History of Construction
Inactive CCR Surface Impoundment

City of Ames Steam Electric Plant

Ames Municipal Electric System
502 Carroll Avenue
Ames, Iowa 50010

SCS ENGINEERS

April 16, 2018

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

Subject: History of Construction
Inactive Coal Combustion Residuals (CCR) Surface Impoundment

Dear Mr. Trower:

SCS Engineers has prepared the History of Construction for the Inactive CCR Surface Impoundment at the City of Ames Steam Electric Plant in accordance with the requirements set forth in §257.73(c)(1) of the CCR Rule (40 CFR 257.50-107).

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

Sincerely,

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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 History of Construction as specified in Section §257.73(c) of the rule by April 17, 2018. This document provides the History of Construction for the COA CCR Impoundment.

The owner or operator of a CCR unit, per Section §257.73(c)(1) must prepare a History of Construction that includes the following items as specified in §257.73(c)(1)(i) through (xi):

1. The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and the identification number of the CCR unit if one has been assigned by the state.
2. The location of the CCR unit identified on the most recent U.S. Geological Survey (USGS) 7½ minute or 15 minute topographic quadrangle map, or a topographic map of equivalent scale if a USGS map is not available.
3. A statement of the purpose for which the CCR unit is being used.
4. The name and size in acres of the watershed within which the CCR unit is located.
5. A description of the physical and engineering properties of the foundation and abutment materials on which the CCR unit is constructed.
6. A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit; the method of site preparation and construction of each zone of the CCR unit; and the approximate dates of construction of each successive stage of construction of the CCR unit.
7. At a scale that details engineering structures and appurtenances relevant to the design, construction, operation, and maintenance of the CCR unit, detailed dimensional drawings of the CCR unit, including a plan view and cross sections of the length and width of the CCR unit, showing all zones, foundation improvements, drainage provisions, spillways, diversion ditches, outlets, instrument locations, and slope protection, in addition to the normal operating pool surface elevation and the maximum pool surface elevation following peak discharge from the inflow design flood, the expected maximum depth of CCR within the CCR surface impoundment, and any identifiable natural or manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation.
8. A description of the type, purpose, and location of existing instrumentation.
9. Area-capacity curves for the CCR unit.
10. A description of each spillway and diversion design features and capacities and calculations used in their determination.

11. The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit.
12. Any record or knowledge of structural instability of the CCR unit. Note: This item corresponds to §257.73(c)(1)(xii), but is not required in §257.73(c)(1).

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 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 impoundment was designed by Lutz, Daily & Brain Consulting Engineers in 1980. Construction of the CCR impoundment was overseen by Lutz, Daily & Brain personnel. Density and permeability testing during construction was performed by Patzig Testing Laboratories Co., Inc.

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 ground 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.

The City of Ames Steam Electric Plant has two generating units (7 and 8), 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 prior to October 19, 2015. The surface impoundment continues to be operated by the COA to dispose of the non-CCR ash from the co-firing of 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 HISTORY OF CONSTRUCTION

3.1 CCR UNIT CONTACT INFORMATION

40 CFR 257.73(c)(1)(i). *"The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and the identification number of the CCR unit if one has been assigned by the state."*

The City of Ames Steam Electric Plant is the current owner and operator of the inactive CCR surface impoundment. The current contact information is:

City of Ames Steam Electric Plant
Ames Municipal Electric System
502 Carroll Avenue
Ames, Iowa 50010
(515) 239-5170

The sign northwest of the inactive CCR surface impoundment denotes the facility as "CCR Ash Unit." The Iowa Department of Natural Resources (IDNR) has not assigned this facility a number.

3.2 CCR UNIT LOCATION

40 CFR 257.73(c)(1)(ii). *"The location of the CCR unit identified on the most recent U.S. Geological Survey (USGS) 7½ minute or 15 minute topographic quadrangle map, or a topographic map of equivalent scale if a USGS map is not available."*

The City of Ames Steam Electric Plant CCR inactive surface impoundment is 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 Municipal 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. Figure 1 on the following page shows the impoundment location on the USGS Ames-East 7.5-minute series quadrangle map.

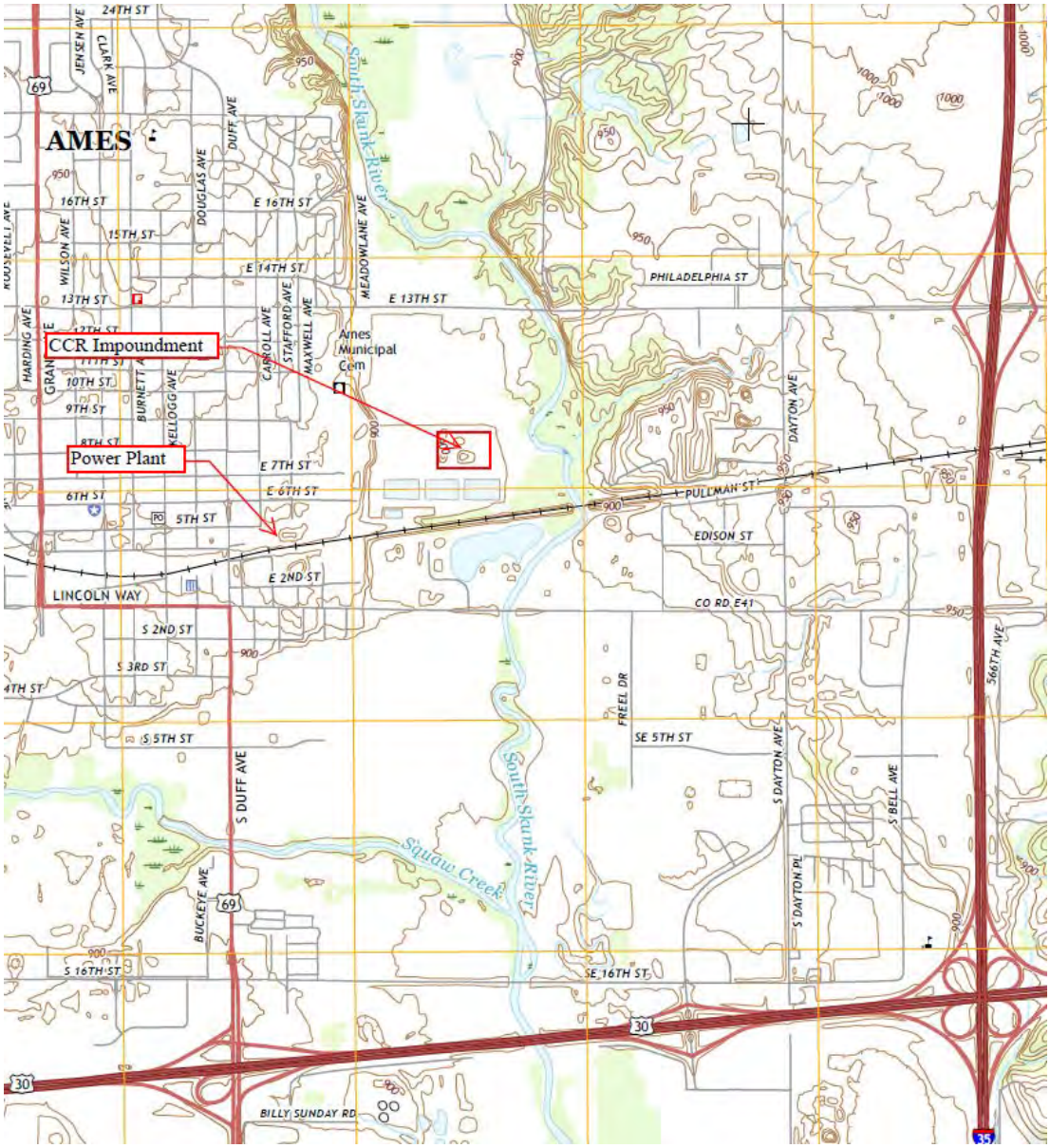

Figure 1 – USGS Topo Map

3.3 CCR UNIT PURPOSE

40 CFR 257.73(c)(1)(iii). *"A statement of the purpose for which the CCR unit is being used."*

The inactive CCR surface impoundment is currently used to receive and store RDF bottom ash sluiced from the plant. The inactive surface impoundment also receives precipitation across its extent.

3.4 WATERSHED INFORMATION

40 CFR 257.73(c)(1)(iv). *"The name and size in acres of the watershed within which the CCR unit is located."*

The COA inactive CCR impoundment is part of the South Skunk River Watershed, which, according to the South Skunk River Watershed Rapid Water Assessment, completed by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in May 2008, has a drainage area of approximately 1,180,000 acres or 1,844 square miles (mi^2). The site is located approximately 1.43 miles north of Streamgage Number 05471000 (South Skunk River below Squaw Creek near Ames, Iowa).The drainage area above Streamgage Number 0547100 (within the South Skunk River Watershed) is approximately 556 mi^2.

The crest of the CCR impoundment embankments is located above the 100-year flood level. The adjacent property has no contributing watershed runoff flowing into the impoundment during normal conditions. The highest flood on record is the August 2010 storm with an annual-flood probability estimate of <0.2 percent. Although the nearest stream gauge (05471000) is located 1.43 miles south of the site, several constrictions in the stream channel are located between the gage and the site. This would have increased the peak stream elevation at the site, relative to the peak stream elevation (60.25 site datum)[1] at the stream gage.

3.5 PHYSICAL AND ENGINEERING PROPERTIES OF CCR UNIT

40 CFR 257.73(c)(1)(v). *"A description of the physical and engineering properties of the foundation and abutment materials on which the CCR unit is constructed."*

Two geotechnical investigations were completed during the impoundment design phase to determine the material available to construct the CCR impoundment. These reports, both completed by Patzig Testing Laboratories, Inc., dated June 27, 1980 and September 12, 1980 are included in Appendix A. Additional boring and soils reports were completed as referenced in the Detailed Specifications for Pump House, Ponds and Miscellaneous Construction document found in Appendix B.

A subsurface investigation was conducted by Wenck Associates, Inc. in 2016 as part of the Slope Stability Assessment. The investigation included conventional soil borings, cone penetration test (CPT) probes, and laboratory testing of disturbed and undisturbed soil samples. Pertinent sections of this report are also included in Appendix B.

Based on these investigations, the impoundment embankments were constructed on alluvial soils from alluvial deposition of the South Skunk River. Two soil horizons of engineering significance are located under the CCR impoundments. The upper soil horizon consists of generally lean clay and occasionally sand that is classified as CL/ML according to the Unified Soil Classification System. The

[1] City Datum = 823.55 MSL

lower horizon consists of silty sand to sandy silt classified as SM/ML. Based on the CPT logs, the elevation of the break between the upper and lower soil horizons ranges from elevation 50 to 57.

The engineering properties of the two horizons are summarized in Table 1 below.

Table 1. Soil Engineering Properties

Horizon	Liquid Limits, %	Plastic Index, %	Classification	Dry Density, pcf	Std Proctor Density, pcf	Percent Compaction, %	Friction Angle, Phi	Cohesion psf
Embankment	NA	NA	CL		94-106	<95	NA	NA
Upper	27-38	9-17	CL	96-108	94-98	<100	18-26	266-542
Lower	NA	NA	SM	103-110	111-115		NA	NA

NA = Not Analyzed

3.6 CONSTRUCTION DETAILS

40 CFR 257.73(c)(1)(vi). *"A statement of the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the CCR unit; the method of site preparation and construction of each zone of the CCR unit; and the approximate dates of construction of each successive stage of construction of the CCR unit."*

The CCR impoundment and adjacent Lime Wastewater Pond were designed by the engineering firm Lutz, Daily, & Brain in 1980. Construction of the CCR surface impoundment was overseen by Lutz, Daily & Brain personnel. Density and permeability testing during construction was performed by Patzig Testing Laboratories Co., Inc. The engineering plans and project specifications for the 1980 construction of the CCR surface impoundment are provided in Appendix B and C. Based on documentation from Patzig Testing Laboratories Co., Inc. from November and December 1980, the CCR surface impoundment was constructed in one phase between October 31, 1980 and approximately November 17, 1980, concurrent with the Lime Storage Lagoon. The construction of the CCR embankments occurred primarily from November 5 through November 10, 1980. Appendix B also contains the geotechnical reports, completed in 1980, which provide soil test results for construction of the CCR surface impoundment.

3.7 DETAILED DRAWINGS

40 CFR 257.73(c)(1)(vii). *"At a scale that details engineering structures and appurtenances relevant to the design, construction, operation, and maintenance of the CCR unit, detailed dimensional drawings of the CCR unit, including a plan view and cross sections of the length and width of the CCR unit, showing all zones, foundation improvements, drainage provisions, spillways, diversion ditches, outlets, instrument locations, and slope protection, in addition to the normal operating pool surface elevation and the maximum pool surface elevation following peak discharge from the inflow design flood, the expected maximum depth of CCR within the CCR surface impoundment, and any identifiable natural or manmade features that could adversely affect operation of the CCR unit due to malfunction or mis-operation."*

Available detailed design drawings, up-dated with as-built changes for the CCR impoundment, are presented in Appendix C.

3.8 INSTRUMENTATION

40 CFR 257.73(c)(1)(viii). *"A description of the type, purpose, and location of existing instrumentation."*

There are three piezometers that are utilized for groundwater level readings. Table 2 below provides a summary of the instruments, their locations, maximum recorded reading since measurements have been recorded beginning in November 2015, and the date on which those readings occurred.

Table 2. Instrument Information

Instrument Name	Instrument Location	Maximum Groundwater Elevation*, ft	Date
PZ-1	Northwest of surface impoundment	59.84	9/30/2016
PZ-2	Northeast of surface impoundment	58.51	9/30/2016
PZ-3	West of pump house	58.94	9/30/2016

*Since monthly groundwater level readings commenced in November 2015. Elevation in local datum.

In addition, there is a staff gauge on the CCR impoundment weir structure that marks water levels from 0.7 feet to approximately 1.5 feet below the top of the concrete structure. A floating rod located in the pump house measures the west clear water basin water level. Measurements are recorded several times a day by the Steam Electric Plant staff within the pump house.

3.9 AREA-CAPACITY CURVES

40 CFR 257.73(c)(1)(ix). *"Area-capacity curves for the CCR unit."*

Area-capacity curves have not been developed for the inactive CCR surface impoundment because there is no run-on into the impoundment. Hydrologic and hydraulic capacity of the impoundment is presented in the Initial Inflow Design Flood Control System Plan prepared by SCS Engineers.

3.10 SPILLWAY AND DIVERSION DESIGN FEATURES

40 CFR 257.73(c)(1)(x). *"A description of each spillway and diversion design features and capacities and calculations used in their determination."*

The inactive CCR surface impoundment operates as part of a closed loop system and does not have a channel spillway. Stop logs are utilized in the weir structure between the inactive CCR surface impoundment and the first of two clear water ponds to control the water level in the impoundment. Details are included in the design plans in Appendix C.

3.11 SURVEILLANCE, MAINTENANCE, AND REPAIR OF CCR UNIT

40 CFR 257.73(c)(1)(xi). *"The construction specifications and provisions for surveillance, maintenance, and repair of the CCR unit."*

Surveillance, maintenance, and repair of the inactive CCR surface impoundment occurs through the periodic inspections required through 40 CFR §257.83. These include at a minimum 7 day, monthly, and annual inspections by a qualified person (40 CFR §257.83(a)) or a professional engineer (40 CFR §257.83(b)). In addition, the standard operating procedure (SOP) for the COA Steam Electric Plant has staff at the inactive CCR surface impoundment during each shift – three (3) times a day – recording water levels in the pump house and visually observing conditions.

3.12 CCR UNIT INSTABILITY

40 CFR 257.73(c)(1)(xii). *"Any record or knowledge of structural instability of the CCR unit."*

There is no written or verbal record provided indicating structural instability of the inactive CCR surface impoundments. In addition, based on visual observation the dikes are in good condition without evidence of significant issues.

4 REVISIONS AND AMENDMENTS

4.1 RECORDKEEPING AND REPORTING

40 CFR 257.73(c)(2). *"Changes to the history of construction. If there is a significant change to any information compiled under paragraph (c)(1) of this section, the owner or operator of the CCR unit must update the relevant information and place it in the facility's operating record as required by § 257.105(f)(9)."*

Any significant changes to the history of construction information compiled will be updated within this document and the revised document will be placed in the facility's operating record.

40 CFR 257.105(f)(9). *"The history of construction, and any revisions of it, as required by § 257.73(c), except that these files must be maintained until the CCR unit completes closure of the unit in accordance with § 257.102."*

The history of construction document will be placed in the facility's operating record by April 17, 2018.

40 CFR 257.106(f)(8). *"Provide notification of the availability of the history of construction, and any revision of it, specified under § 257.105(f)(9)."*

The COA will notify the Iowa Department of Natural Resources (IDNR) that this report has been completed and placed in the facility's operating record and on the COA CCR Rule Compliance Data and Information website.

40 CFR 257.107(f)(8). *"The history of construction, and any revisions of it, specified under § 257.105(f)(9)."*

The history of construction document will be placed on the COA CCR Rule Compliance Data and Information website by April 17, 2018.