

January 8, 2021



Colorado Springs Utilities
1521 Hancock Expressway
Colorado Springs, Colorado 80903

Attn: Brad Pritekel

Re: Coal Combustion Residual (CCR) Landfill Annual (2020) Inspection
Clear Springs Ranch
Fountain, Colorado
Terracon Project No. 23155030

Dear Mr. Pritekel:

Terracon Consultants, Inc. (Terracon) is pleased to present this report of the Coal Combustion Residual (CCR) Landfill Annual (2020) Inspection services provided for the Clear Springs Ranch CCR landfill. Our services were provided in general accordance with Colorado Springs Utilities (UTILITIES) Purchase Order 157318 received on September 24, 2020.

1.0 PROJECT INFORMATION

1.1 Site Location

ITEM	DESCRIPTION
Location	The CCR Landfill at Clear Springs Ranch in Fountain, Colorado
Existing improvements	An existing and active landfill containing non-volatile fly ash, bottom ash, waste salt / fly ash mixture, spent sandblasting media, flue gas desulfurization waste, sediment from the Martin Drake Power Plant's Storm Water Ponds, and ash derived from the co-combustion of biosolids, woody biomass, or other related solid fuels. The total capacity of the 75-acre landfill is 5 million cubic yards (CY) with a net volume of 3,737,000 CY contained within the Landfill as of December 29, 2020. Based on the December 29, 2020 survey, there is an estimated 541,000 cubic yards of bottom ash and about 3,195,600 cubic yards of fly ash currently in the landfill.
Import Activity for 2020	Fly Ash, Bottom Ash, and Scrubber byproduct from January through December 23, 2020: <ul style="list-style-type: none">▪ Nixon Fly Ash: 25,384 tons▪ Nixon Bottom Ash: 3,271 tons▪ Drake Fly Ash: 2,495 tons▪ Drake Bottom Ash: 955 tons▪ Drake Scrubber Gypsum: 5,997 tons
Existing topography	The active landfill has a relatively flat top with side slopes of about 3H:1V (Horizontal:Vertical) or flatter.



1.2 Background

The Clear Springs Ranch CCR Landfill is subject to the Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals (CCR) from Electric Utilities rule published by the Environmental Protection Agency in the Code of Federal Regulations - 40 CFR Parts 257 and 261, dated April 17, 2015.

In accordance with these regulations, UTILITIES must inspect the CCR landfill in accordance with the following requirements:

257.84 (b) Annual inspections by a qualified professional engineer.

(1) Existing and new CCR landfills and any lateral expansion of a CCR landfill must be inspected on a periodic basis by a qualified professional engineer to ensure that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards. The inspection must, at a minimum, include:

(i) A review of available information regarding the status and condition of the CCR unit, including, but not limited to, files available in the operating record (e.g., the results of inspections by a qualified person, and results of previous annual inspections); and

(ii) A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit.

(2) Inspection report. The qualified professional engineer must prepare a report following each inspection that addresses the following:

(i) Any changes in geometry of the structure since the previous annual inspection;

(ii) The approximate volume of CCR contained in the unit at the time of the inspection;

(iii) Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit; and

The source of materials approved for placement in the CCR landfill include:

- Non-volatile fly ash, bottom ash, waste salt / fly ash mixture, spent sandblasting media, flue gas desulfurization (scrubber) waste, sediment from the Martin Drake Power Plant's Storm Water and Process Water Ponds, and ash derived from the co-combustion of biosolids, woody biomass, or other related solids fuels

We understand that the disposal of these materials at the CCR landfill are currently approved by El Paso County and the Colorado Department of Public Health and Environment (CDPHE).

2.0 SCOPE OF SERVICES

The following sections provide an overview of the work scope performed by Terracon.

2.1 Annual Inspection

Terracon's previous annual inspections of the CCR landfill included a review of available information regarding the status and condition of the CCR landfill and files provided by UTILITIES including results of previous inspections, land surveys, and CCR production and sales. Although not specifically required in Section 257.84b, previous geotechnical studies of the CCR landfill, performed by others, included subsurface explorations, laboratory testing, and slope stability analyses.

For our 2020 annual inspection, we performed our services in accordance with Section 257.84b and included the following activities:

- Visual observations of the CCR unit by a professional geotechnical engineer to identify signs of distress or malfunction of the CCR unit
- Observations of existing or potential structural weakness associated with slope stability or erosion of the CCR unit, in addition to existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit
- Noted changes in geometry of the CCR structure since the 2019 annual inspection
- Estimate the approximate volume of the CCR at the time of the inspection based on survey information provided by UTILITIES, delivery quantities, and sales

3.0 CCR LANDFILL INSPECTION RESULTS

The results of our 2020 annual inspection are discussed below. Selected photographs taken during the inspection and a subsequent site visit are included on the attached photograph log. Our services included a desktop review of the 2020 Volumetric Survey provided by UTILITIES, as well as site observations.

3.1 2020 Annual Observation of the CCR Landfill Structure Geometry

Historical Information

The CCR landfill has been active since the late 1970's and is currently being used for disposal of relatively dry ash. We were provided with the design drawing, "East Expansion of Ash Landfill", dated March 29, 2008 that indicates the intended final geometry of the landfill (height and slope gradients). The acceptable slope gradients of 3H:1V are also based on the stability analyses presented in the November 17, 2009, Ash Landfill Slope Stability Investigation for the Clear Spring Ranch Facility, prepared by Kleinfelder.

Based on the Ash Landfill 2020 Volumetric Survey, dated December 29, 2020, the landfill varies from about 30 feet above the surrounding ground surface within the Bottom Ash area to the west and about 50 to 70 feet high at the eastern terminus. The lowest elevation at the toe of the landfill slope appears to be at the southeast corner at El. 5444. The highest elevation at the crest of the

landfill also appears to be at the southeast corner of the landfill at El. 5524. The side slopes are generally at a gradient of about 3H:1V.

Site Observations

Terracon visited the site on September 24, 2020 for our annual observations of the CCR landfill surface features. The purpose of our visit included observations for erosion control measures for slopes and the perimeter road, isolated or surficial slope instability, proper soil cap thicknesses and competency, as well as understanding landfill earthwork and grading activities.

Activity at the landfill during our observations consisted of stockpiling of bottom ash at the base of the western terminus of the land fill. Utilities was investigating the potential of mining the bottom ash within the top western third; however, there are no plans to mine the bottom ash at this time. New fly ash was being placed and compacted near the east portion of the landfill. Placement of ash in this area was started at the southeast portion of the landfill and is continuing north toward the northeast portion of the landfill. The material is placed by pushing the fly ash up the slope in lifts of about 4 inches, then tracked into place using a CAT D8R bulldozer.

The current top of the landfill was relatively flat and sloped gently down gradient to the west (300 H:1V). The surface reportedly consisted of an approximate 1-foot thick temporary soil cap. The landfill has the capacity to increase approximately 20 feet in height. The far southeast corner of the landfill is the only area approaching the top height level. Overall, the landfill ground surface was covered with a sparse to moderate amount of native vegetation.

The side slopes of the landfill also had an approximate 1-foot thick soil cap. Most of the perimeter sloped surfaces were sparse to moderately vegetated with dried-out, 6-inch to 3-foot high vegetation. An estimated 10 to 20 percent of the side slopes had recently been regraded before our September 24 site visit. These areas consisted of bulldozer-tracked surfaces of exposed soil that appeared to generally be in suitable condition. However, exposed CCRs were observed in a recently regraded area at the southeast corner of the landfill. Exposed CCRs were also observed in a cut bank on the top of the landfill near the southeast portion of the landfill. We generally observed a soil berm at the toe and crest of the landfill slopes.

During our initial site visit, we observed a slight to moderate amount of erosion rills and gullies along all slopes. Most of the erosion features were about 3 to 6 inches deep, or less. However, in several areas relatively deep erosion features ranging from about 9 inches up to about 12 inches deep were observed. The areas of relatively deep erosion rills were located at the west facing slope surface north of the mining area, at the north facing slope surface at the northeast corner of the landfill, and at the south facing slope at the south central portion of the landfill.

Several discrepancies observed during our September 24, 2020 site visit include the following:

- Exposed CCRs at the recently regraded slope at the southeast corner of the landfill (Photos #1 and #2)

- Exposed CCRs at a cut bank on top of the landfill near its southeast portion (no photos)
- Some erosion rills were becoming relatively deeply incised near the middle area of the south facing slope (Photo #9)
- Some erosion rills were becoming relatively deeply incised near the middle area of the west facing slope (Photo #17)
- Some erosion Rills were becoming relatively deeply incised at the northeast corner of the landfill (Photos #34, #35, and #36)

3.2 Approximate Volume of the CCR

Based on the provided Volumetric Surveys, the provided annual Net Volumes of the Ash Landfill are:

- 2013: 3,535,900 cubic yards
- 2014: 3,539,100 cubic yards
- 2015: 3,563,000 cubic yards
- 2016: 3,578,600 cubic yards
- 2017: 3,679,600 cubic yards
- 2018: 3,690,200 cubic yards
- 2019: 3,769,700 cubic yards
- 2020: 3,737,000 cubic yards

There was an observed decrease in the net volume of the ash landfill from the survey performed in 2019 to the survey performed in 2020. UTILITIES indicated that this likely resulted from several different factors:

- Ash measured in the working area in 2019 has since been compacted and covered resulting in a volume decrease
- Mining and sale of both bottom ash and fly ash
- The 2019 survey possibly included the volume of cover soil stockpiles located on top of and northeast of the landfill which were not included in the 2020 survey.

3.3 Observations of Existing or Potential Structural Weakness

Visual evidence of apparent existing and potential structural weaknesses was not observed.

3.4 Slope Stability Analysis

Slope stability analyses was beyond the scope of our services. Kleinfelder performed slope stability analyses as part of a November 17, 2009 study. The lowest presented slope stability analyses was 2.6. The January 29, 2009 State of Colorado letter indicated the slope stability analysis was acceptable. Furthermore, the State of Colorado letter indicated “in its present condition as well as proposed final configuration, the ash landfill is at a low risk to be impacted by slope stability issues.” No apparent signs of slope instability were observed during our site visit.

3.5 Recommendations

We recommended to UTILITIES representatives that slopes with erosion features (rills and gullies) greater than about 3 to 6 inches deep be filled and re-graded. We also recommended regrading to establish a minimum 1-foot thick soil cap in areas where CCRs are exposed.

During our subsequent site visit on November 19, 2020, the deficient areas described in the Observations Section of this report had been repaired. The exposed CCRs at the cut bank on top of the landfill near its southeast portion had been re-graded (Photo # 42). The relatively deeply incised erosion rills on the south, west, and north facing slopes had been re-graded (Photos #43, #44, and #45, respectively). The area at the southeast corner of the landfill was being actively worked at the time of our subsequent site visit. After completion, UTILITIES provided photographs (Photo # 41) showing this area had been re-graded to provide cover of the exposed CCRs.

Continued observations of the landfill should occur by UTILITIES throughout the year, with particular attention to the erosion features along the slopes. Routine maintenance should be conducted, when necessary, to maintain the soil cover. We understand the grading activities are typically accomplished by tracking a bulldozer up and down the slopes. As part of routine maintenance throughout the year we recommended the soil berms adjacent to roadway and at the crest of the slope be maintained and repaired for continuity, as necessary.

4.0 GENERAL COMMENTS

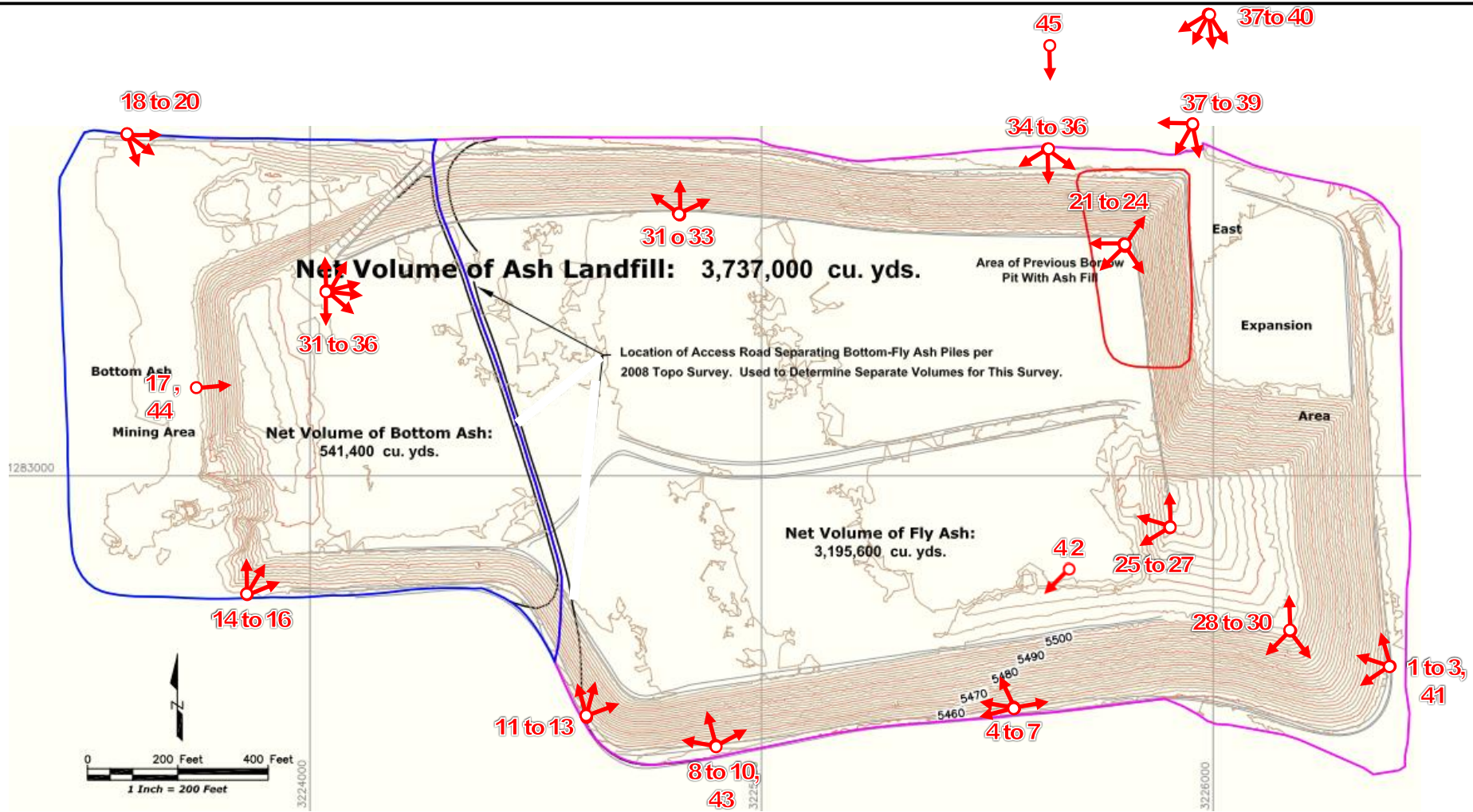
The observations and recommendations presented in this report are based upon the data and information discussed in this report. This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety and excavation support are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

Sincerely,
Terracon Consultants, Inc.

Tyler A. Compton, P.E.
Project Engineer

Ryan W. Feist, P.E.
Principal

Attachments: Photograph Location Diagram
Photograph Log



INDICATES PHOTO NUMBER AND ORIENTATION, PHOTOS TAKEN

BASE DRAWING OBTAINED FROM THE CSU 2020 SURVEY DRAWING, DATED DECEMBER 29, 2020

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager:	RWF	Project No.	23155030
Drawn by:	TAC	Scale:	AS SHOWN
Checked by:	RWF	File Name:	A-1
Approved by:	RWF	Date:	1/8/2021

Terracon
Consulting Engineers & Scientists

4172 Center Park Drive Colorado Springs, CO 80916
PH. (719) 597-2116 FAX. (719) 597-2117

PHOTOGRAPH LOCATION DIAGRAM
CCR LANDFILL ANNUAL INSPECTION CLEAR SPRINGS RANCH FOUNTAIN, COLORADO

Exhibit
A-1

Geotechnical Engineering Report

Clear Springs Ranch CCR Landfill Inspection ■ Colorado Springs, Colorado

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PHOTO LOG (September 24 & November 19, 2020)







<p>Photo #1 Facing Northwest</p>		<p>Photo #2 Facing Southwest</p>
<p>Photo #3 Facing North</p>		<p>Photo #4 Facing East</p>
<p>Photo #5 Facing North</p>		<p>Photo #6 Facing Northwest</p>

Geotechnical Engineering Report

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PHOTO LOG (September 24 & November 19, 2020)

		
<p>Photo #7 Facing West</p>		<p>Photo #8 Facing Northeast</p>
		
<p>Photo #9 Facing North</p>		<p>Photo #10 Facing Northwest</p>
		
<p>Photo #11 Facing East</p>		<p>Photo #12 Facing Northeast</p>







Geotechnical Engineering Report

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PHOTO LOG (September 24 & November 19, 2020)

	
<p>Photo #13 Facing North</p>	<p>Photo #14 Facing East</p>
	
<p>Photo #15 Facing Northeast</p>	<p>Photo #16 Facing North</p>
	
<p>Photo #17 Facing East</p>	<p>Photo #18 Facing South</p>

Geotechnical Engineering Report

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PHOTO LOG (September 24 & November 19, 2020)







	
<p>Photo #19 Facing Southeast</p>	<p>Photo #20 Facing East</p>
	
<p>Photo #21 Facing Southeast</p>	<p>Photo #22 Facing Northeast</p>
	
<p>Photo #23 Facing West</p>	<p>Photo #24 Facing Southwest</p>

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PHOTO LOG (September 24 & November 19, 2020)

	
<p>Photo #25 Facing Southwest</p>	<p>Photo #26 Facing East</p>
	
<p>Photo #27 Facing North</p>	<p>Photo #28 Facing Southwest</p>
	
<p>Photo #29 Facing Southeast</p>	<p>Photo #30 Facing North</p>

Geotechnical Engineering Report

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PHOTO LOG (September 24 & November 19, 2020)



Photo #31 Facing Northeast



Photo #32 Facing North



Photo #33 Facing Northwest



Photo #34 Facing Southeast



Photo #35 Facing South



Photo #36 Facing Southwest

Geotechnical Engineering Report

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PHOTO LOG (September 24 & November 19, 2020)

<p>Photo #37 Facing Southeast</p>		<p>Photo #38 Facing South</p>
<p>Photo #39 Facing Southwest</p>		<p>Photo #40 Facing Southwest</p>
<p>Photo #41 (12/7/20) Facing Northwest</p>		<p>Photo #42 (11/19/20) Facing Southwest</p>

Geotechnical Engineering Report

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PHOTO LOG (September 24 & November 19, 2020)

		
<p>Photo #43 (11/19/20) Facing North</p>		<p>Photo #44 (11/19/20) Facing East</p>
		
<p>Photo #45 (11/19/20) Facing South</p>		