December 4, 2015

Colorado Springs Utilities
1521 Hancock Expressway
Colorado Springs, Colorado 80903

Attn.: Brian Leach

Re: Coal Combustion Residual (CCR) Landfill Annual (2015) Inspection & Qualified Personnel Training
Clear Springs Ranch
Fountain, Colorado
Terracon Project No. 23155030

Dear Mr. Leach:

Terracon Consultants, Inc. (Terracon) is pleased to present this report of the Coal Combustion Residual (CCR) Landfill Annual (2015) Inspection & Qualified Personnel Training services provided for the Clear Springs Ranch CCR landfill. Our services were provided in general accordance with Colorado Springs Utilities (UTILITIES) Scope of Work (SOW) provided on May 7, 2015.

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 about 2 million CY remaining.
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 inspection 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.

Terracon inspection services were performed 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 previous 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

2.2 Qualified Person Training

Section 257.84(a) of the regulations states that the landfill must be inspected by a qualified person. As part of our services, Terracon provided "Qualified Person" training to selected UTILITIES' employees on September 2, 2015. The training was provided by Mr. Ryan Feist, a licensed Geotechnical Professional Engineer (PE) in the State of Colorado.

The training included a discussion of the following items:

- Review of landfill operations, capacity, and materials
- Regulatory overview and requirements
- UTILITIES personnel responsibilities
- Landfill design parameters
- Types of Potential Distress including:
  - Surficial Erosion
  - Landfill material transport off-site
  - Surficial slope instability
  - Global slope instability
- Discussion of Preventable Measures including:
  - Promoting vegetation
  - Routine maintenance to repair erosion rills, gullies, and channels, particularly after storm events
  - Berms to contain/redirect surface runoff
  - Proper earthwork operations, i.e. top down cutting of bottom ash

A training attendance record was provided under separate cover.

3.0 CCR LANDFILL INSPECTION RESULTS

The results of Terracon inspection are discussed below. Selected photographs taken during the inspection are included on the attached photograph log. Our services included a desktop review of information provided by UTILITIES, as well as site observations. The desktop review consisted of the following provided information:

- An excerpt from the Nixon Power Plant, Sand Canyon Ash Disposal Capacity Report, prepared by Woodward-Clyde Consultants, dated April 13, 1978
- Clear Springs Ranch CCP Landfill, SHDF, Retention Dam, West of Retention Dam, K Series Boreholes, prepared by Kleinfelder, dated June 10, 2002
- Ash Landfill Slope Stability Investigation for the Clear Spring Ranch Facility, prepared by Kleinfelder, dated November 17, 2009
- State of Colorado, Approval of Slope Stability Analysis: Clear Spring Ranch Ash Landfill, dated January 29, 2009
- 2015 Ash Landfill Area with 1976 (rev 1986) Disposal Map
- 2015 Ash Landfill Area with 1977 Disposal Area
- 2015 Ash Landfill Area with 1980 Disposal Area
- 2015 Ash Landfill with 1981 to 1984 Disposal
- Ash Landfill 2013 Volumetric Survey
- Ash Landfill 2014 Volumetric Survey

3.1 Initial Annual Observation of the CCR Landfill Structure Geometry

The CCR landfill has been active since the late 1970's and is currently being used for disposal of relatively dry ash. We were not provided with design drawings indicating the specified geometry for the landfill (height and slope gradients). The acceptable slope gradients of 3H:1V (Horizontal:Vertical) are 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 2014 Volumetric Survey, dated December 23, 2014, the landfill varies from about 30 feet above the surrounding ground surface within the Bottom Ash area to the west and about 50 to 60 feet high at the eastern terminus. The side slopes are generally at a gradient of about 3H:1V.

Terracon visited the site on August 22, 2015 for our initial review of the CCR landfill. We conducted a subsequent site visit the day of our Personnel Training on September 2, 2015. The purpose of our visits 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 top-down cutting of slopes to mine Bottom Ash along the western terminus of the land fill. Actively mined slopes appeared stable and consistent with the 3H:1V gradients observed along typical slopes of the landfill. New fly ash

was being placed and compacted near the southeast portion of the landfill. The material was 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. 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 ground surface was covered with a moderate amount of native vegetation.

The side slopes of the landfill also had an approximate 1-foot thick soil cap. Most of the slopes were heavily vegetated with 1 foot to 3-foot high vegetation. In general, the slopes were well vegetated. The south facing slope was moderately vegetated with isolated areas containing sparse amounts of vegetation. The east facing slope adjacent to the active fill area at the southeast corner of the landfill was also slightly, to moderately vegetated. Generally, we observed a 1 to 4-foot high soil berm at the crest of the perimeter slope. An erosion channel, approximately 2 feet in diameter, was observed along the east facing slope near the northeast corner of the landfill. The subject slope was heavily vegetated at the location of the erosion channel and was difficult to observe the downslope erosion feature.

During our initial site visit, we observed a slight to moderate amount of erosion rills and gullies along the east and south facing slopes. Most erosion features were less than about 6 inches deep; however, several features were up to about 10 inches below the slope face. One erosion gully at the far southeastern corner had eroded sufficiently to expose the underlying fly ash. We did not observe other areas with exposed fly ash within erosion gullies.

The perimeter earthen road at the toe of the landfill slopes generally had loose soil berms on the upslope and downslope edges of the roadway. The upslope berm had a moderate (one to two locations per approximate 50 feet) amount of gullies that had eroded through the berm. The downslope roadway berm had one significant erosion channel about the midpoint along the south side of the landfill.

3.2 Approximate Volume of the CCR

Based on the provided 2013 and 2014 Volumetric Surveys, the Net Volumes of the Ash Landfill are:

- 2013: 3,535,900 cubic yards
- 2014: 3,539,100 cubic yards

3.3 Observations of Existing or Potential Structural Weakness

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 (gullies) greater than about 3 to 6 inches deep be filled and re-graded. 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 roadways be re-constructed for continuity and fill the erosion channels within the berms.

During our subsequent site visit on September 2, 2015, the slopes at the southeast corner had been re-graded and were relatively free of erosion rills and gullies. UTILITIES representatives also indicated the 2-foot diameter erosion channel of the storm water runoff berm at the crest of the slope, near the northeast corner had been re-graded.

4.0 GENERAL COMMENTS

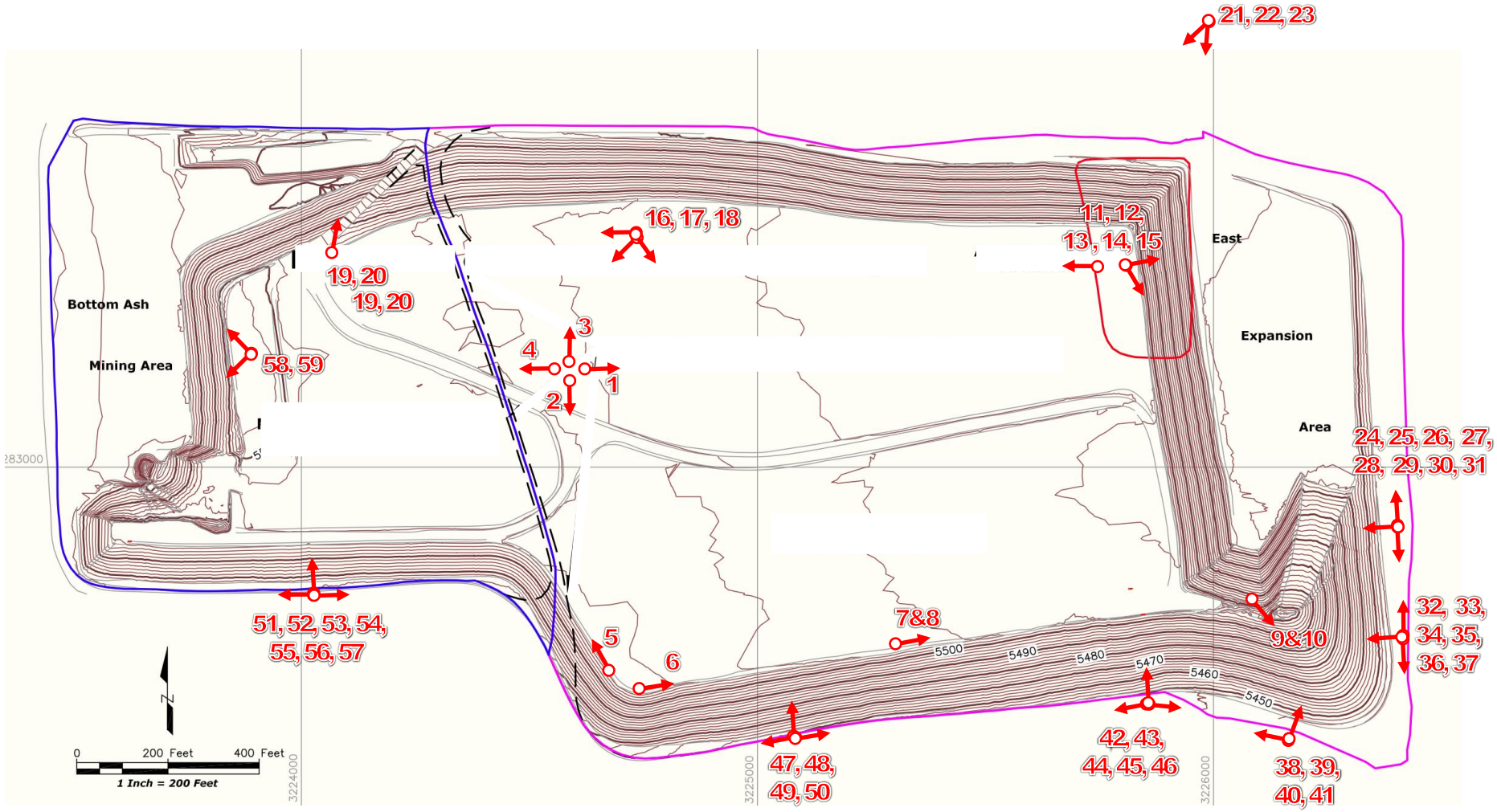
The observations and recommendations presented in this report are based upon the data and information discussed in this report. This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted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

Ryan W. Feist, P.E.
Geotechnical Services Manager

Lawrence R. Keefe
Principal | Office Manager

Attachments: Photograph Location Diagram
Photograph Log



# INDICATES PHOTO NUMBER AND ORIENTATION

BASE DRAWING OBTAINED FROM THE CSU 2014 SURVY DRAWING, DATED DECEMBER 23, 2014

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

Project Manager:	RWF
Drawn by:	RWF
Checked by:	RWF
Approved by:	RWF

Project No.	23155030
Scale:	AS SHOWN
File Name:	A-1
Date:	11/05/15

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PHOTOGRAPH LOCATION DIAGRAM

CCR LANDFILL ANNUAL INSPECTION
CLEAR SPRINGS RANCH
FOUNTAIN, COLORADO

Exhibit

A-1

Photo #1

Photo #2

Photo #3

Photo #4

Photo #5

Photo #6

Photo #7

Photo #8

Photo #9

Photo #10

Photo #11

Photo #12

Photo #13

Photo #14

Photo #15

Photo #16

Photo #17

Photo #18

Photo #19

Photo #20

Photo #21

Photo #22

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Photo #61

Photo #62

Photo #63

Photo #64

		
Photo #65		**Photo #66**