWED	TLR
APPROVED	RRJ

PROJECT
ESCALANTE GENERATING STATION
COAL COMBUSTION RESIDUALS LANDFILL
ANNUAL INSPECTION REPORT

TITLE
EXISTING CONDITIONS

PROJECT NO. 1663066 | REV. A | FIGURE A-1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
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APPENDIX B
ANNUAL INSPECTION FORM

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

Inspection Date: December 14, 2016	**Inspection Time:** 10:00 am – 2:00 pm	**Legend:** Y Yes; N No; NI Not inspected; NA Not applicable; RA Requires action
Inspector(s): Tammy Rauen, PE	**Title(s):** Senior Project Engineer	
Reviewer: Jason Obermeyer, PE	**Title:** Senior Engineer and Associate	

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 during the last 5 days						
2. Briefly describe wind (calm, breezy, windy, gusty) and weather (cold, warm, cloudy, sunny) conditions during the inspection: Overcast, gusty, 60 degrees						
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: NA East: dry South: dry West: NA						
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. Minor erosion rills on the east and south-embankment slopes.						
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.3. Minor rills were observed on the east and south-embankment slopes. Refer to the Annual Inspection Report for pictures.						
F.5. Small animal burrows were observed on the east-embankment slope. Refer to the Annual Inspection Report for pictures.						

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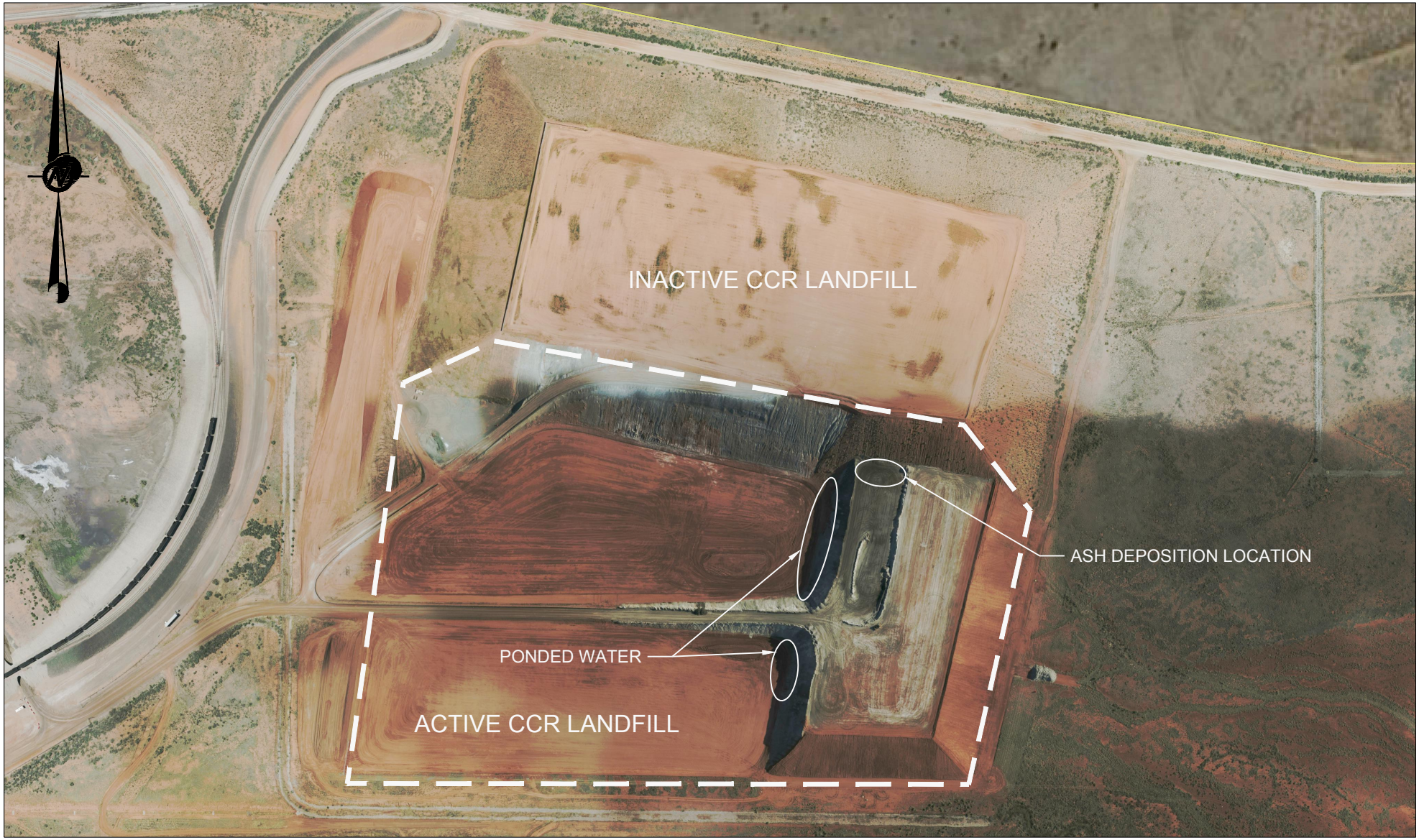

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SCALE FEET

ANNUAL INSPECTION FORM

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

Inspection Date: December 14, 2016