

Section 7 **Closure Plan**

Section 7 of this permit addresses the following regulatory sections:
R315-319-102;

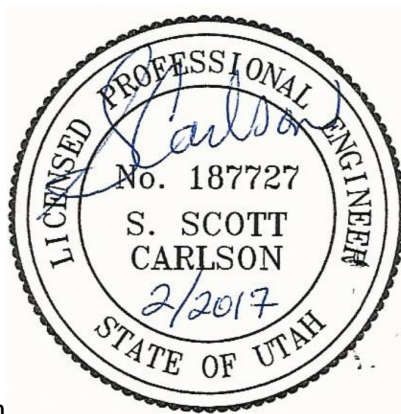
7.0 Closure Plan

The closure plan in this section is designed to

- Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration liquids into the ash material and releases of CCR, leachate or contaminated run-off to the ground water, surface water or to the atmosphere;
- Preclude the probability of future impoundment of water, sediment or slurry;
- Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post closure care period;
- Minimize the need for further maintenance of the landfill; and
- Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.

The Closure Plan SCA#2 Ash Landfill was originally prepared in October 2016 and added to the operating record. This current update was prepared in February 2017 to address permit formatting needs for the SCA#2 Ash Landfill.

I certify that this Closure Plan meets the requirements of federal regulations 40CFR §257.102 as it pertains to the closure of existing CCR Landfills, and meets the corresponding Utah Code Rules R315-319-102.



S. Scott Carlson, PE 187727, Utah
February 2017

7.1 Introduction

This section identifies the Closure Plan for the existing SCA #2 Ash Landfill. The plan described herein identifies the design of the facility and the final cover system intended to minimize or eliminate, to the extent feasible, potential impacts to the ground water, surface water or to the atmosphere associated with this facility. This plan has been prepared to meet the requirements of 40CFR 257.102 and the Utah State regulations R315-319-102.

The existing SCA #2 Ash Landfill encompasses a footprint of approximately 30-40 acres resting against and into a small side hill with existing elevations ranging from approximately 6400 to 6775. This location was chosen because there is no surface water flowing in the vicinity and it is up above the valley floor and has minimal potential for ground water.

Potential infiltration of water into the landfill is minimized first by reducing the potential for surface water run-on and by collecting and controlling the surface water run-off from the facility. Please see the run-on / run-off control plan for more information.

Closure of this existing landfill includes an infiltration layer (minimum of 18-inches) covering the ash material with earthen material with a permeability no greater than 1×10^{-5} cm/sec. and a final erosion and revegetation cover layer (minimum of 6-inches) and revegetate the surface to reduce potential runoff and erosion from the site.

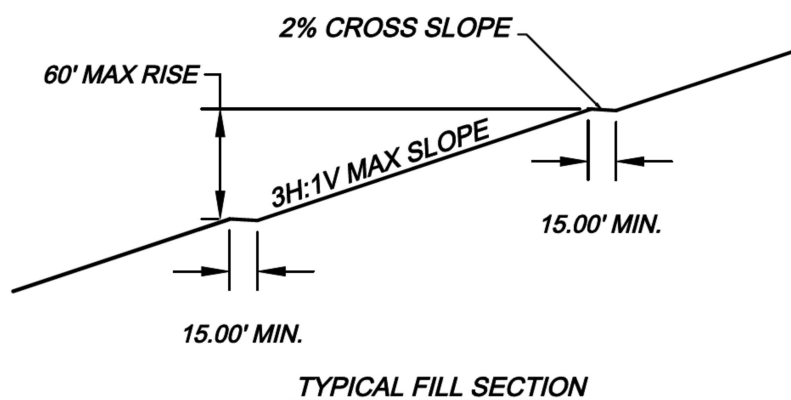
Placement of the design cover materials will control, minimize or eliminate, to the extent feasible, post-closure infiltration liquids into the ash material and releases of CCR, leachate or contaminated run-off to the ground water, surface water or to the atmosphere.

7.2 Landfill Design Parameters

The design parameters for the SCA #2 Ash Landfill include the following:

- The SCA#2 Ash Landfill has a maximum design footprint of approximately 30-40 acres. This is the largest area of the CCR unit that would ever require final cover at any time during the landfill's active life. However it is anticipated that the lower portions of the landfill will be receive their final cover early in advance of closing the landfill (The lowest portion received its cover layers in 2016). This will minimize maximum total area the requiring cover at one time.

- The design capacity of the SCA #2 Ash Landfill is calculated to include capacity for up to 3.6 Million cubic yards of ash material with a maximum material thickness of approximately 170 feet above existing ground (approximately 375 feet from the toe to the top of the landfill). Based on an average of 300,000 cubic yards per year, the landfill could serve for approximately twelve years. If the annual material placement quantity is less, the landfill could serve for a longer time.
- The landfill is designed with a 3H:1V slope on the face of the landfill (Periodic survey measurement will occur on each lift. If any significant portions of the lift have a slope steeper than 2.5H:1V, they will be re-graded.) The geotechnical stability requirements have calculated that a 2H:1V slope is stable. SCA has determined that the design of 3H:1V is more conservative and will provide a preferred condition and adequate contingency to account for anticipated variability in constructed conditions.
- Benches/Terraces are designed 15 feet wide at a maximum vertical spacing of 60 feet. Terrace benches are designed with a minimum 2% cross slope into the hill to keep storm water from spilling over the bench. (Periodic survey measurement will occur on each terrace/lift. If any significant portions of the terrace are higher than 60 feet, or if they do not have a minimum 2% cross slope, they will be re-graded.)
- Drainage Collection ditches on each bench/terrace with the ditch profile slope generally in the range of 1-2%. Drainage will be directed to perimeter collection ditches, through erosion control BMP's and sediment traps and then into a clay-lined sediment pond. (Periodic survey measurement will occur on each terrace. If any significant portions of the terrace ditches are less than 0.5% or steeper than 3.5% slope, they will be re-graded. (Perimeter ditches are designed with steeper slopes and will be constructed on native soil – not over ash material- and include regular BMP's for velocity control).
- The final ash surface and thereby the final covered surface will be graded to provide adequate slopes to prevent noticeable impounding of precipitation on the site.



7.3 Final Soil Cover System

The final soil cover system is designed to close the SCA#2 Ash Landfill in a manner that will

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- Preclude the probability of future impoundment of water, sediment or slurry;
- Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post closure care period;
- Minimize the need for further maintenance of the landfill; and
- Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.

7.3.1 Infiltration Layer

SCA will install an 18-inch thick infiltration layer over the ash material. This layer will consist of soil material with a maximum permeability of 1×10^{-5} cm/sec. These soil materials may be selected from onsite Mancos shale or import soils meeting the permeability requirements. The natural subsoil layer under the ash landfill consists of Mancos shale. SCA will place and spread this infiltration layer material across the surface of the slope, moisture condition and compact with a small dozer, making a minimum of two passes on each lift. A minimum of 3 permeability tests will be performed on the completed infiltration layer (for each 60 foot lift) either directly in place by a licensed geotechnical engineering firm or by extracting a core sample and tested by a qualified geotechnical laboratory.

7.3.1.1 Leachate Potential

Extensive geotechnical testing of the SCA ash material has been conducted in connection with the design of this landfill. The pozzolanic properties of this ash not only improve the mass stability of the landfill, but when combined with the low hydraulic conductivity of the ash, the dry conditions at the selected site, the surface water controls, vegetative native soil cover, and other favorable characteristics of this landfill, the potential for leachate discharge to occur during the active and post-closure phases of the SCA #2 Ash Landfill is negligible.

7.3.2 Erosion and Vegetation Layer

SCA has gained successful reclamation experience over the past 20 years and benefitted from the collective experience of the Utah coal mining community. SCA's final surface soil layer is based on this experience and is designed to both minimize water percolation in contact with the infiltration layer and to promote successful re-vegetation and erosion control. The following principles have influenced the design of this plan:

- Precipitation in the area typically ranges from 10 inches to 20 inches per year
- Evapotranspiration in the area typically can range from 20 inches to 35 inches per year
- Seeding with a mixture of properly selected species can establish a good vegetative cover to reduce erosion, reduce weeds, maintain natural conditions and extract water from the soil cover layer.
- Mixing a weed free straw or hay mulch along with fertilizer into the upper soil cover layer provides added nutrients in the soil cover without making it immediately available for weed growth.
- Placement of the soil cover in a roughened state can reduce erosion gullies by capturing precipitation in small pockets rather than allowing it to run down the slope. These pockets are also effective at assisting vegetation growth.

Regulatory requirements include a minimum of 6-inches of soil material on top of the infiltration layer. However, given the principles above, SCA will place significantly more than the minimum in an effort to reduce runoff and improve vegetation success. The design for the SCA#2 Ash Landfill erosion and vegetation layer includes:

- Place a native soil layer for vegetative growth (approximately 18-inch loose thickness)
 - The proposed native soil will be tested to confirm appropriate fertilizer and mulch amendments. Given the experience with native soils in this area, it is expected that soil amendments may include something like the following:
 - Spread fertilizer over the soil cover at a rate of up to 200 lb./acre 16-16-8 fertilizer (slow release) or equivalent

- Depending on the organic content of the native soil, SCA may choose to spread up to 1.5 ton per acre of certified weed free straw mulch or hay.
 - Mix the above noted fertilizer and mulch into the top 12-18 inches of soil utilizing any efficient and effective method (some options include scarifying, plowing, track hoe pocketing, etc.) and
 - Leave the slope surface in a roughened condition to reduce erosion potential (typical 4”-8” deep pockets). This slope roughening condition is valuable in creating a surface that requires less maintenance of the landfill cover throughout the post-closure period.
- The additional depth of this soil layer allows for significant pocketing without approaching the minimum 6-inch requirement even in the bottom of the pockets. This additional depth also protects against potential disruption of the integrity of the final cover system in the event of settling or subsidence.
- Seed with reclamation seed mix currently being used on SCA’s Sunnyside properties.

The final soil cover placed for the erosion and vegetation layer will be spread with small equipment with an effort to avoid compaction. Roughening and mixing efforts will assist in keeping the soil loosened.

7.4 Construction QA / QC

It is in the best interest of SCA to ensure proper construction of the landfill and the cover materials. SCA will oversee its contractors and be responsible for requiring proven construction means and methods from them. Verification of proper material placement and compaction will include a variety of testing:

- Soil Cover
 - Either import or native soils may be used for cover material, provided they meet the intended purpose.
 - An 18” soil cap (1×10^{-5} cm/sec permeability) will be placed over the ash material. Compaction will include two passes with the dozer. No in place density tests will be required. Permeability tests (minimum 3 per 60 foot lift) will be conducted by a licensed geotechnical firm or sent to a qualified geotechnical laboratory.
 - An 18” loose layer of reclamation soil will be placed over the soil cap and roughened in place. Tests for vegetative parameters will be performed for each material source to confirm the appropriate amount of fertilizer and mulch to be added.
 - Random pothole verification will be performed to observe the depth of soil placed. Minimum of 3 potholes per 60 foot lift shall be dug.
- Re-Vegetation
 - SCA maintains a current reclamation seeding mix that adjusts from time to time based on a variety of conditions, including seed species availability. SCA will utilize the current reclamation seed mix to establish vegetation cover and long term native plant growth. SCA will visually monitor the vegetation growth as part of the post-closure plan and reseed when needed.

7.5 Schedule of Closure Activities

Commencement of closure activities must begin no later than 30 days after the date on which the last known final receipt of waste is received or within two years of the landfill becoming idle. In accordance with 40CFR 257.102(e)(3) and R315-319-102(e)(3), closure of the landfill has commenced when the owner or operator has ceased placing waste and completes any of the following actions or activities:

- (i) Taken any steps necessary to implement the written closure plan;
- (ii) Submitted a completed application for any required state or agency permit or permit modification; or
- (iii) Taken any steps necessary to comply with any state or other agency standards that are a prerequisite, or are otherwise applicable, to initiating or completing the closure of a CCR unit.

A variety of regulatory requirements determine opportunity for extensions if needed prior to commencing closure activities.

Nonetheless, SCA's plan is for periodic covering of the lower slopes of the landfill in advance of closure as the active area of the landfill progresses up the hill. Given that plan, SCA began covering those lower slopes in 2016. It is anticipated that cover placement work will occur at least annually or bi-annually throughout the active life of the landfill. This proactive approach will minimize the amount of ash material exposed to the elements and further protect surface waters, groundwater and the atmosphere.

Approvals, permits and other authorizations are in place to allow for cover materials to be placed on the landfill surface periodically throughout the active life of the landfill. The cover layers described in this plan are installed during the non-winter season and generally are completed within 6-months from the commencement of cover placement activities. Placement of vegetative amendments (fertilizers, mulches, etc.), and seeding activities is generally scheduled for the fall season to improve germination and growth success.

It is estimated that this landfill will be ready for closure some time between 2024 and 2029, depending on the ash production rates and the status of the SCA power plant.

7.6 Amendments to this plan

It may become necessary to amend this plan or portions of this plan. In the event that amendments are needed, SCA will follow the requirements of 40CFR 257.102(b)(3) and R315-319-102(b)(3), and obtain a written certification from a licensed professional engineer that the plan and any amendments to this written closure plan meet the requirements of 40CFR 257.102 and R315-319-102.

7.7 Notifications

SCA will comply with the closure recordkeeping requirements as specified in 40CFR 257.105(i) and R315-319-105(i), the closure notification requirements specified in 40CFR 257.106(i) and R315-319-106(i), and the closure Internet requirements specified in 40CFR 257.107(i) and R315-319-107(i).

SCA will prepare a notification of intent to close this landfill prior to commencement of landfill closure. The notification will include a certification by a licensed professional engineer as required by 40CFR 257.102(d)(3)(iii) and R315-319-102(d)(3)(iii), as applicable. The notification will be placed in the facility's operating record.

SCA will prepare a notification of completion of closure within 30 days after the completion of closure activities for this landfill. The notification will include a certification by a licensed professional engineer as required by 40CFR 257.102(d)(3)(iii) and R315-319-102(d)(3)(iii), as applicable. The notification will be placed in the facility's operating record.

Upon final closure of the ash landfill, SCA will record a notation on the deed to this property at the Carbon County Recorder's office. This notation will in perpetuity notify any potential purchaser of the property that:

- The land has been used as an ash landfill
- The use of the land is restricted under the post closure care requirements as provided by 40CFR 257.104 (d)(1)(iii) and R315-319-104(d)(1)(iii),

SCA will prepare a notification within 30 days after recording the deed notation, stating that the notation has been recorded. This notification will be placed in the facility's operating record.