



REPORT

Coal Combustion Residuals Landfill Inspection
Nucla Station Ash Disposal Facility

Submitted to:

Tri-State Generation and Transmission Association, Inc.

1100 W 116th Avenue, Westminster, Colorado, USA 80234

Submitted by:

WSP USA Inc.

7245 W Alaska Drive, Suite 200, Lakewood, Colorado, USA 80226



+1 303 980 0540

21453425.003-002-RPT-0

December 15, 2023



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1.0 INTRODUCTION

1.1 Background

WSP USA Inc. (WSP) has prepared this inspection report for Tri-State Generation and Transmission Association, Inc. (Tri-State) to summarize our review of available information and visual observation of the Nucla Station Ash Disposal Facility (the facility). The facility served as the location for final deposition of coal combustion residuals (CCRs) generated at Tri-State's Nucla Station beginning in 1987. Nucla Station was retired from service in 2019.

The facility classifies as an existing CCR landfill under 40 CFR 257. The facility was closed in 2022, and a notification of closure completion was placed in the facility's operating record on June 22, 2022.

The annual inspections described in 40 CFR 257.84(b) are listed under the operating criteria for CCR landfills and are interpreted to be required only for operating (not closed) CCR landfills; inspection of closed CCR landfills is to be conducted in accordance with the post-closure plan that is implemented under 40 CFR 257.104. Notwithstanding this interpretation, WSP's review of available information and visual observation was completed in a manner consistent with 40 CFR 257.84(b)(1) for the purpose of verifying that the design, construction, and maintenance of the facility are aligned with recognized and generally accepted good engineering practice. The visual observation by WSP's representative, Jason Obermeyer, PE, took place on November 14, 2023.

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

1.2 Facility Description

The facility is located in Montrose County, approximately 5.5 miles southeast of Nucla, Colorado. Tri-State historically disposed fly ash, bottom ash, and other permitted non-hazardous utility-related wastes¹ at the facility. The Colorado Department of Public Health and Environment (CDPHE) and the Montrose County Board of Commissioners originally approved construction of the facility on a 40-acre parcel in October 1987. Pursuant to a March 2002 application submittal, Tri-State expanded the facility laterally onto an adjacent 40-acre parcel under a Certificate of Designation granted by Montrose County in April 2004 and a Special Use Permit via Notice of Decision dated July 2005. Filling began in the expansion area in 2006. The final disposal footprint encompasses approximately 61 acres. The facility is regulated by CDPHE under 6 CCR 1007-2 Part 1, "Regulations Pertaining to Solid Waste Sites and Facilities."

Disposal of ash at the facility initially occurred behind starter dikes that encompassed the deposition area. Over time, the height of the facility was increased gradually as needed to contain the ash being generated. The height was increased with containment berms that were periodically constructed around the perimeter of the facility. Each individual containment berm was constructed atop and slightly inside of the previous containment berm to form the embankment slopes. At approximate 20-foot vertical intervals, the containment berms were inwardly offset an additional 10 feet to establish benches with terrace channels for stormwater management. The resulting composite slope is approximately 3 horizontal to 1 vertical, with the slope between benches approximately 2.5 horizontal to 1 vertical. The containment berms were constructed with a sufficient thickness of suitable soil and appropriately vegetated so that they also serve as the final cover system on the embankment slopes.

¹ For simplicity, the term "ash," where used in this document, encompasses all permitted wastes.

The facility received the known final receipt of waste by December 31, 2021. In 2022, a final cover system meeting the requirements of the closure plan (Golder 2022a) was constructed over the 18 acres of the facility that had yet to be closed as of that date.

2.0 REVIEW OF AVAILABLE INFORMATION

2.1 Information Reviewed

The inspection included a review of information pertaining to the status and condition of the facility, including files that are available in the operating record. WSP has reviewed information provided by Tri-State to verify that the design, construction, and maintenance of the facility are consistent with recognized and generally accepted good engineering practice. The information WSP has reviewed includes the following:

- the engineering design and operations report for ash disposal on the initial 40-acre parcel (Colorado-Ute Electric Association, Inc. 1987)
- the hydrogeologic investigation report for ash disposal on the initial 40-acre parcel (Western Colorado Testing, Inc. and J.F.T. Agapito & Associates, Inc. 1987)
- the design and operations report for ash disposal on the 40-acre lateral expansion parcel (Geo-Trans Inc. 2002) and addenda thereto (Golder 2017b)
- the fugitive dust control plan for the facility (Golder 2015)
- previous inspection reports for the facility (Golder 2016a, 2017a, 2018a, 2018b, 2019, 2020, 2021a, and 2022c)
- the run-on and run-off control system plan for the facility (Golder 2021b)
- the closure plan for the facility (Golder 2022a)
- the notification of intent to close the facility (Tri-State 2022a)
- the notification of final cover completion for the facility (Tri-State 2022b) and accompanying closure certification (Golder 2022b)
- the notification of recording of notice of obligation for the facility (Tri-State 2022c)
- the post-closure plan for the facility (Golder 2016b)
- weekly and monthly inspection forms documenting inspections conducted by qualified persons employed by Tri-State between December 14, 2022, and October 25, 2023

The weekly and monthly inspection forms provided valuable information regarding the status and condition of the facility since WSP's previous inspection, as well as the repair and maintenance activities that were completed. The thoroughness of the weekly and monthly inspections and documentation was found to be exceptional.

2.2 Changes in Facility Geometry

No changes in facility geometry have occurred since the previous inspection. However, the south embankment slopes have been roughened to create an undulating surface with the objective of reducing the vulnerability of the slopes to rill erosion and enhancing the potential for successful revegetation. Establishment of a resilient vegetative community on the south embankment slopes has been a continual challenge. The roughening

technique implemented on the south embankment slopes has been used successfully for similar applications in the region and was approved by CDPHE.

2.3 Ash Volume Contained in the Facility

The volume of ash contained in the facility at closure was estimated as 4,750,000 cubic yards (Golder 2022c).

2.4 Changes Affecting Stability or Maintenance

Our review of the weekly and monthly inspection forms completed between December 14, 2022, and October 25, 2023, indicates that changes affecting the stability or maintenance of the facility have not been identified during the weekly and monthly inspections. The inspection forms indicate that minor issues, such as erosion rills, are being addressed proactively. Indications of changes that affect stability or maintenance of the facility were not identified during WSP's visual observation on November 14, 2023 (refer to Section 3.0).

3.0 VISUAL OBSERVATION

3.1 Overview

The inspection included a visual observation of the facility that was intended to identify signs of distress or malfunction, appearances of structural weakness, or existing conditions that are disrupting or have the potential to disrupt the maintenance and safety of the facility, if present. The findings of the visual observation are described 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.

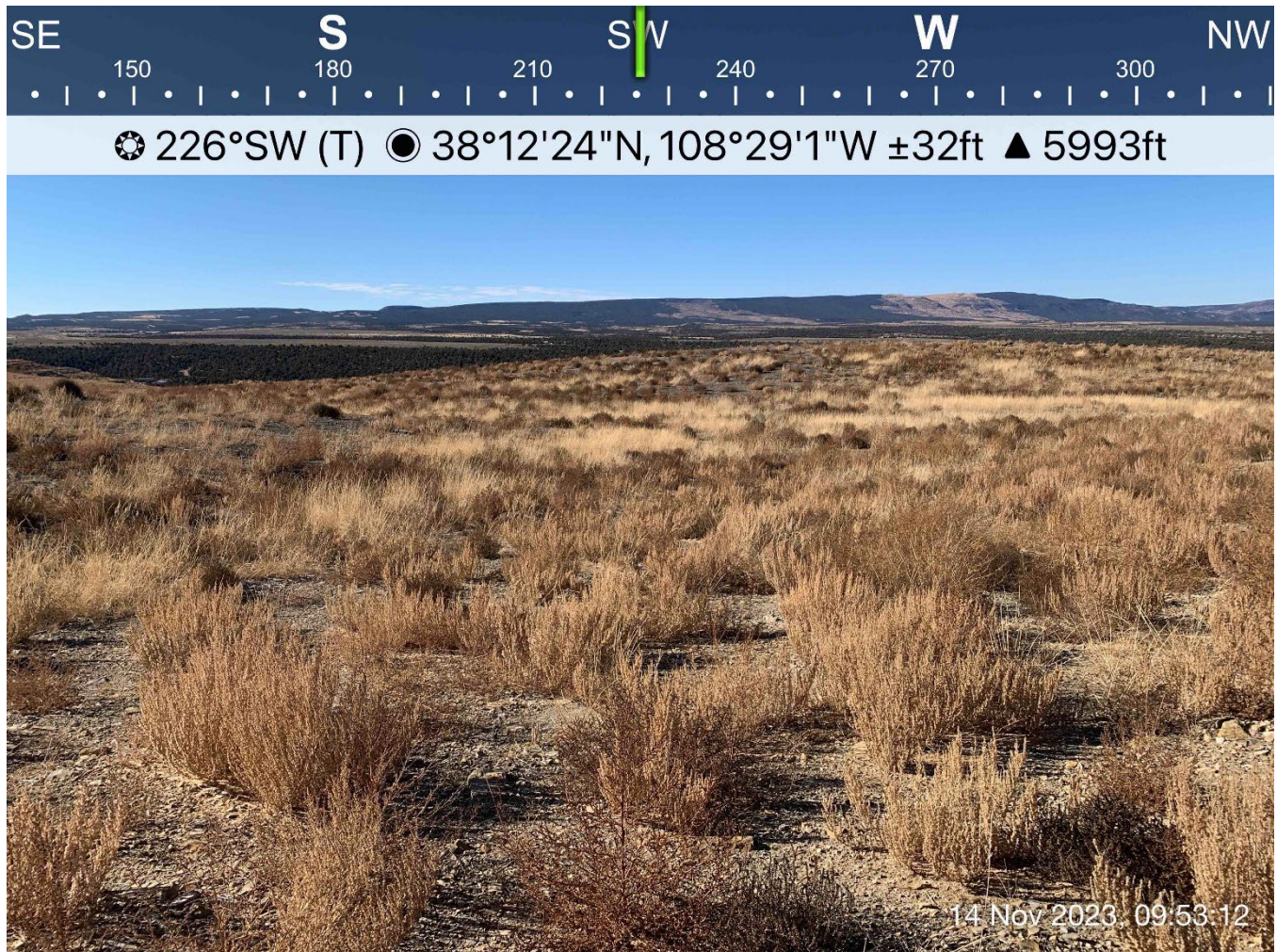
3.3 Findings

WSP conducted a visual observation of the facility on November 14, 2023. WSP observed the condition of the top surface, embankment slopes, embankment crest, embankment toe, and stormwater control features. The

inspection form is included in Appendix A. The locations and orientations of photographs presented in this section are shown on the inspection form.

3.3.1 Top Surface

The top surface was observed to be in good condition. Signs of ground movement, such as sloughing or sliding, cracking, subsidence, or bulging, were not observed across the top surface. The top surface was appropriately graded so that stormwater will be routed away from the facility to the designated locations. Minor erosion rills were observed at one location, where indicated in Appendix A. The erosion rills do not currently pose a threat to structural stability and did not hinder WSP's ability to inspect the facility. Tri-State personnel indicated that work to repair the erosion rills and reduce the potential for future erosion was scheduled to be implemented in December 2023, weather permitting. Vegetation has been established across the top surface following completion of closure activities in 2022. Tri-State personnel indicated that Halogeton, which is generally considered to be an undesirable plant species, has been identified in some areas on the top surface. The typical condition of the top surface is depicted in Photograph 1.



Photograph 1: Typical Condition of the Top Surface

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 Condition of the Embankment Crest

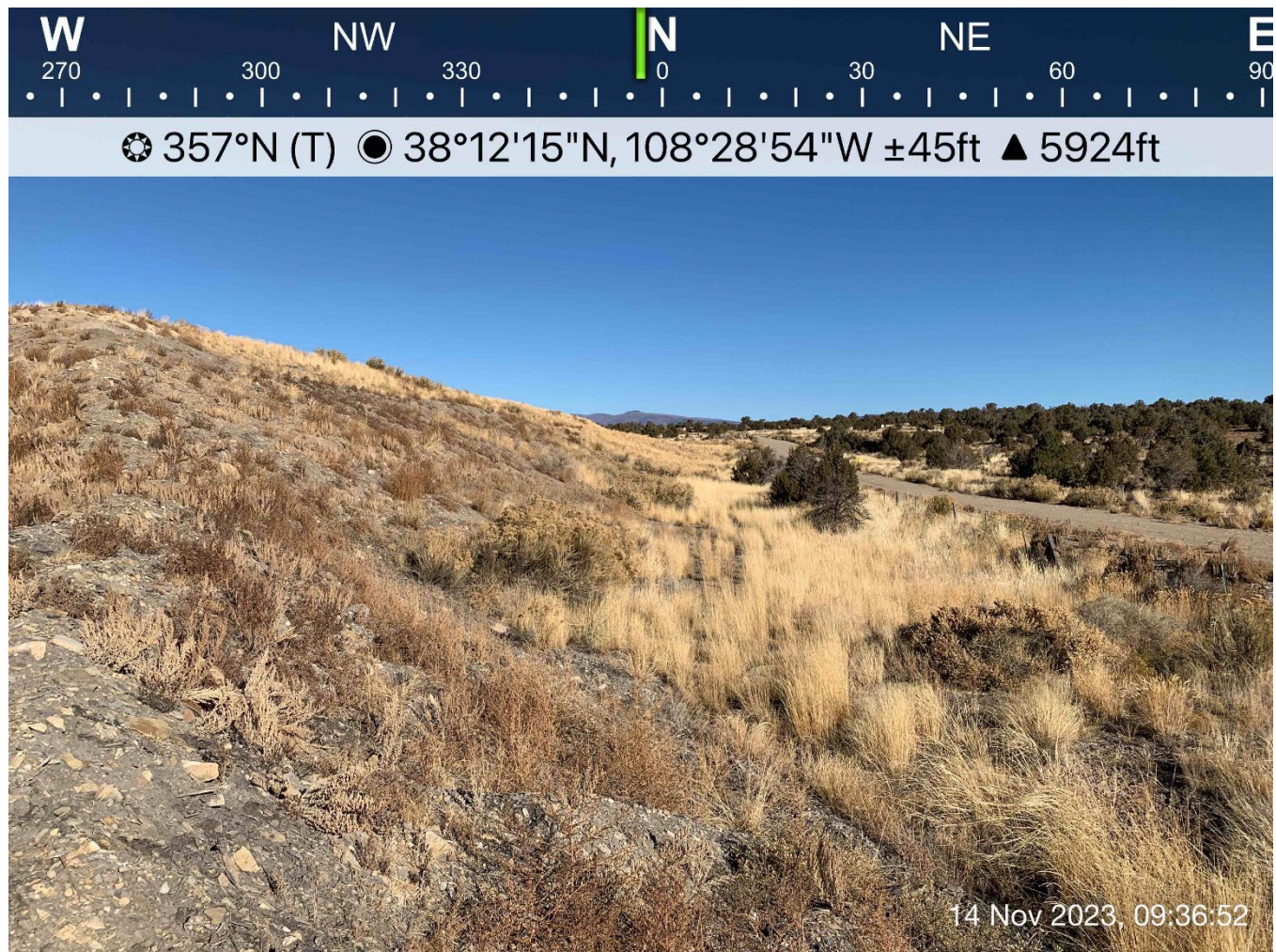
3.3.3 Embankment Slopes

The embankment slopes were observed to be in fair to good condition. Signs of ground movement, such as sloughing or sliding, cracking, subsidence, or bulging, were not observed on the embankment slopes. Evidence of excessive erosion or slope deterioration was not observed on the embankment slopes. Native vegetation has been established on the embankment slopes, with the exception of the south embankment slopes. At the time of the visual observation, the south embankment slopes had been roughened to create an undulating surface (refer to Section 2.2) but not yet reseeded. The west, north, and east embankment slopes generally had adequate vegetative coverage at the time of the visual observation. Unusually poor or thriving vegetative growth was not observed on these embankment slopes. A few animal burrows were observed on the embankment slopes, where

indicated in Appendix A. The animal burrows did not appear to be active, do not currently pose a threat to structural stability, and did not hinder WSP’s ability to inspect the facility. The typical condition of the south embankment slopes is depicted in Photograph 3. The typical condition of the west, north, and east embankment slopes is depicted in Photograph 4.



Photograph 3: Typical Condition of the South Embankment Slopes



Photograph 4: Typical Condition of the West, North, and East Embankment Slopes

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 5.



Photograph 5: Typical Condition of the Embankment Toe

3.3.5 Stormwater Control Features

The stormwater control features at the facility were observed to be in good condition. Downchute channels and energy dissipation basins at the facility are constructed with riprap. The typical condition of the downchute channels is depicted in Photograph 6. Terrace channels at the facility are provided at approximate 20-foot vertical intervals. Erosion control wattles have been installed to control erosion and capture sediment in the terrace channels at appropriate intervals. The typical condition of the terrace channels is depicted in Photograph 7. Perimeter channels are in place around the facility where they are needed to control stormwater. Perimeter channels at the facility are generally constructed with soil and rock. Erosion control wattles have been installed at appropriate intervals in the perimeter channels to control erosion and capture sediment. The typical condition of the perimeter channels is depicted in Photograph 8. During the visual observation, WSP observed that the damage to a stormwater outfall that was caused by major storm events in late September and early October 2022, where indicated in Appendix A, had not yet been repaired. The damage is shown in Photograph 9. Tri-State indicated that the repair work was scheduled to be implemented in December 2023, weather permitting. The damage does not currently pose a threat to structural stability and did not hinder WSP's ability to inspect the facility.



Photograph 6: Typical Condition of Downchute Channels



Photograph 7: Typical Condition of Terrace Channels



Photograph 8: Typical Condition of Perimeter Channels



Photograph 9: Damage to Stormwater Outfall

4.0 CONCLUSIONS AND RECOMMENDATIONS

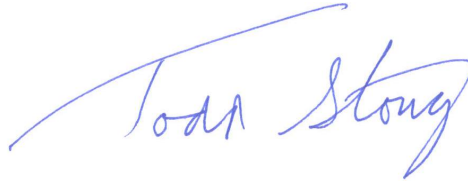
WSP completed an inspection of the Nucla Station Ash Disposal Facility, including a visual observation conducted on November 14, 2023. The facility was observed to be in good condition overall. Signs of distress or malfunction of the facility were not observed, appearances of actual or potential structural weakness of the facility were not identified, and existing conditions that are disrupting or have the potential to disrupt the maintenance and safety of the facility were not observed. Current facility maintenance practices such as control of burrowing animals, monitoring and maintenance of embankment slopes, establishment of suitable vegetation on embankment slopes, and use of appropriate erosion control measures should continue, with repairs or improvements made as the need is indicated by periodic inspections. Reseeding of the south embankment slopes should be carried out during the appropriate season. Repair of the damaged stormwater outfall and the observed erosion rills should be completed when weather conditions allow. The need to address or control the growth of Halogeton on the top surface should also be evaluated.

Signature Page

WSP USA Inc.



Jason Obermeyer, PE
Vice President, Geotechnical Engineer



Todd Stong, PE
Vice President, Geotechnical Engineer

JEO/TJS/rm

[https://golderassociates.sharepoint.com/sites/170821/project files/5 technical work/inspection/final/_formatted/21453425.003-002-rpt-0-2023_nucla_insp_rpt_15dec23.docx](https://golderassociates.sharepoint.com/sites/170821/project%20files/5%20technical%20work/inspection/final/_formatted/21453425.003-002-rpt-0-2023_nucla_insp_rpt_15dec23.docx)

5.0 REFERENCES

- Colorado-Ute Electric Association, Inc. 1987. Nucla Station Fly Ash, Bottom Ash, Slag and Flue Gas Emission Control Waste Disposal Facility Engineering Design and Operations Report. Report prepared for the Colorado Department of Health. February 6.
- Geo-Trans Inc. 2002. Design and Operations Report, Nucla, Colorado, Ash Disposal Facility. Report prepared on behalf of Tri-State Generation and Transmission Association, Inc., for the Colorado Department of Public Health and Environment. March 21.
- Golder (Golder Associates Inc.). 2015. Nucla Generating Station Coal Combustion Residuals Fugitive Dust Control Plan. Plan prepared for Tri-State Generation and Transmission Association, Inc. October.
- Golder. 2016a. Coal Combustion Residuals Landfill Annual Inspection Report, Nucla Station Ash Disposal Site. Report prepared for Tri-State Generation and Transmission Association, Inc. January 18.
- Golder. 2016b. Nucla Station Ash Disposal Facility Post-Closure Plan. Plan prepared for Tri-State Generation and Transmission Association, Inc. October.
- Golder. 2017a. Coal Combustion Residuals Landfill Annual Inspection Report, Nucla Station Ash Disposal Site. Report prepared for Tri-State Generation and Transmission Association, Inc. January 16.
- Golder. 2017b. Design & Operations Report Addenda, Nucla Station Ash Disposal Facility. Report prepared for Tri-State Generation and Transmission Association, Inc. April.
- Golder. 2018a. Coal Combustion Residuals Landfill Annual Inspection Report, Nucla Station Ash Disposal Site. Report prepared for Tri-State Generation and Transmission Association, Inc. January 12.
- Golder. 2018b. Coal Combustion Residuals Landfill Annual Inspection, Nucla Station Ash Disposal Site. Report prepared for Tri-State Generation and Transmission Association, Inc. December 21.
- Golder. 2019. Coal Combustion Residuals Landfill Annual Inspection, Nucla Station Ash Disposal Facility. Report prepared for Tri-State Generation and Transmission Association, Inc. December 20.
- Golder. 2020. Coal Combustion Residuals Landfill Annual Inspection, Nucla Station Ash Disposal Facility. Report prepared for Tri-State Generation and Transmission Association, Inc. December 18.
- Golder. 2021a. Coal Combustion Residuals Landfill Annual Inspection, Nucla Station Ash Disposal Facility. Report prepared for Tri-State Generation and Transmission Association, Inc. December 17.
- Golder. 2021b. Run-On and Runoff Control System Plan, Nucla Station Ash Disposal Facility. Plan prepared for Tri-State Generation and Transmission Association, Inc. October 15.
- Golder. 2022a. Closure Plan, Nucla Station Ash Disposal Facility. Plan prepared for Tri-State Generation and Transmission Association, Inc. February 23.
- Golder. 2022b. Closure Certification, Nucla Station Ash Disposal Facility. Report prepared for Tri-State Generation and Transmission Association, Inc. June 20.
- Golder. 2022c. Coal Combustion Residuals Landfill Annual Inspection, Nucla Station Ash Disposal Facility. Report prepared for Tri-State Generation and Transmission Association, Inc. December 16.

Tri-State (Tri-State Generation and Transmission Association, Inc.). 2022a. Notification of Intent to Close CCR Unit, Nucla Station Ash Disposal Facility. January 28.

Tri-State. 2022b. Notification of Final Cover Completion, Nucla Station Ash Disposal Facility. June 22.

Tri-State. 2022c. Notification of Recording of Notice of Obligation in Lieu of CCR Deed Notation, Nucla Station Ash Disposal Facility. June 22.

Western Colorado Testing, Inc., and J.F.T. Agapito & Associates, Inc. 1987. Geological and Geohydrological Evaluation of Dry Storage Site, Nucla CFB Demonstration Project. Report prepared on behalf of Colorado-Ute Electric Association, Inc., for the Colorado Department of Health. July 8.

APPENDIX A

Inspection Form

TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION
NUCLA STATION ASH DISPOSAL FACILITY
INSPECTION FORM



Inspection Date: November 14, 2023	Inspection Time: 9:30am-11:30am	Legend: Y Yes N No NI Not inspected NA Not applicable RA Requires action
Inspector(s): Jason Obermeyer, PE	Title(s): Vice President	
Reviewer: Todd Stong, PE	Title: Vice President	

Instructions: Complete each part of the 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 addressed:

a. Erosion repairs at the stormwater outfall on the southern half of the east perimeter	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: None

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.
2. Are facility access controls (signage, fencing, gates) in good condition?	Y	N	NI	NA	RA	If N and/or RA, please elaborate.
3. Do you observe signs of unauthorized access or disposal?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.

D. Top Surface

1. Do you observe signs of ground movement on the top surface? Y N NI NA RA If Y and/or RA, please elaborate.

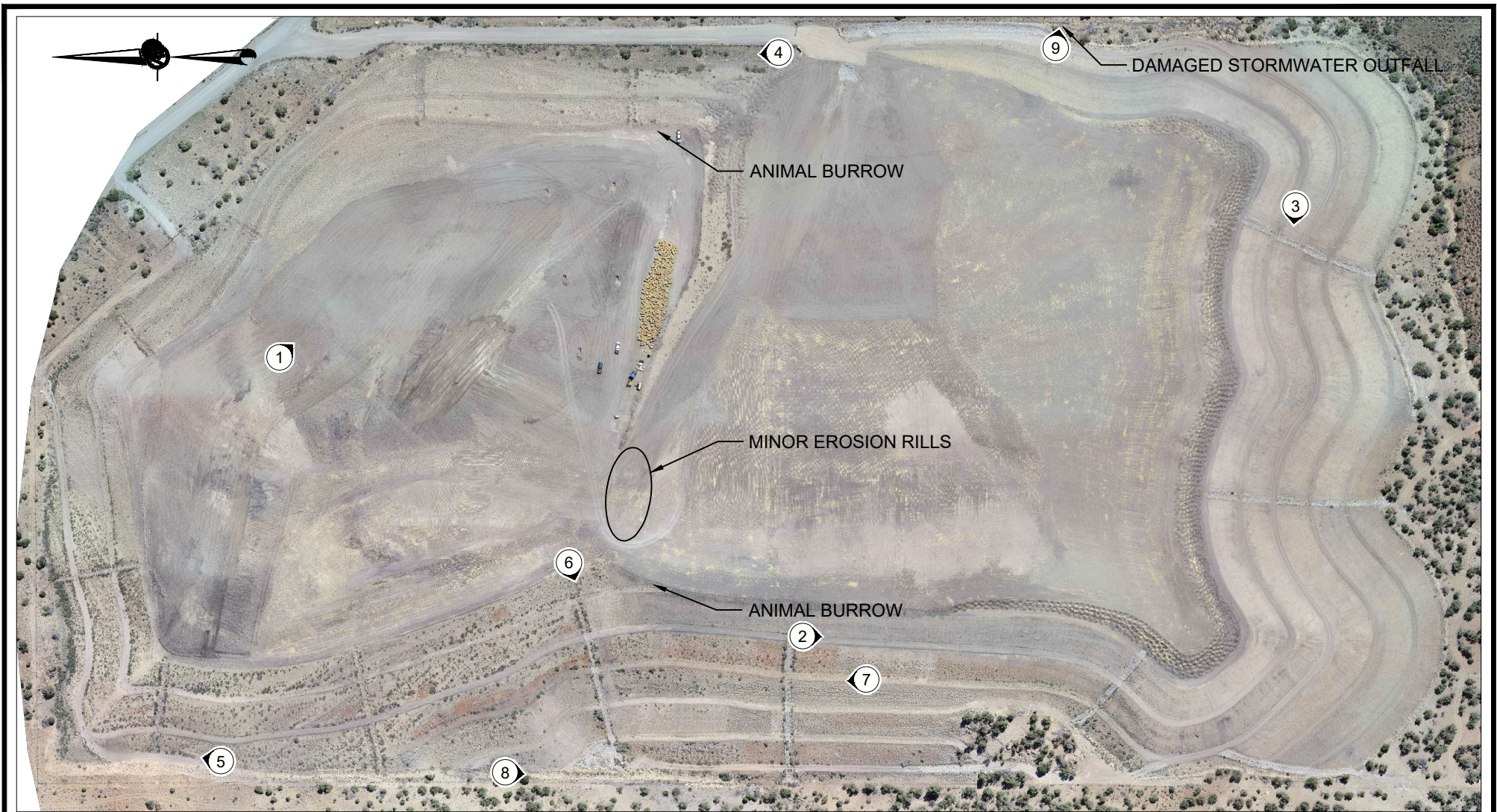
If Y, circle those that apply: Slough or Slide Cracking Subsidence Bulging

2. Do you observe ponding on the top surface?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
3. Do you observe signs of excessive erosion on the top surface?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.
4. Do you observe inadequate, 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 top surface?	Y	N	NI	NA	RA	If Y and/or RA, please elaborate.

E. Embankment Crests

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.

F. Embankment Slopes						
1. Briefly describe ground conditions (wet, dry, soft, firm). North: Dry, firm East: Dry, firm South: Dry, loose West: Dry, firm						
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 inadequate, 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 Toes						
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.
H. Stormwater Control Features						
1. Are rundowns (downchute channels) and energy dissipation features in good condition?	Y	N	NI	NA	RA	If N and/or RA, please elaborate.
2. Are terrace channels in good condition and providing positive drainage toward rundowns?	Y	N	NI	NA	RA	If N and/or RA, please elaborate.
3. Are culverts (including inlet and outlet areas) in good condition?	Y	N	NI	NA	RA	If N and/or RA, please elaborate.
4. Are perimeter channels and stormwater outfalls in good condition?	Y	N	NI	NA	RA	If N and/or RA, please elaborate.
I. Open Items						
1. List unresolved items from the previous inspection (RA in Section A.) and new items identified during the current inspection (RA in Sections B. through H.):						
a. Erosion repairs at the stormwater outfall on the southern half of the east perimeter						
b. Reseeding of the south embankment slopes						
c.						
d.						
e.						
J. Elaboration						
Identify the specific item number (for instance, F.2.) and elaborate on each deficiency or issue identified during the inspection. Attach documentation (photographs or sketches) if practical.						
A.1.a/H.4. The stormwater outfall on the southern half of the east perimeter (see the map on page 3) was damaged by major storm events in late September and early October 2022, according to Tri-State personnel. Repair work is needed and is scheduled to be implemented in December 2023, weather permitting.						
D.4. Tri-State personnel indicated that Halogeton has been identified in some areas on the top surface.						
D.5. Small animal burrows were observed in two locations on the top surface (see the map on page 3). The burrows did not appear to be active.						
F.4. The south embankment slopes have not yet been reseeded after being roughened to create an undulating surface. Reseeding should be carried out during the appropriate season.						



AERIAL IMAGE: EPP & ASSOCIATES, MAY 13, 2022.



② PHOTOGRAPH LOCATION AND DIRECTION

INSPECTION FORM

TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION NUCLA STATION ASH DISPOSAL FACILITY





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