



Environment

Submitted to:
Colorado Springs Utilities
Colorado Springs, CO

Submitted by:
AECOM
Greenwood Village, Colorado
60508951
October 11, 2016

Coal Combustion Residuals (CCR) Landfill Post-Closure Plan Clear Spring Ranch El Paso County, Colorado



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Figure 1 Site Location Map

Figure 2 CCR Landfill Plan – Anticipated Post-Closure Conditions

List of Acronyms

CCR	coal combustion residuals
CDPHE	Colorado Department of Public Health and Environment
CFR	Code of Federal Regulations
CSR	Clear Spring Ranch
CSU	Colorado Springs Utilities
H:V	horizontal to vertical
RCRA	Resource Conservation and Recovery Act
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
Utilities	Colorado Springs Utilities

1.0 Introduction

Once closure of the CCR Landfill has been completed in accordance with the CCR Landfill Closure Plan (AECOM, 2016a) and closure has been deemed adequate, the post-closure period begins. During post-closure, the CCR Landfill will be inspected and maintained to ensure the integrity and effectiveness of the final cover system. Post-closure activities will also include inspections and maintenance of the run-on and run-off control system and long-term groundwater monitoring system, if applicable.

This Post-Closure Plan has been prepared on behalf of Colorado Springs Utilities to meet the Coal Combustion Residuals (CCR) Regulations (CCR Rule) as detailed in 40 Code of Federal Regulations (CFR) 257.104.

1.1 Background

Clear Spring Ranch (CSR) is a 4,759-acre property located at the intersection of Interstate 25 and Ray Nixon Road, approximately 17 miles south of Colorado Springs (**Figure 1**). It was acquired in 1972 by the City of Colorado Springs on behalf of its enterprise Colorado Springs Utilities (“Utilities”). The primary land uses on the CSR property are those related to utility services: electric generation & transmission, water / wastewater treatment & delivery, and waste management.

Power generation at Utilities’ Martin Drake and Ray Nixon Power Plants produces CCR. Utilities places these residuals in the CCR Landfill (or “the site”) located in the southern part of CSR. Utilities’ materials currently authorized by the Colorado Department of Public Health and Environment (CDPHE) and El Paso County for placement in the CCR Landfill are listed in the facility’s Engineering Design and Operations Report (CSU, 2012). The location of the CCR Landfill is shown on **Figure 1**.

1.2 Regulations

The CCR Landfill is regulated by the CCR Rule promulgated by the United States Environmental Protection Agency (USEPA, 2015) under 40 CFR Part 257, Subtitle D of the Resource Conservation and Recovery Act (RCRA). The CCR Landfill is also regulated by the CDPHE Hazardous Materials and Waste Management Division under the Regulations Pertaining to Solid Waste Sites and Facilities (6 Code of Colorado Regulations 1007-2, Part 1) (Solid Waste Regulations) (CDPHE, 2015) and by the Local Governing Authority (i.e., El Paso County). The disposal area, as shown on **Figure 1**, is located within the boundaries established by the Clear Spring Ranch Certificate of Designation (CD-04-001) and Use Subject to Special Review (AL-05-006), which were approved by the Board of County Commissioners. This Post-Closure Plan was developed to meet the requirements of the CCR Rule, as detailed in 40 CFR 257.104.

1.3 Owner/Operator Information

The owner and operator of the CCR Landfill (and the contact during the post-closure period) is:

Colorado Spring Utilities – Energy Services Division
Attn: Ray Nixon Power Plant Manager
P.O. Box 1103, Mail Code 40
Colorado Springs, CO 80947
Phone: 719-668-4800
Email: askus@csu.org

1.4 Purpose

The purpose of this Post-Closure Plan is as follows.

1. Maintain the integrity and effectiveness of the final cover system, including making repairs to the final cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the final cover.
2. Maintain the groundwater monitoring system, if applicable.
3. Provide an initial written post-closure plan to meet the requirements of 40 CFR 257.104.

2.0 Site Characterization

This section characterizes the site and includes a discussion of the site hydrology, hydrogeology, soil, and current conditions at the CCR Landfill.

2.1 Site Hydrology and Hydrogeology

The CCR Landfill is located in Sand Canyon, a small, west-east trending topographic depression that is bounded to the north and south by outcroppings of Pierre Shale. Approximately 50 feet of Quaternary sediments have been deposited in the canyon. These sediments, referred to as the Piney Creek Alluvium, consist of horizontal layers of clay, silty clay, sand, and gravel. Most of the alluvium is poorly-sorted and fine-grained with silt-sized materials predominating. Bedding is poorly defined except for a thin layer of gravel near the base of the deposit. The Piney Creek Alluvium is saturated beneath the CCR Landfill and forms the uppermost water-bearing zone in Sand Canyon. It is underlain by approximately 3,500 to 4,000 feet of Pierre Shale that forms a hydraulic barrier between the alluvium and deeper water-bearing formations, if present. Groundwater within the Piney Creek Alluvium flows to the east-southeast along the top of the alluvium-Pierre Shale contact. Water level measurements indicate that the saturated thickness of the alluvial water-bearing zone is approximately zero to 25 feet.

Approximately one mile east of the CCR Landfill, Sand Canyon intersects the north-south alluvial channel of Fountain Creek. The upgradient portion of Sand Canyon occupied by the CCR Landfill is cut off from Fountain Creek by the Retention Dam installed by Utilities in 1978. The Retention Dam, located approximately 3,000 feet downgradient (east) of the landfill (**Figure 1**), has a bentonite core and is keyed into the Pierre Shale bedrock. It captures surface water run-off from the CCR Landfill and also restricts groundwater flow. To enhance the Dam's performance, Utilities installed a bentonite barrier wall through the upgradient toe of the dam in October 1994 and later added a French drain along the southern downgradient side of the dam to collect residual seepage water. The seepage intercepted by the French drain is pumped back to the upgradient side of the dam. The Retention Dam and French drain are intended to prevent releases that may occur from migrating downgradient to Fountain Creek.

2.2 Site Surficial Soil

According to the United States Department of Agriculture (USDA) Web Soil Survey (USDA, 2016), the CCR Landfill was constructed in an area consisting primarily of two soil types: Razor-Midway complex and Limon clay. The Razor-Midway complex is well drained and the surface layer consists of stony/cobbly clay loam and clay to a depth of approximately 15 to 30 inches. Permeability of the soil is estimated to be moderately low to moderately high and the available water storage capacity is low to very low. The Limon clay is well drained and the surface layer consists of clay, silty clay, and silty clay loam to a depth of at least 60 inches. Permeability of the soil is estimated to be moderately low to moderately high and the available water storage capacity is high.

2.3 Anticipated Post-Closure Conditions

The anticipated post-closure topography is shown on **Figure 2**. The CCR Landfill is approximately 75 acres in size with an estimated final capacity of approximately 5,000,000 cubic yards. The final grades on the side slopes of the CCR Landfill will be no greater than 3:1 (horizontal to vertical [H:V]) and the final grades on the top of the CCR Landfill will be crowned with a slope of no less than 20:1 (H:V). These grades will promote surface water run-off and minimize erosion. The final contours, including the final cover, will reach an elevation no greater than 5,540 feet at the highest grade.

According to Utilities, the 3:1 (H:V) grade was approved as part of the approval of the 2004 Certificate of Designation for Clear Spring Ranch (CDPHE, 2004). In 2009, Utilities hired a third party geotechnical engineering firm (Kleinfelder) to assess the global stability of the landfill's then current configuration and its anticipated configuration at closure. Kleinfelder's slope stability analysis concluded that there was a very low risk of slope instability (Kleinfelder, 2009). The final cover will be revegetated and permanent run-on and run-off controls will ensure the long-term integrity of the final cover system.

The post-closure specific land use will continue as industrial use. Post-closure use of the property will be managed to not disturb the integrity of the final cover, the run-on/run-off controls, or the groundwater monitoring system. Disturbance will only be permitted if Utilities demonstrates that disturbance of the final cover (including removal of CCR) will not increase the potential threat to human health or the environment.

3.0 Inspections, Maintenance, and Monitoring During Post-Closure

According to the CCR Rule, the Utilities will conduct post-closure care for a minimum period of 30 years. This section discusses the inspection, maintenance, and monitoring requirements throughout the post-closure care period.

3.1 Inspections

Periodic visual inspections of the CCR Landfill will be performed by a qualified person (either a Utilities' employee or a third-party). Inspections will be performed monthly during the growing season until vegetation is established. In addition, annual inspections will be performed for the first five years, biannual inspections for the next ten years, and inspections once every five years after that. Inspections of the CCR Landfill will continue for the duration of the post-closure period; however, the frequency of inspection may be reduced (or increased) based on observed conditions during the post-closure period.

The CCR Landfill will be inspected to evaluate the following:

- Vegetation growth
- Weeds
- Erosion
- Animal intrusion
- Settlement
- Surface water drainage and run-on and run-off controls
- Groundwater monitoring system (if required)

The CCR Landfill is located within the CSR facility, which is a secure/fenced facility with locked gates. Therefore, inspections for security are not required.

3.2 Maintenance

During the post-closure care period, the CCR Landfill will receive routine maintenance to meet post-closure care requirements and non-routine maintenance based on inspection findings. Maintenance activities are discussed in the following sections.

3.2.1 Vegetation Maintenance

Vegetation maintenance may include re-seeding bare areas or inter-seed planting and/or addition of soil amendments to bare areas.

3.2.2 Weed Control

Weeds and invasive or woody plants will be controlled by mowing and/or weed spraying with approved herbicides, as needed. Mowing will not be lower than four to six inches. Chemical weed spraying should be avoided during the first growing season to protect new perennial growth. Weed control methods will be modified as necessary based on recommendations by the weed control contractor.

3.2.3 Erosion Repair

Erosion rills/gullies/channels will be repaired by hand raking (for small areas) or by grading or backfilling (for larger areas). Backfilling will be in accordance with the approved cover system design and backfilled areas will be seeded, mulched, and protected with erosion controls (erosion control blankets, wattles,

etc.) as needed. The use of riprap or other forms of armoring may be evaluated for use in drainage channels and on steep slopes.

3.2.4 Animal Intrusion Control

Observed animal holes in the cover will be repaired promptly by filling in the holes with appropriate dirt and re-seeding. If animal intrusion becomes a constant maintenance problem, efforts should be made to remove the animals (e.g. prairie dogs).

3.2.5 Settlement Monitoring and Repair

As discussed in the CCR Landfill Closure Plan (AECOM, 2016a), as the landfill contains relatively homogenous soil-like waste, and does not contain putrescible materials, settling and subsidence is anticipated to be minimal. A baseline survey of the landfill's contours will be conducted upon completion of the installation of the final cover. If merited at any time following placement of the final cover, a new survey of the landfill will be conducted and compared to the initial survey to evaluate if subsidence is of concern. Minor settlement, subsidence, or displacement will be corrected by grading to promote positive surface drainage or filling of cracks with soil in accordance with the approved cover system design. Major settlement, subsidence, or displacement, as verified by survey, may require an engineer to evaluate the cause and recommend corrective action.

3.2.6 Maintenance of Run-on and Run-off Controls

Permanent run-on / run-off controls during post-closure will be in accordance with the most recently updated version of the Run-on and Run-off Control System Plan (AECOM, 2016b). Eroded drainage channels, sediment basins, and culvert inlet/outlets will be graded and repaired as necessary to return the controls to design conditions. Ponding within drainage channels will be repaired/graded such that positive grade is maintain. Debris/sediment/vegetation blocking drainage channels and/or culverts will be removed. Crushed culverts or otherwise mal-functioning culverts will be replaced or repaired as needed to maintain design capacity. Sediment will be removed from sediment basin as needed.

3.2.7 Groundwater Monitoring and Maintenance of the Groundwater Monitoring System

The current groundwater detection monitoring plan is being revised and modified to meet the requirements of 40 CFR 257.94. If a groundwater monitoring system is in use during post-closure, the monitoring wells will be inspected and maintained during post-closure. Maintenance may include repair of concrete well pads, repair or replacement of well casings, and/or replacement of locks.

3.3 Inspection/Maintenance Reporting

A post-closure inspection form is provided in **Appendix A**. Indications of problems and recommended actions will be noted after each inspection. This documentation, along with records of maintenance activities and other relevant information will be kept in the landfill operating records and will be available for review.

4.0 Amendment, Recordkeeping, and Notification

4.1 Amendment of the Plan

As required by 40 CFR 257.104(d)(3), Utilities may amend this initial written Post-Closure Plan at any time provided the revised plan is placed in the facility's operating record. Utilities will amend this plan whenever there is a change in operation of the CCR Landfill that would substantially affect the plan and if unanticipated events (after post-closure activities have commenced) necessitate a revision. Utilities will amend this plan at least 60 days prior to a planned change in the operation of the CCR Landfill, or no later than 60 days after an unanticipated event requires the need to revise the existing plan. If this plan is revised after post-closure activities have commenced for the CCR Landfill, Utilities will amend the plan no later than 30 days following the triggering event. Any amendment of this plan will be certified by a qualified professional engineer.

4.2 Recordkeeping

Utilities will maintain their files with this Post-Closure Plan, any subsequent revisions/amendments of this Post-Closure Plan, inspection reports, documentation of maintenance, and other pertinent documents within the facility's operating record for a period of at least five years in accordance with 40 CFR 257.105.

4.3 Notification

Utilities will notify CDPHE whenever the Post-Closure Plan (along with any subsequent updates) has been placed in the operating record in accordance with the notification requirements specified in 40 CFR 257.106. No later than 60 days following the completion of the post-closure care period, Utilities will prepare a notification verifying that post-closure care has been completed. The notification will include a written certification from a qualified professional engineer verifying that post-closure has been completed in accordance with this post-closure plan.

5.0 Certification

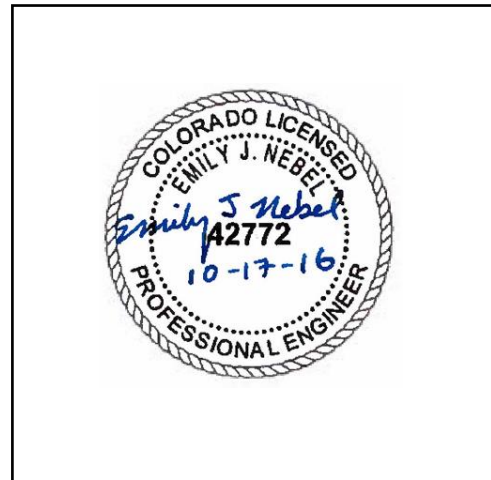
Certification Statement 40 CFR § 257.104(d)(4) – Coal Combustion Residuals (CCR) Landfill Post-Closure Plan, Clear Spring Ranch, El Paso County, Colorado

CCR Unit – Colorado Springs Utilities, Clear Spring Ranch, CCR Landfill

I, Emily J. Nebel, being a Registered Professional Engineer in good standing in the State of Colorado, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the information contained in the CCR Landfill Post-Closure Plan dated October 17, 2016 meets the requirements of 40 CFR § 257.104.

Emily J. Nebel
Printed Name

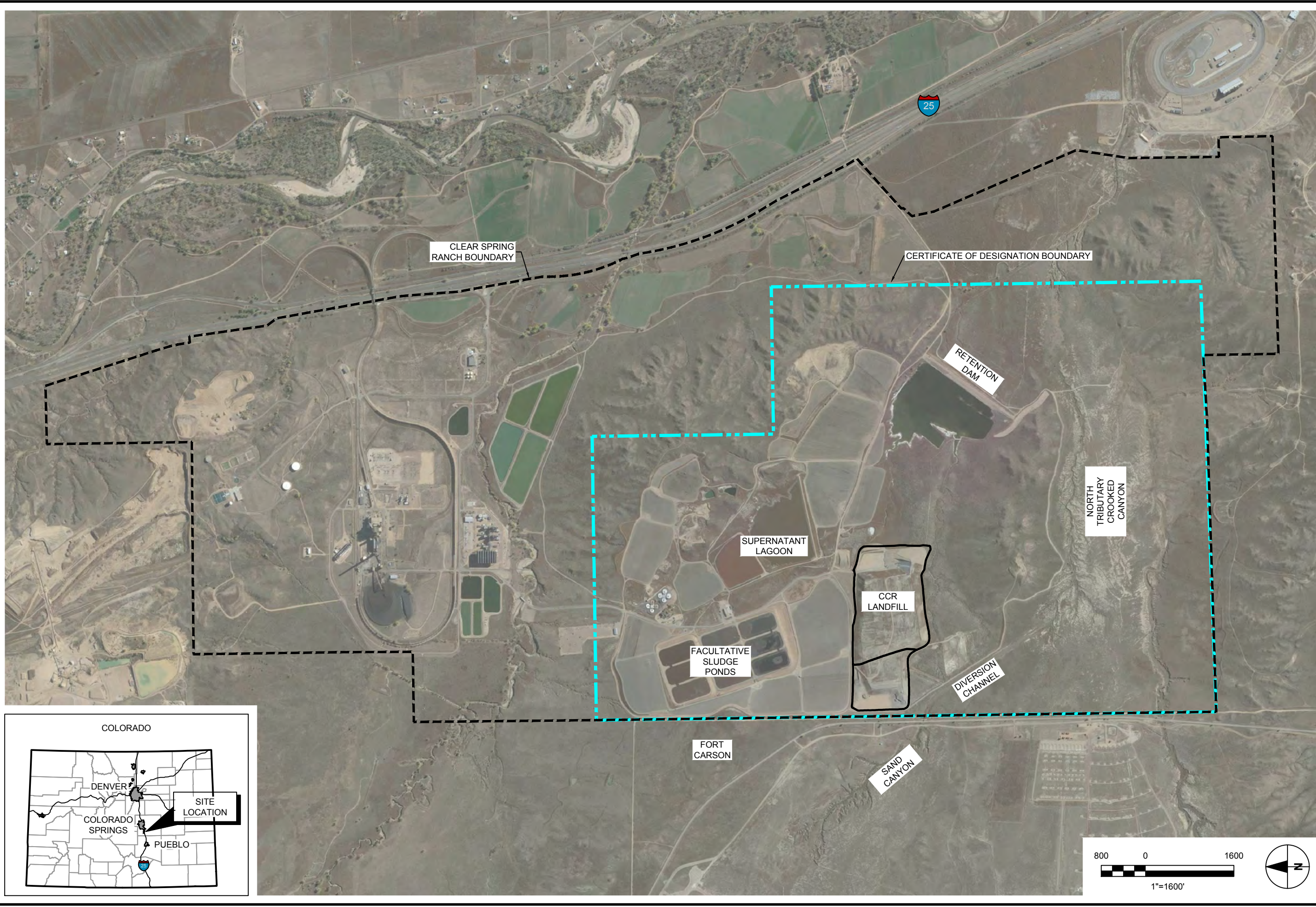
October 17, 2016
Date

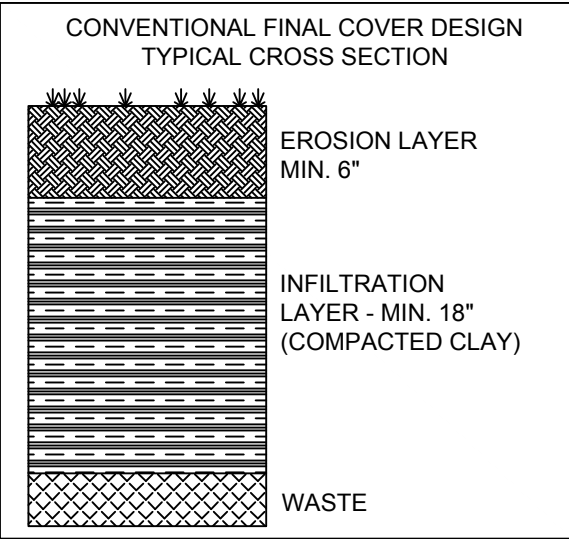
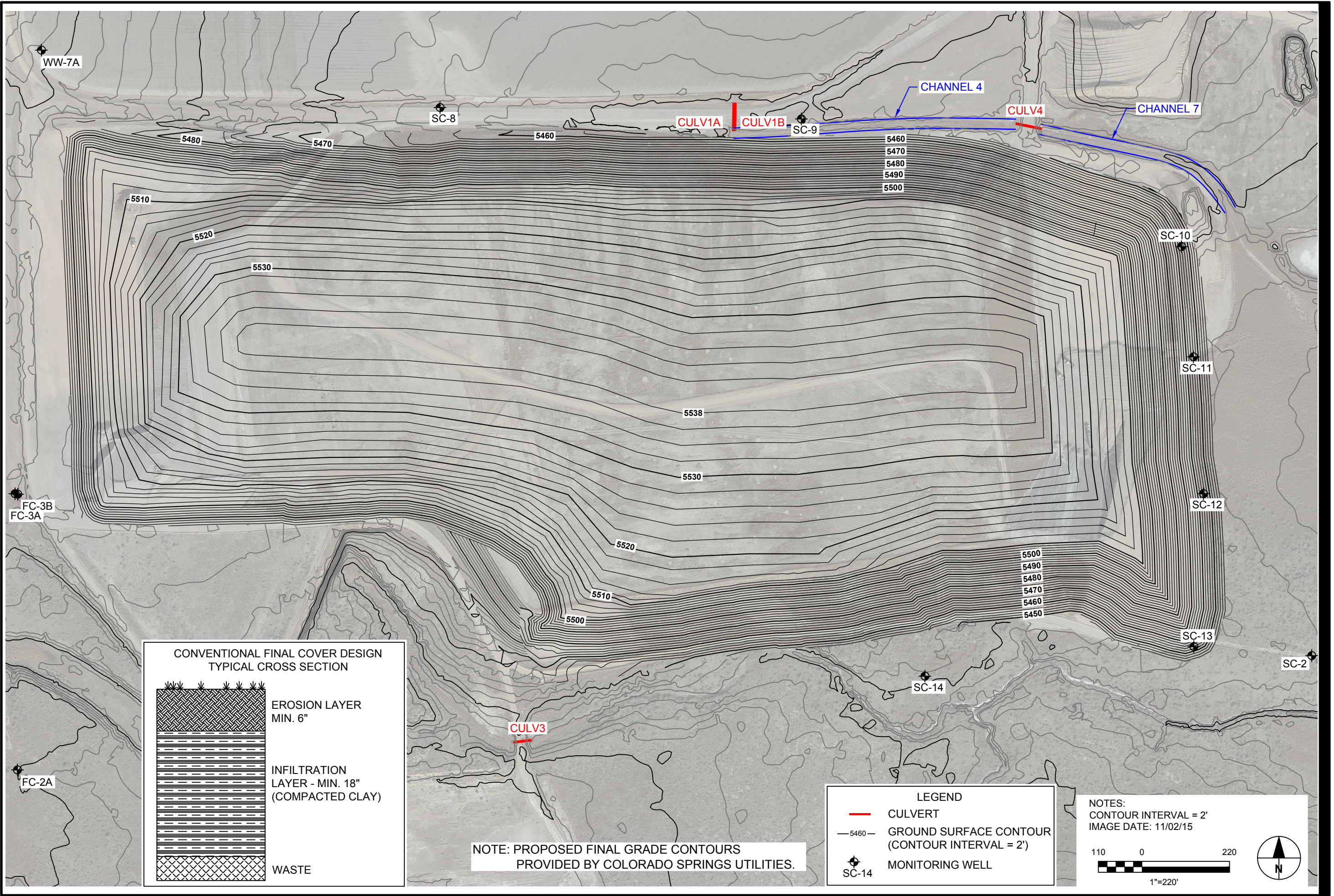


6.0 References

- AECOM. 2016a. Coal Combustion Residuals (CCR) Landfill Closure Plan, Clear Spring Ranch, El Paso County, Colorado. October, 2016.
- AECOM. 2016b. Coal Combustion Residuals (CCR) Landfill Run-on and Run-off Control System Plan, Clear Spring Ranch, El Paso County, Colorado, October, 2016.
- Colorado Department of Public Health and Environment (CDPHE). 2004. Letter from Glenn Mallory and Jerry Henderson/CDPHE to Carl Schueler/El Paso County, Re: Amendment to Consolidate Prior Approvals, Clear Spring Ranch. June 28, 2004.
- CDPHE. 2015. Hazardous Materials and Waste Management Division. 6 Code of Colorado Regulations 1007-2, Part 1, Regulations Pertaining to Solid Waste Sites and Facilities, Effective June 30, 2015.
- Colorado Springs Utilities (CSU). 2012. Engineering Design and Operations Report, Appendix A Coal Combustion Products Disposal Operations. Colorado Springs Utilities. Updated June 25, 2012.
- Kleinfelder. 2009. Geotechnical Engineering Services, Ash Landfill Slope Stability Investigation, Clear Spring Ranch Facility, Southwest of Interstate 25 and Ray Nixon Road, Southwest of Fountain, CO. Prepared by Kleinfelder. November 17, 2009.
- U.S. Department of Agriculture (USDA). 2016. Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at <http://websoilsurvey.nrcs.usda.gov/>. Accessed August 9, 2016.
- U.S. Environmental Protection Agency (USEPA). 2015. 40 CFR Parts 257 and 261 Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule. Federal Register, v.80, no. 74, April 17, 2015, 201 pp.

Figures





NOTE: PROPOSED FINAL GRADE CONTOURS PROVIDED BY COLORADO SPRINGS UTILITIES.

LEGEND

- CULVERT
- GROUND SURFACE CONTOUR (CONTOUR INTERVAL = 2')
- MONITORING WELL

SC-14

NOTES:
 CONTOUR INTERVAL = 2'
 IMAGE DATE: 11/02/15

**Appendix A
Post-Closure Inspection
Form**

CCR Landfill Post-Closure Inspection Form
Clear Spring Ranch, El Paso County, Colorado

Date of Inspection: _____ Time of Inspection: _____

Name of Qualified Inspector: _____

Signature of Qualified Inspector: _____

Inspection Areas/Items (circle yes or no)

Vegetation	Any bare areas?	Yes	No
	Any signs of stressed vegetation?	Yes	No
Weeds	Any presence of noxious weeds?	Yes	No
	Any woody vegetation?	Yes	No
	Any other unwanted vegetation?	Yes	No
Erosion	Any rills/gullies on side slopes?	Yes	No
	Any noted erosion within drainage channels?	Yes	No
	Any noted erosion at inlets/outlets to culverts?	Yes	No
	Any noted erosion of perimeter roads?	Yes	No
	Any evidence of exposed CCR or CCR transport off-site?	Yes	No
Animal Intrusion			
	Any significant animal burrows?	Yes	No
Settlement	Any depressions or standing water?	Yes	No
	Any cracking/sliding/sloughing of slopes?	Yes	No
	Any damage to survey benchmark or settlement monuments?	Yes	No
Run-on/Run-off Controls			
	Any damage to culverts?	Yes	No
	Any obstructions of culverts or drainage channels?	Yes	No
	Any standing water within drainage channels?	Yes	No
	Any damage to sediment basin embankments/outlets/spillways?	Yes	No
Groundwater Monitoring System			
	Any damage to monitoring well pads?	Yes	No
	Any damage to monitoring well casings?	Yes	No
	Any missing, rusted, or corroded locks?	Yes	No

Explanation of any "Yes" answers from above:

Description of any required maintenance:

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