

January 17, 2022



Colorado Springs Utilities
1521 Hancock Expressway
Colorado Springs, Colorado 80903

Attn: Brad Pritekel

Re: Coal Combustion Residual (CCR) Landfill Annual (2021) Inspection
Clear Spring 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 (2021) Inspection services provided for the Clear Spring Ranch CCR landfill. Our services were provided in general accordance with Colorado Springs Utilities (UTILITIES) Purchase Order 163864 received on January 4, 2022.

1.0 PROJECT INFORMATION

1.1 Site Location

ITEM	DESCRIPTION
Location	The CCR Landfill at Clear Spring 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 5,220,600 cubic yards (CY). As of December 27, 2021, there is a net volume of 3,802,500 CY contained within the Landfill. This includes an estimated 554,000 cubic yards of bottom ash and about 3,248,500 cubic yards of fly ash currently in the landfill.
Import Activity for 2021 (Provided By UTILITIES)	Fly Ash, Bottom Ash, and Scrubber byproduct in 2021: <ul style="list-style-type: none">▪ Nixon Fly Ash: 16,253 tons▪ Nixon Bottom Ash: 3,088 tons▪ Drake Fly Ash: 215 tons▪ Drake Bottom Ash: 1022 tons▪ Drake Scrubber Gypsum: 4,450 tons▪ Bottom Ash Removed from landfill: 12,505 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 Spring 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 2021 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 2020 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
- Review the CSR CCR Landfill Weekly Inspection Checklists dated between January 6, 2021 and December 29, 2021

3.0 CCR LANDFILL INSPECTION RESULTS

The results of our 2021 annual inspection are discussed below. Selected photographs taken during the inspection and photographs provided by UTILITIES are included on the attached photograph log. Our services included a desktop review of the 2021 Volumetric Survey provided by UTILITIES, as well as site observations.

3.1 2021 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 2021 Volumetric Survey, dated December 27, 2021, 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 21, 2021 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.

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 interim cover. The landfill has the capacity to increase approximately 15 feet in height. The far southeast corner of the landfill is the only area approaching the final waste grade. 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.

During our initial site visit, we observed a moderate amount of erosion rills and gullies along a portion of the southern slope. Most of the erosion features were about 6 to 8 inches deep, or less. The areas of erosion rills were located at the south facing slope surface in the southwest area of the fly ash portion of the landfill (see Photos # 7 to 9 in the attached photography log). The erosion rills were subsequently repaired, see Section 3.5 for details.

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
- 2021: 3,802,500 cubic yards

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 the slope with erosion features (rills and gullies) in the area of Photos 7 through 9 should be filled and re-graded. On December 14, 2021, UTILITIES provided photographs (Photo # 56 - 60) showing the deficient area described in the Observations Section of this report had been repaired.

Throughout the course of 2021, the Weekly Inspection Checklists were authored by four separate Qualified Inspectors. In general, the Weekly Inspection Checklists were performed every seven days. The Weekly Inspection Checklists indicated the same responses every week with the occasional note of rain or snow as an added form of dust control. No comments, deficiencies (such as the erosion and riling we noted in our inspection), or repair recommendations were noted on the Weekly Inspection Checklists. We recommend UTILITIES modify the weekly checklist to include a section regarding landfill cover conditions. We also recommend that UTILITIES increase the frequency of Qualified Inspectors training. Terracon can provide the training, if requested.

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. In addition, we recommended the soil berms adjacent to roadway and at the crest of the slope be repaired for continuity, as necessary.

4.0 GENERAL COMMENTS

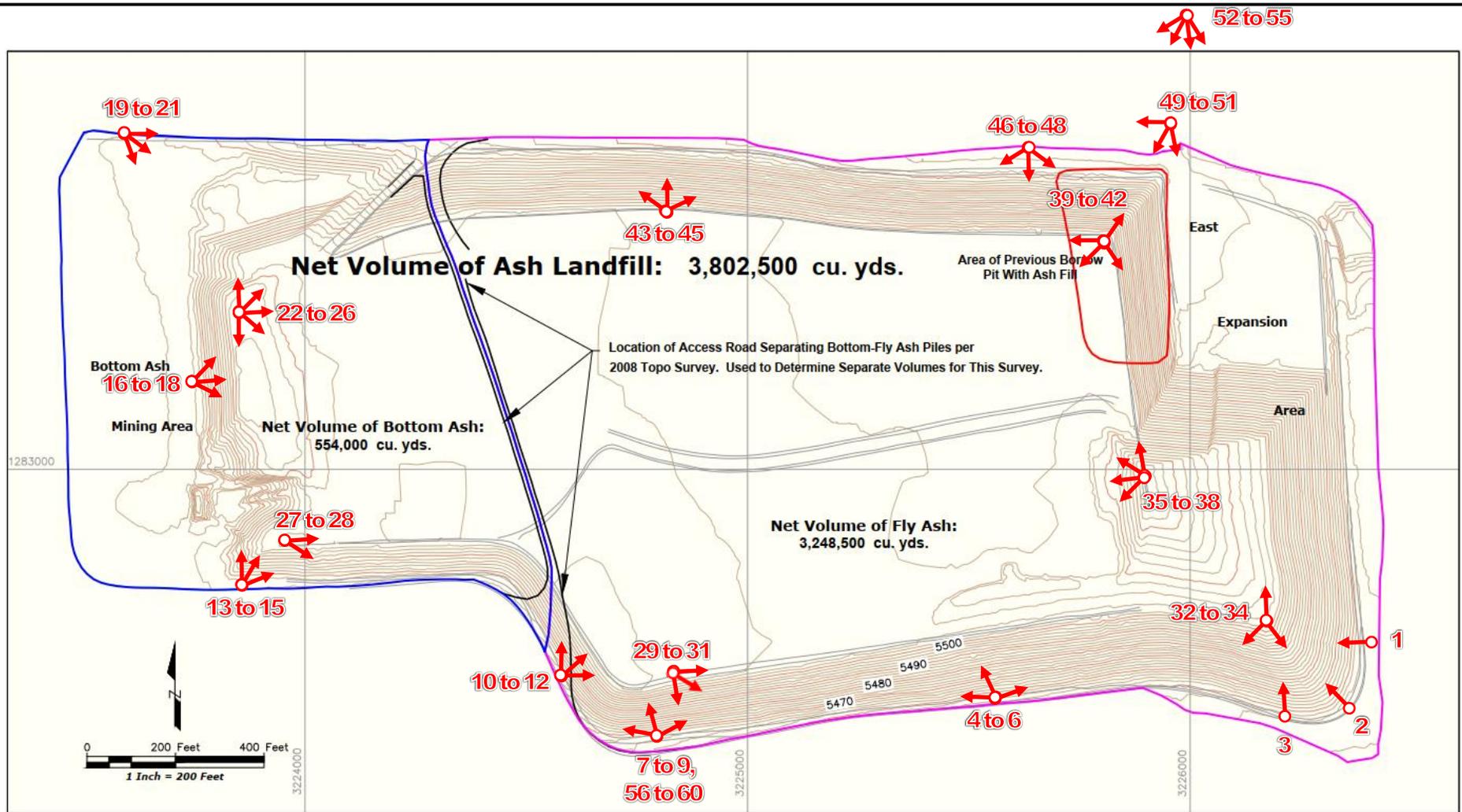
The observations and recommendations presented in this report are based upon the data and information discussed in this report. This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted 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.

John N. Haas, P.E.
Geotechnical Department Manager

Ryan W. Feist, P.E.
Senior Principal

Attachments: Photograph Location Diagram
Photograph Log



INDICATES PHOTO NUMBER AND ORIENTATION, PHOTOS TAKEN

BASE DRAWING OBTAINED FROM THE CSU 2021 SURVEY DRAWING, DATED DECEMBER 27, 2021

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:	JNH	File Name:	A-1
Approved by:	RWF	Date:	1/6/2022

Terracon
Consulting Engineers & Scientists

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PHOTOGRAPH LOCATION DIAGRAM

CCR LANDFILL ANNUAL INSPECTION

CLEAR SPRINGS RANCH

FOUNTAIN, COLORADO

Exhibit

A-1

Geotechnical Engineering Report

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

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Photo #7 Facing North (Prior to Repair)



Photo #8 Facing East (Prior to Repair)



Photo #9 Facing West (Prior to Repair)



Photo #10 Facing East



Photo #11 Facing Northeast



Photo #12 Facing North

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Photo #13 Facing Northeast



Photo #14 Facing Northeast



Photo #15 Facing North



Photo #16 Facing East



Photo #17 Facing Southeast



Photo #18 Facing Northeast

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Photo #19 Facing South



Photo #20 Facing Southeast



Photo #21 Facing East



Photo #22 Facing North



Photo #23 Facing Northeast



Photo #24 Facing East

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Photo #25 Facing Southeast



Photo #26 Facing South



Photo #27 Facing East



Photo #28 Facing Southeast



Photo #29 Facing South



Photo #30 Facing Southeast

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Photo #31 Facing East



Photo #32 Facing Southeast



Photo #33 Facing East



Photo #34 Facing North



Photo #35 Facing North



Photo #36 Facing Northwest

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Photo #37 Facing West



Photo #38 Facing Southwest



Photo #39 Facing Northeast



Photo #40 Facing Southeast



Photo #41 Facing Southwest



Photo #42 Facing West

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Photo #43 Facing North



Photo #44 Facing Northeast



Photo #45 Facing Northwest



Photo #46 Facing South



Photo #47 Facing Southwest



Photo #48 Facing Southeast

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Photo #49 Facing Southwest



Photo #50 Facing West



Photo #51 Facing South



Photo #52 Facing Southeast



Photo #53 Facing South



Photo #54 Facing South

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Photo #55 Facing Southwest



Photo #56 Facing North (Provided by UTILITIES on 12/14/2021)



Photo #57 Facing North (Provided by UTILITIES on 12/14/2021)



Photo #58 Facing Northeast (Provided by UTILITIES on 12/14/2021)



Photo #59 Facing Northwest (Provided by UTILITIES on 12/14/2021)



Photo #60 Facing North (Provided by UTILITIES on 12/14/2021)