



Written Closure Plan

Hayden Station - Active CCR Landfill
Public Service Company of Colorado
Denver, Colorado

October 17, 2016

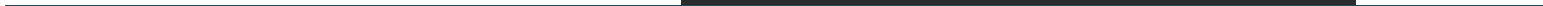


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Table of Abbreviations and Acronyms

Abbreviation	Definition
ADF	Ash Disposal Facility
CCR	Coal Combustion Residuals
CDPHE	Colorado Department of Public Health and Environment
CFR	Code of Federal Regulations
cm/sec	centimeters per second
lbs/CY	pounds per cubic yard
MW	megawatt

1.0 General Information

Hayden Station is a 446 MW coal-fired, steam turbine power plant owned and operated by Public Service Company of Colorado (PSCo), an Xcel Energy Company. The station is located at 13125 U.S. Highway 40, Hayden, Colorado 81639.

The station's ash disposal facility (ADF) is located on the power plant property, on Routt County Road 27 approximately 1 mile south of Colorado Highway 40 in Routt County, Colorado approximately 5 miles east of Hayden, Colorado and 20 miles west of Steamboat Springs, Colorado.

Figure 1 provides a Site Location Map.

The ADF receives coal combustion residuals (CCR) from the station operations as well as air emission control byproducts, water intake silt, excavation soils, and coal impurities. CCR or other wastes are not accepted from any other source. The ADF is located on 154 acres of land, of which 136+/- acres are used for CCR disposal and 18+/- acres are used for stormwater control structures, access roads, and a borrow area.

In accordance with 40 CFR 257 Disposal of Coal Combustion Residuals From Electrical Utilities (CCR Rule) §102(b), owners of CCR disposal units are required to publish a written closure plan that, "...describes the steps necessary to close the CCR unit at any point during the active life of the CCR unit consistent with recognized and generally accepted good engineering practices."

This closure plan fulfills the requirements of 40 CFR 257.102(b).

2.0 Description of Closure Plan – §257.102(b)(1)(i-iii)

The Hayden ADF is an active, unlined, CCR disposal unit that began construction and operation in 1983 and has remained in continuous operation since that time. The ADF is operated under an Engineering Design and Operations Plan (EDOP) developed pursuant to Colorado Department of Public Health and Environment (CDPHE) Solid Waste Regulations. The ADF has an estimated remaining 60-year life expectancy and will provide CCR disposal capacity through approximately 2075, assuming current ash production rates.

Closure of the ADF is implemented in phases as outer soil berms are constructed for each lift. This results in ongoing closure construction activities occurring at the ADF. According to PSCo, as of 2015, approximately 18 acres are considered closed.

Since the ADF does not have an engineered liner system and uses the naturally low permeability lithology of the Lewis Shale instead, the final cover system defaults to the CCR Rule's minimum standard. According to 40 CFR 257.102(d) - Closure Performance Standard when Leaving CCR In Place – *the final cover system designed to have a permeability less than or equal to any bottom liner system or natural subsoils present, or a permeability no greater than 10^{-5} cm/sec.* The current closure plan is based upon the assumption that Hayden will install an 18-inch infiltration soil layer followed by a 6-inch topsoil layer. The final cover will have an overall permeability no greater than 1.0×10^{-5} centimeters per second (cm/sec).



Figure 1. Hayden Power Station Location Map

An on-site soil borrow area will be mined for soil to be used for the 18-inch infiltration soil layer. The soil borrow area is located along the east boundary of the ADF. The on-site unconsolidated soil is described in the EDOP by Woodward-Clyde Consultants as alluvial and colluvial deposits with permeabilities in the range of 10^{-6} to 10^{-9} cm/sec. If additional soils are needed, clean off-site soils will be imported. Each new borrow source will be tested prior to being used on-site.

As it is encountered, existing on-site topsoil material will be stripped and stockpiled for future use. The existing topsoil will be reinstalled above the infiltration layer soils as the 6-inch final topsoil layer. After topsoil is installed it will be tracked and seeded. Vegetative cover is an important part of the final cover system as it provides long-term stabilization of the slopes, limits erosion due to stormwater run-off, and reduces the potential for wind blown nuisance dust.

Upon completion of closure activities, a notification of completion of closure will be completed, per 40 CFR 257.102(h) and 257.105(i)(8). The notification will document that all requirements and conditions of the Closure Plan were achieved. The report will be signed and sealed by a Colorado registered Professional Engineer.

3.0 Inventory Estimate – §257.102(b)(1)(iv)

In accordance with 257.102(b)(1)(iv) an estimate of the maximum inventory of CCR ever on-site over the active life of the CCR Landfill must be provided.

The ADF accepts approximately 50,000 tons of bottom ash (2,970 pounds per cubic yard [lbs/CY]) and 200,000 tons of flue gas desulfurization (FGD) fly ash (1,755 lbs/CY) annually. Additional wastes disposed include approximately 400 cubic yards of water intake silt (Yampa River sediment) and 50 tons of coal impurities (dirt, rocks, etc.) annually.

Assuming the above quantities have remained consistent since the ADF opened in 1983 and the CCR has an average density of approximately 2,000 lbs/CY, the estimated total CCR currently deposited within the ADF is approximately 8,000,000 cubic yards.

When the ADF reaches final capacity in 2075, the estimated final volume of CCR will be approximately 22,755,000 cubic yards.

4.0 Area Requiring Final Cover – §257.102(b)1(v)

In accordance with 257.102(b)(1)(v) an estimate of the largest area of the CCR unit ever requiring a final cover must be provided.

Closure of the ADF will continue to be implemented in phases as outer soil berms are constructed for each lift. Therefore, the currently open, active area is the largest area containing CCR that will require a final cover, and is estimated to be approximately 50 acres.

In 2075, when the ADF reaches final capacity, the ADF's entire 136-acre CCR disposal area will have received a final cover as described herein.



5.0 Schedule of Closure Activities – §257.102(b)1(vi)

Table 1. Schedule of Closure Activities		
Task	Start Date	Finish Date
Written Closure Plan	October 17, 2016	October 17, 2016
Written Post-Closure Plan	October 17, 2016	October 17, 2016
Landfill Closure	On-going	Year 2075
Annual Inspections	Year 2015	Annually until 2075
Fugitive Dust Plan Updates	Year 2015	Annually until 2075
Post Closure Maintenance	Year 2075	Year 2105 (minimum)

6.0 Qualified Professional Engineer Certification §257.102(b)(4) and §257.102(d)(3)

According to 40 CFR §257.102(b)(4), the owner or operator of the CCR unit must obtain a written certification from a qualified professional engineer that the initial and any amendment of the written closure plan meets the requirements of this section.

According to 40 CFR §257.102(d)(3), the owner or operator of the CCR unit must obtain a written certification from a qualified professional engineer that the design of the final cover system meets the requirements of this section.

I, Christopher M. Koehler, being a registered Professional Engineer, in accordance with the Colorado State Board of Licensure for Architects, Professional Engineers, and Professional Land Surveyors, do hereby certify to the best of my knowledge, information, and belief, that the information contained in this written Closure Plan dated October 17, 2016, was conducted in accordance with the requirements of 40 CFR 257.102(b) and (d), is true and correct, and was prepared in accordance with recognized and generally accepted good engineering practices.

SIGNATURE:



Colorado PE 0051359

DATE:

October 14, 2016