Closure Care Plan
Inactive CCR Surface Impoundment

City of Ames Steam Electric Plant

Ames Municipal Electric System
502 Carroll Avenue
Ames, Iowa 50010

April 16, 2018

SCS Engineers
8450 Hickman Road, Suite 20
Clive, Iowa 50325
515-631-6161

April 16, 2018
File No. 27217425.00

Mr. Brian Trower
Assistant Director – Electric Services
Ames Municipal Electric System
502 Carroll Avenue
Ames, Iowa 50010

Subject: Closure Plan
Inactive Coal Combustion Residuals (CCR) Surface Impoundment

Dear Mr. Trower:

SCS Engineers has prepared the Closure Plan for the Inactive CCR Surface Impoundment for the City of Ames Steam Electric Plant in accordance with the requirements set forth in §257.102(b) of the CCR Rule (40 CFR 257.50-107).

If you have any questions regarding this document, please contact the undersigned.

Sincerely,

Christine L. Collier, P.E.
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PE CERTIFICATION

Certification Statement 40 CFR §257.102(b)(4) – Initial Written Closure Plan

This Initial Written Closure Plan for the City of Ames (COA) Steam Electric Plant CCR Inactive Surface Impoundment was prepared by SCS Engineers (SCS). The document and Certification are based on and limited to information that SCS has relied on from the City of Ames and others, but not independently verified, by SCS.

I, Christine L. Collier, hereby certify that this Closure Care Plan meets the requirements of 40 CFR §257.102(b) and that it was prepared by me or under my direct supervision, and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Christine L Collier Digitally signed by Christine Collier
Date: 2018.04.16 22:46:15 -05'00'

(signature) (date)

Christine L. Collier

(printed or typed name)

License number 17963

My license renewal date is December 31, 2019.

Pages or sheets covered by this seal:
Entire Document

1 INTRODUCTION

On April 17, 2015, the Environmental Protection Agency issued the final version of the federal Coal Combustion Residuals (CCR) Rule to regulate the disposal of CCR materials generated from the combustion of coal at electric utilities and independent power producers. Inactive power plant ash impoundments containing CCR are regulated under Section 257.100 of the Code of Federal Regulations (CFR) 40 Part 257.

The City of Ames (COA)Steam Electric Plant is subject to the CCR Rule and in accordance with the rule must prepare a Closure Plan as specified in the Section §257.102 of the rule by April 17, 2018. This document provides the Initial Closure Plan for the COA CCR Impoundment. This plan will be revised if there is a change in the operation of the CCR unit that would substantially affect the written closure plan or before or after closure activities have commenced, when unanticipated events necessitate a revision of the written closure plan.

The owner or operator of a CCR unit, per Section §257.102(b)(i) must prepare 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. The Closure Plan must include the following information:

1. A narrative description of how the CCR unit will be closed in accordance with Section §257.102.
2. If closure of the CCR unit will be accomplished through removal of CCR from the CCR unit, a description of the procedures to remove the CCR and decontaminate the CCR unit in accordance with §257.102(c).
3. If closure of the CCR unit will be accomplished by leaving CCR in place, a description of the final cover system, designed in accordance with §257.102 (d), and the methods and procedures to be used to install the final cover. The closure plan must also discuss how the final cover system will achieve the performance standards specified in the same section.
4. An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit.
5. An estimate of the largest area of the CCR unit ever requiring a final cover as required by §257.102 (d) at any time during the CCR unit's active life.
6. A schedule for completing all activities necessary to satisfy the closure criteria in Section §257.102, including an estimate of the year in which all closure activities for the CCR unit will be completed.

2 BRIEF DESCRIPTION OF IMPOUNDMENT

The City of Ames Steam Electric Plant is located at 200 East 5th Street, in Ames, Iowa. The City of Ames Steam Electric Plant disposed of their CCR materials in a single CCR surface impoundment located approximately 3,000 feet northeast of the generating station in Section 1, Township 83 North, Range 24 West. The approximately 9.6 acre CCR impoundment is located adjacent to and to the east of the COA Water Treatment Plant's Lime Pond. The CCR surface impoundment is approximately 900 feet in length in the east-west direction and a maximum of 675 feet in length in the north-south direction. Based on the 2017 aerial image obtained from the COA and the parcel information found on the City of Ames Beacon™ geographic information system (GIS) site, the area to the north and immediate northeast of the impoundment is privately-owned crop land, to the northeast beyond the privately owned crop land is the COA South River Valley Park, to the east (ranging from 450 to 950 feet) is the South Skunk River, to the south is COA property and the railroad embankment for the Union Pacific Railroad, and to the west is the lime pond.

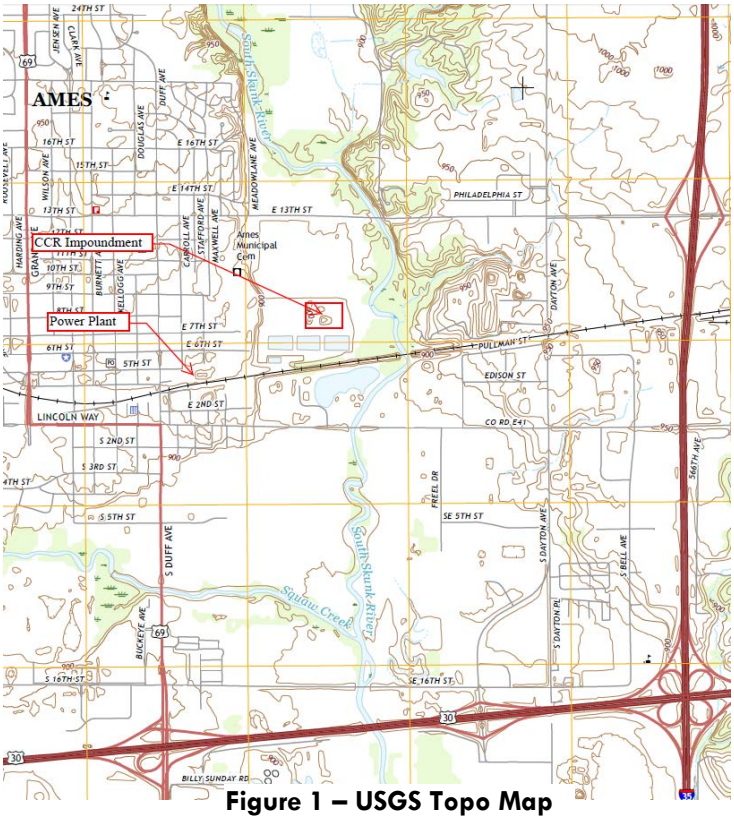

Figure 1 – USGS Topo Map

The COA owns and operates two electric power generating facilities, the City of Ames Steam Electric Plant, and the City of Ames Combustion Turbine Station. The City of Ames Steam Electric Plant has two generating units (7 and 8), with nameplate ratings of 33 and 65 megawatts, which went into commercial operation in 1967 and 1982, respectively. Both units were outfitted with pulverized coal boilers providing steam to non-reheat turbine-generators. For fuel, the boilers used ultra-low sulfur sub-bituminous coal from the Powder River Basin in Wyoming, along with co-firing refuse derived fuel (RDF). In 2016, both units were converted from coal to natural gas, while still co-firing RDF. RDF has been co-fired in the Steam Electric Plant since 1975.

Placement of CCR into the impoundment ceased before October 19, 2015. The surface impoundment continues to be operated by the COA to dispose of non-CCR ash from the co-firing of refuse derived fuel (RDF) in the power plant's boilers. The RDF ash is sluiced from the power plant and is discharged into the primary ash basin to allow time for the ash to settle out to clarify the water. Water from the impoundment ultimately flows into the discharge structure connecting the

impoundment with the first of two clear water basins. After passing through the two clear water basins, the water enters the pump house at the southwest corner of the second clear water basin, and is pumped back to the power plant for reuse as ash transport (sluice) water. The pump house has two pumps rated at 1,350 gallons per minute (gpm) to pump the water back to the power plant.

3 CLOSURE ACTIVITIES AND SCHEDULE

3.1 DESCRIPTION OF CCR UNIT CLOSURE

40 CFR 257.102(b)(1)(i). *"A narrative description of how the CCR unit will be closed in accordance with this section."*

The COA inactive CCR Surface Impoundment is currently being utilized to sluice non-CCR bottom ash from the co-burning of RDF with natural gas. The COA has most recently projected operating the power plant out to the year 2036. While this date is arbitrary and may change, it will be utilized for the closing date for the preparation of this document. The COA, over the next several years, intends on methodically dewatering and removing the existing CCR and RDF ash from the surface impoundment. This material will be hauled to an approved Municipal Solid Waste (MSW) Landfill for disposal unless used for an approved beneficial use. The COA will continue to utilize the surface impoundment for RDF bottom ash disposal until the Steam Electric Plant shuts down, performing periodic dewatering and clean outs as needed. The COA inactive CCR surface impoundment will then close as described in the subsequent sections.

3.2 CLOSURE THROUGH REMOVAL OF CCR

40 CFR 257.102(b)(1)(ii). *"If closure of the CCR unit will be accomplished through removal of CCR from the CCR unit, a description of the procedures to remove the CCR and decontaminate the CCR unit in accordance with paragraph (c) of this section."*

The COA plans on removing CCR and non-CCR ash through the process of dewatering and hauling the material to an approved Municipal Solid Waste (MSW) Landfill for disposal. However, the COA does not intend on removing all the CCR material and completing the decontamination process. Therefore, this Closure Plan will focus on closure by leaving the CCR in place.

3.3 CLOSURE THROUGH LEAVING CCR IN PLACE

40 CFR 257.102(b)(1)(iii). *"If closure of the CCR unit will be accomplished by leaving CCR in place, a description of the final cover system, designed in accordance with paragraph (d) of this section, and the methods and procedures to be used to install the final cover. The closure plan must also discuss how the final cover system will achieve the performance standards specified in paragraph (d) of this section."*

Once the COA Steam Electric Plant is no longer in operation, the COA will close the inactive CCR surface impoundment by leaving the remaining CCR and RDF ash in place. In doing so, the COA will meet the performance standards specified in 40 CFR 257.104(d) as further discussed below.

3.3.1 Minimum Requirements

The COA will close the surface impoundment in a manner that will meet the following criteria:

(i) Control minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere;

(ii) Preclude the probability of future impoundment of water, sediment, or slurry;

(iii) 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;

(iv) Minimize the need for further maintenance of the CCR unit; and

(v) Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.

3.3.2 Drainage and Stabilization of CCR Surface Impoundments

Prior to the installing the final cover on the CCR surface impoundment, the COA will dewater the free liquids within the impoundment. Once free liquids are removed, liquids within the ash pores will be drained for sufficient time to create a stable structure for placement of final cover. Once the ash is stable, it will be graded to promote positive drainage across the ash and dike structure, including regrading the dike at the ash elevation within the impoundment.

3.3.3 Final Cover System

The COA will utilize the prescriptive final cover system to minimize infiltration and erosion. The final cover will meet the requirements of 40 CFR 257.102(d)(3)(1)(A) through (D). The cover on top of the ash will consist of a compacted clay layer that is a minimum of 18 inches. Permeability tests taken at the time of liner installation indicated the liner system installed at the time of construction met the Iowa Department of Environmental Quality (IDEQ) maximum allowable leakage rate requirement of 1/16 inch/day for a 6-foot head. Laboratory testing during construction indicated the permeability of the liner soils ranged from 3x10-8 to 0.4X10-9 cm/sec; therefore, the permeability of the compacted clay layer must be less than or equal to that value. An erosion layer containing a minimum of six inches of earthen material that is capable of sustaining native plant growth will be placed over the compacted clay layer. A suitable seed mixture will be used over the erosion layer utilizing vegetation with roots less than six inches. The final cover system will accommodate settling and subsidence to avoid the disruption of the integrity of the final cover system. At the time of the design of the final cap, an alternative cover may be considered depending on the conditions in the CCR surface impoundment at the time of closure.

3.4 MAXIMUM INVENTORY OF CCR EVER ON-SITE

40 CFR 257.102(b)(2)(iv). *"An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit."*

CCR has not been deposited in the CCR surface impoundment since prior to October 19, 2015. A rough survey was completed of the stock-piled CCR/RDF ash in March 2018. At that time it was

estimated that the volume of CCR/RDF ash within the impoundment but above the water line was 37,969 cy. The water line at the time of the 2017 site inspection in December was 69.70 feet. A 3:1 slope was created from the approximate surface impoundment boundary to the bottom elevation of the impoundment (59.0 feet). The volume from the surface water to the base was then calculated using CAD and determined to be 160,289 cy. The sum equals the volume of impounded CCR and water, although some ash is stockpiled above the top of dike elevation within the surface impoundment. Worst case scenario assuming the entire estimated volume below the water line was CCR/RDF ash with no water, there would be approximately 160,289 cy of CCR/RDF ash. The combination of the stockpile and impounded CCR/RDF ash would then be 198,249 cy of CCR/RDF ash on site.

3.5 LARGEST FINAL COVER AREA DURING ACTIVE LIFE

40 CFR 257.102(b)(2)(v). *"An estimate of the largest area of the CCR unit ever requiring a final cover as required by paragraph (d) of this section at any time during the CCR unit's active life."*

The CCR surface impoundment has an approximate surface area of 9.6 acres. This estimated area is the largest area that will require a final cover.

3.6 CLOSURE ACTIVITY COMPLETION SCHEDULE

40 CFR 257.102(b)(2)(vi). *"A schedule for completing all activities necessary to satisfy the closure criteria in this section, including an estimate of the year in which all closure activities for the CCR unit will be completed. The schedule should provide sufficient information to describe the sequential steps that will be taken to close the CCR unit, including identification of major milestones such as coordinating with and obtaining necessary approvals and permits from other agencies, the dewatering and stabilization phases of CCR surface impoundment closure, or installation of the final cover system, and the estimated timeframes to complete each step or phase of CCR unit closure."*

The COA continues to operate the CCR surface impoundment to accept bottom ash from the burning of RDF. This process is anticipated to occur for at least another 18 years and potentially longer. Therefore, hard dates are not provided in Table 1 – Initial Schedule for Closure of the CCR Surface Impoundment past the completion of the initial Closure and Post-Closure Care Plan, but rather a reference to the time prior to or after the shutdown of Units 7 and 8 of the COA Steam Electric Plant. The COA will commence closure of the inactive CCR surface impoundment no later than 30 days after the date on which the inactive CCR surface impoundment receives the known final receipt of the RDF bottom ash. The closure will be completed within five years of commencing closure activities unless extenuating circumstances require the COA to request up to a two year extension per 40 CFR 257.102.(f)(2)(i).

Table 1 – Initial Schedule for Closure of the CCR Surface Impoundment		
Task Description	**Anticipated Duration**	**Anticipated Completion Date**
Pre-Design Activities		
Preparation of Closure Plan for compliance with Federal CCR Rule	1 Month	4/17/2018
Post Closure Plan in the COA's CCR Operating Record	1 Day	4/17/2018
Send a Notification of the availability of the Closure plan to the Relevant State Director and publish Closure Plan to the COA's CCR Internet Website	1 Day	4/17/2018
Post-Closure Plan in the COA's CCR Operating Record	1 Day	4/17/2018
Send Notification of availability of Post-Closure Plan to the State Director and place Post-Closure Plan to the COA's CCR Internet Website	1 Day	4/17/2018
Design / Bidding / Permitting		
Secure Engineering Design Services	120 Days	T – 450 Days
Site Survey & Bathymetric Survey	30 Days	T – 330 Days
Engineering / Preparation of Bid Documents	180 Days	T – 300 Days
Issue Invitation to Bid (ITB)	60 Days	T –120 Days
Bids Due	1 Day	T – 60 Days
Bid Evaluation Period	30 Days	T – 60 Days
Award Work – City Council Approval	15 Days	T – 30 Days
Contract & Bond – City Council Approval	15 Days	T – 15 Days
COA Steam Electric Plant Ceases Operation (T=0)		
Place a Notification of Intent to Close the Surface Impoundment in the COA's CCR Operating Record	30 Days	T + 30 Days
Send Notification of Intent to Close to State Director and Post Notification to the Station's Internet Website	30 Days	T + 30 Days
Initiation of Close-In-Place Activities	30 Days	T + 30 Days
Construction		
Contractor Mobilize to Site	7 Days	T + 37 Days
Dewater and Unwater CCR Material	6 Months	T + 189 Days
Grading CCR/RDF Material	2 Months	T + 250 Days
Prepare Surface for Cover	14 Days	T + 264 Days
Placement of 18-Inch Compacted Soil Layer	21 Days	T + 285 Days
Placement of 6-Inch Topsoil Layer	14 Days	T + 299 Days
Topsoil and Seeding	7 Days	T + 308 Days
Site Cleanup and Demobilization	7 Days	T + 315 Days

Table 1 – Initial Schedule for Closure of the CCR Surface Impoundment		
Task Description	**Anticipated Duration**	**Anticipated Completion Date**
Post-Construction Administration		
Certification Verifying the Completion of Closure in Accordance with the Closure Plan	30 Days	T + 345 Days
Place a Notification of CCR Surface Impoundment Closure Completion in the COA's CCR Operating Record	30 Days	T + 375 Days
Send Notification of Availability of Closure Completion to Relevant State Director / Place Closure Completion to the COA's CCR Internet Website	30 Days	T + 405 Days
Record a Notation of the CCR Impoundment Closure on the Deed of the Property	30 Days	T + 435 Days
Place a Notification of the Deed Notation in the COA's CCR Operating Record		
Send Notification of Availability of Deed Notation to Relevant State Director / Place Deed Notation to the COA's CCR Internet Website		
Place a Notification of Completion of the Post-Closure Care in the COA's CCR Operating Record	30 Years	Closure Date + 30 Years
Send a Notification of the Availability of the Post-Closure Care to the Relevant State Director and Place Post-Closure Care to the COA's CCR Internet Website	30 Years	Closure Date + 30 Years

4 REVISIONS AND AMENDMENTS

4.1 RECORDKEEPING AND REPORTING

40 CFR 257.102(b)(2)(iii). *"The owner or operator has completed the written post-closure plan when the plan including the certification required by paragraph (b)(4) of this section, has been placed in the facility's operating record as required by §257.105(i)(4)."*

The Initial Closure Care Plan will be placed in the facility's operating record and on the COA's CCR Rule Compliance Data and Information website by April 17, 2018. The COA will amend the Closure Plan whenever there is a change in the operation of the CCR unit that would substantially affect the written closure plan in effect or when before or after closure activities have commenced unanticipated events necessitate a revision of the written closure plan. The Closure Plan will be amended at least 60 days prior to a planned change in the operation of the facility or CCR unit, or no later than 60 days after an unanticipated event requires the need to revise an existing written closure plan.

If the written closure plan is revised after closure activities have commenced for the COA CCR Surface Impoundment, the COA will amend the current closure plan no later than 30 days following the triggering event. The COA will obtain a written certification from a qualified professional engineer that the initial and any amendment of the written closure plan meets the requirements of Section §257.102 of the CCR Rule.

The most recent copy of the written Closure Plan and any amendment of the plan will be in the facility's operating record. It will also be on the COA's CCR Rule Compliance Data and Information website within 30 days of being placed in the operating record.