

REPORT

Active Coal Combustion Residuals Disposal Facility 2021 Annual Inspection

Escalante Generating Station

Submitted to:

Tri-State Generation and Transmission Association, Inc.

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Submitted by:

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21453429-1-R-0

January 14, 2022

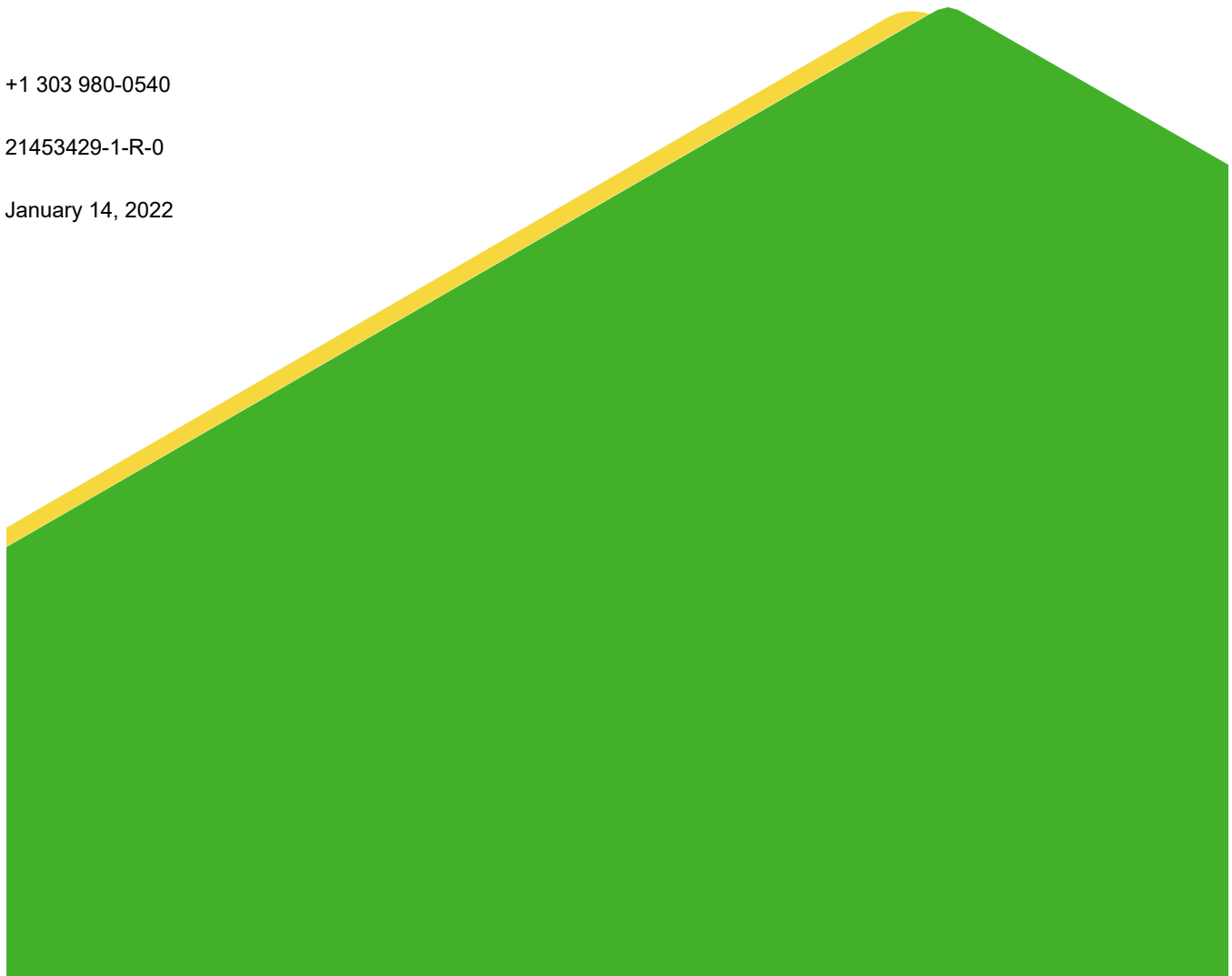


Table of Contents

1.0 INTRODUCTION	1
1.1 Background	1
1.2 Facility Description	1
2.0 REVIEW OF AVAILABLE INFORMATION	1
2.1 Information Reviewed	1
2.2 Changes in Facility Geometry	2
2.3 CCR Volume Contained in the Facility	2
2.4 Changes Affecting Stability or Operation	2
3.0 VISUAL OBSERVATION	2
3.1 Overview	2
3.2 Visual Observation Terminology	3
3.3 Findings	3
3.3.1 Deposition Area	3
3.3.2 Embankment Crest	4
3.3.3 Embankment Slopes	5
3.3.4 Embankment Toe	6
3.3.5 Storm Water Control Features	7
4.0 CONCLUSIONS AND RECOMMENDATIONS	8
5.0 REFERENCES	10

FIGURES

Photograph 1: Typical Deposition Area Condition	4
Photograph 2: Typical Embankment Crest Condition	5
Photograph 3: Typical Embankment Slope Condition	6
Photograph 4: Typical Embankment Toe Condition	7
Photograph 5: Typical Storm Water Channel Condition	8

APPENDICES

Appendix A

Annual Inspection Form

1.0 INTRODUCTION

1.1 Background

Golder Associates USA Inc. (Golder), a member of WSP, 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 purpose 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 (PE) 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 observation took place on October 20, 2021.

This report presents a description of the facility (Section 1.0), a summary of Golder's review of available information about the facility (Section 2.0), the findings from Golder's visual observation of the facility (Section 3.0), and Golder's conclusions and recommendations (Section 4.0).

1.2 Facility Description

Escalante Generating Station operated as a 270-megawatt coal-fired electric generation plant from 1984 until its retirement in August 2020. The plant site is located approximately 4.2 miles northwest of Prewitt, New Mexico. Tri-State generated fly ash, bottom ash, and flue gas desulfurization (FGD) material at Escalante Generating Station and disposed these materials in the facility. The facility is expected to continue receiving permitted waste materials and remains an active CCR disposal facility. The facility is one of several site features regulated by the New Mexico Environmental Department, Ground Water Quality Bureau, under Discharge Permit DP-206. Filling began at the facility in 2009, and CCRs have been deposited over approximately 24 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 has progressed westward as design grades or interim grades were reached. As the height of the fill increased, CCRs have been placed such that they abut (piggyback) 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 pertaining to the status and condition of the facility, including files that are available in the operating record. Golder has 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 has 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 runoff control system plan for the facility (Geosyntec Consultants 2021).
- the closure plan for the facility (Golder 2016a).
- the closure and post-closure plan for the site under Ground Water Discharge Permit DP-206 (Geosyntec Consultants 2020).
- previous annual inspection reports for the facility (Golder 2016b, 2017, 2018, 2019, 2020, 2021).
- weekly inspection forms documenting weekly inspections conducted by qualified persons employed by Tri-State between January 8, 2021, and December 28, 2021.

The weekly inspection forms provided valuable information regarding the status and condition of the facility throughout 2021.

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 (north of the facility access road) has remained in generally the same location, with relatively minor increases in height due to limited waste placement in 2021. The approximate limit of CCR placement in the facility at the time of the visual observation is shown in Appendix A.

2.3 CCR 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 visual observation. Based on historical information and CCR placement data provided by Tri-State, Golder estimates that the volume of CCRs contained within the facility was 1,090,000 cubic yards at the time of the visual observation.

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. Golder's review of the weekly inspection forms completed between January 8, 2021, and December 28, 2021, indicates that changes affecting the stability or operation of the facility have not been identified during the weekly inspections. Indications of changes that affect stability or operation of the facility were not identified during Golder's visual observation on October 20, 2021 (refer to Section 3.0). It is noteworthy, however, that waste deposition rates have diminished since retirement of the generating unit in August 2020, and they are expected to remain relatively low leading up to eventual closure of the facility.

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 or facility performance
- Significant: An observed deficiency where the current condition is worse than the minimum expected condition and could pose a threat to structural stability or facility performance 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 or facility performance

3.3 Findings

Golder conducted a visual observation of the facility on October 20, 2021. Golder observed the condition of the deposition area, embankment slopes, embankment crest, embankment toe, and stormwater control features. The annual inspection form is included in Appendix A. The locations and orientations of photographs presented in this section are shown in the annual inspection form.

3.3.1 Deposition Area

The deposition area was observed to be in good condition. Appendix A shows the deposition area location at the time of the visual observation. Signs of ground movement, such as sloughing or sliding, cracking, subsidence, or bulging, were not observed in the deposition area. Appropriate grading had been established to collect CCR 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 CCR contact water off of the deposition area. Fugitive dust was not observed at the time of the visual observation. The typical condition of the deposition area is depicted in Photograph 1.



Photograph 1: 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 2.



Photograph 2: Typical Embankment Crest Condition

3.3.3 Embankment Slopes

The 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 slopes. Evidence of significant wind and water erosion was observed on the embankment slopes near the northeast corner of the facility. Appendix A shows the approximate area exhibiting significant wind and water erosion at the time of the visual observation. Evidence of significant wind and water erosion included reduced cover soil thickness on the embankment slope, wind-deposited soil and CCR particles on the embankment slope, and accumulation of cover soil near the toe of the embankment slope in the indicated area. The wind and water erosion does not currently pose a threat to structural stability, but it should be addressed as part of facility closure, including verification of adequate cover soil thickness. Minor rilling was also observed on the embankment slopes, with the largest rills near the west end of the south embankment slope. The rilling does not currently pose a threat to structural stability, but it should be monitored and addressed if it becomes significant or excessive. Golder recommends that rill repair efforts be deferred until the rills become more severe or a reseeding attempt is planned, as repair efforts would disturb the vegetation and the crust remaining from the most recent hydraulic mulch application.

Native vegetation is present on the embankment slopes, 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 embankment slopes, but there was generally less vegetative coverage on the south embankment slope than on the east embankment slope due to the southern aspect. No trees were observed on the embankment slopes. Active animal burrows were not observed on the embankment slopes. The typical condition of the embankment slopes is depicted in Photograph 3.



Photograph 3: Typical 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 4.



Photograph 4: Typical Embankment Toe Condition

3.3.5 Stormwater Control Features

The stormwater control features at the facility were observed to be in fair condition. At the time of the visual observation, the only permanent stormwater control feature at the facility was a run-on control channel that is designed to convey stormwater from west to east outside the southern limit 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 5.



Photograph 5: Typical Storm Water Channel Condition

4.0 CONCLUSIONS AND RECOMMENDATIONS

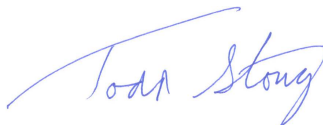
Golder completed an annual inspection of the active CCR disposal facility at Escalante Generating Station to address the requirements of 40 CFR 257.84. Signs of distress or malfunction of the facility were not observed, and appearances of actual or potential structural weakness of the facility were not 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 significant erosion damage on embankment slopes, establishment of suitable vegetation on embankment slopes, control and containment of CCR contact water, periodic removal of shrubs from the run-on control channel, and promotion of positive stormwater drainage away from the facility.

Signature Page

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5.0 REFERENCES

- Geosyntec Consultants. 2020. Discharge Permit Closure and Post Closure Plan, Escalante Generating Station, Groundwater Discharge Permit DP-206. Plan prepared for Tri-State Generation and Transmission Association, Inc. December.
- Geosyntec Consultants. 2021. Run-On and Run-Off Control System Plan Periodic Update for CCR Landfill, Escalante Generating Station. Plan prepared for Tri-State Generation and Transmission Association, Inc. October 30.
- Golder (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. 2016a. Escalante Generating Station Active Ash Landfill Closure Plan. Plan prepared for Tri-State Generation and Transmission Association, Inc. October.
- Golder. 2016b. Coal Combustion Residuals Landfill Annual Inspection Report, Escalante Generating Station. Report prepared for Tri-State Generation and Transmission Association, Inc. January 18.
- Golder. 2017. Coal Combustion Residuals Landfill Annual Inspection Report, Escalante Generating Station. Report prepared for Tri-State Generation and Transmission Association, Inc. January 18.
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- Golder. 2019. Active Coal Combustion Residuals Landfill Annual Inspection, Escalante Generating Station. Report prepared for Tri-State Generation and Transmission Association, Inc. January 15.
- Golder. 2020. Active Coal Combustion Residuals Landfill Annual Inspection, Escalante Generating Station. Report prepared for Tri-State Generation and Transmission Association, Inc. January 15.
- Golder. 2021. Active Coal Combustion Residuals Disposal Facility 2020 Annual Inspection, Escalante Generating Station. Report prepared for Tri-State Generation and Transmission Association, Inc. January 15.
- 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 DISPOSAL FACILITY** ***ANNUAL INSPECTION FORM***

Inspection Date: October 20, 2021	Inspection Time: 1:00 – 2:30 pm	Legend: Y Yes N No NI Not inspected NA Not applicable RA Requires action
Inspector(s): Jason Obermeyer, PE	Title(s): Senior Consultant	
Reviewer: Todd Stong, PE	Title: Senior Consultant	

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. 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: Dry

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

C. Facility Access

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

D. Deposition Area

1. Where are CCRs 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.

If Y, circle those that apply: Slough or Slide Cracking Subsidence Bulging

3. Do you observe ponding in the deposition 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 (deposition 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 CCR contact water from migrating away from the facility? Y N NI NA RA If N and/or RA, please elaborate.

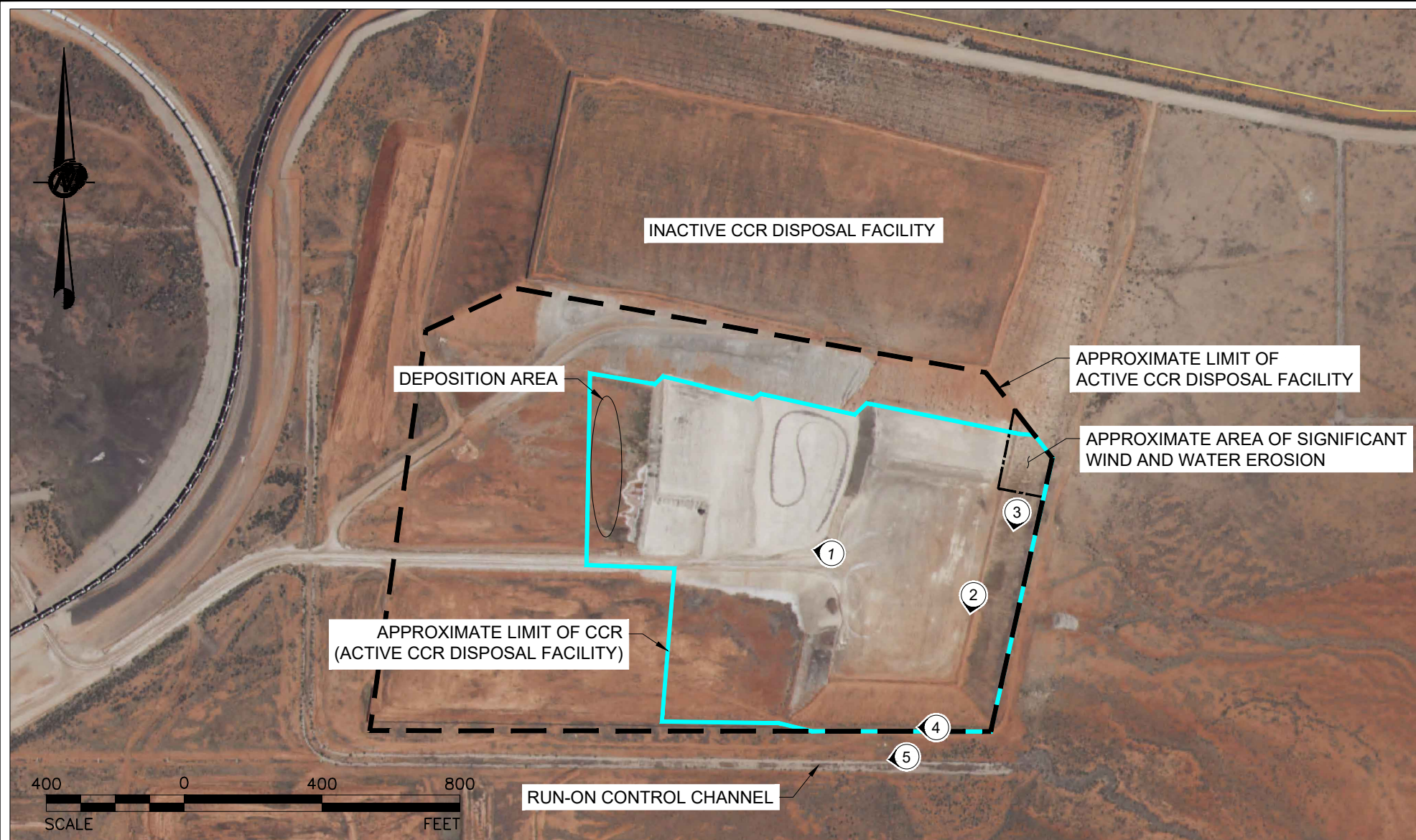
E. Embankment Crest

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. Embankment 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 embankment slopes? If Y, 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 unwanted or unusual (thriving or poor) vegetative growth?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
5. Do you observe animal burrows on the embankment 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 CCRs outside of the disposal footprint?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
H. Storm Water Control Features						
1. Are run-on control features in satisfactory condition?	Y	N	NI	NA	RA	If N and/or RA, please elaborate.
I. Open Items						
1. 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						
<p><i>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.</i></p> <p>F.3. Evidence of significant wind and water erosion was observed on the embankment slopes near the northeast corner of the facility. The approximate area exhibiting significant wind and water erosion at the time of the visual observation is shown on page 3. Evidence of significant wind and water erosion included reduced cover soil thickness on the embankment slope, wind-deposited CCR on the embankment slope, and accumulation of cover soil near the toe of the embankment slope in the indicated area. The wind and water erosion does not currently pose a threat to structural stability, but it should be addressed as part of facility closure, including verification of adequate cover soil thickness.</p>						



Aerial Image: National Agricultural Imagery Program, USDA, 2020.

LEGEND

② PHOTOGRAPH LOCATION AND DIRECTION

ANNUAL INSPECTION FORM

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



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