



**Location Restrictions**  
**SCPD**  
**Sioux Energy Center**



## Contents

I.	Introduction.....	1
II.	Background .....	1
A.	Active Surface Impoundments .....	1
III.	Location Restrictions.....	1
A.	Placement Above the Uppermost Aquifer – 40 CFR §257.60 .....	1
B.	Wetlands – 40 CFR §257.61 .....	4
C.	Fault Areas – 40 CFR §257.62.....	6
D.	Seismic Impact Zones – 40 CFR §257.63.....	7
E.	Unstable Areas - 40 CFR §257.64 .....	9

## LOCATION RESTRICTIONS - SIOUX ENERGY CENTER

### I. Introduction

Ameren Missouri has evaluated the Sioux Energy Center's ("Sioux") SCPD active surface impoundment in accordance with location restrictions set forth below:

§257.60, Placement Above the Uppermost Aquifer;  
§257.61, Wetlands;  
§257.62, Fault Areas;  
§257.63, Seismic Impact Zones; and  
§257.64, Unstable Areas.

### II. Background

#### A. Active Surface Impoundments

The Sioux UWL surface impoundment SCPD (Gypsum Pond Cell 2) constructed in 2022 and 2023 pursuant to approvals from the Missouri Department of Natural Resources (MDNR) and pursuant to State of Missouri Solid Waste Disposal Area Construction Permit Number 0918301. The permitted footprint for disposal of utility waste covers approximately 183.5 acres and will be developed in phases. SCPD has a disposal area of approximately 40 acres. The UWL facility also uses landfill cell SCL4A and a Recycle Pond to manage stormwater and discharge waters from SCPD. The Recycle Pond does not collect or manage CCR and is not subject to 40 CFR §257 requirements.

SCPD was placed into service in 2022 and receives process water used to sluice gypsum. The impoundment stores gypsum and discharges decant water into the Recycle Pond. Water collected in the Recycle Pond is returned to the plant for reuse. The impoundment is formed by a compacted earth fill ring dam that is capped by 2 feet of impervious clay and an HDPE liner.

### III. Location Restrictions

#### A. Placement Above the Uppermost Aquifer – 40 CFR §257.60

Existing CCR surface impoundments must be constructed with a base that is located no less than 1.52 meters (five feet) above the upper limit of the uppermost aquifer, or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations (including the seasonal high water table). The owner or operator must demonstrate that the CCR unit meets the minimum requirements for placement above the uppermost aquifer.

Sioux is about twelve miles west-northwest from the confluence of the Mississippi and Missouri Rivers in an alluvial setting of water-deposited soils in the floodplains. The stratigraphy at the site is comprised of alluvium with a thin, underlying residual/colluvial unit immediately on top of bedrock.

The typical total soil thickness is about one hundred to one hundred twenty feet. The uppermost alluvium is comprised of clays and silts interbedded or intermixed with fine to medium sand. Beneath the fine-grained soils are fine to coarse sands with occasional interlayering silt and fine gravel fragments. Construction of SCPD included the placement of separation layer consisting of 5 feet of clay fill to elevate the base of the clay liner a minimum of 5-foot above the lowest site elevation prior to construction and the top of coarse-grain soil observed in the historical boring logs or during construction.

SCPD has a composite liner consisting of an 80-mil HDPE liner over 24 inches of compacted clay. The base of SCPD clay liner is 5 feet above the upper limit of the uppermost aquifer and meets the requirements of 40 CFR §257.60.

**1. Engineering Certification – Placement Above the Uppermost Aquifer**

The CCR surface impoundment SCPD at the Sioux Energy Center was evaluated to determine if it was constructed with a base that located no less than 5 feet above the upper limit of the uppermost aquifer, or if it can be demonstrated that there will not be intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations (including the seasonal high water table) to meet the requirements of §257.60, Placement Above the Uppermost Aquifer for new CCR Surface Impoundments.

CCR Unit	Meets requirements of 40 CFR §257.60
SCPD (Gypsum Pond Cell 2)	Yes

**Engineer's Seal**



Jeff Bertel, P.E.

License: PE-2010025265, MO

U&A F&C A

## **B. Wetlands – 40 CFR §257.61**

CCR surface impoundments must not be located in wetlands as defined in §232.2, unless the owner or operator demonstrates that the CCR unit meets the requirements of §257.61(a)(1) through (5).

The SCPD at Sioux was evaluated to determine whether jurisdictional wetlands were located in proximity to SCPD and that the operation of the CCR Unit will not cause or contribute to significant wetland degradation. Engineering and biological assessments performed in 2016 and 2018, along with weekly inspections and effluent limitations contained in the facility's water operating permit, confirm that existing CCR Units at Sioux are not causing or contributing to significant degradation of the wetlands adjacent to the CCR units.

The original design of SCPD avoided wetlands identified in a jurisdictional determination completed by the United States Army Corps of Engineers (USACE). As a result, the USACE St. Louis District issued a "No Department of the Army Permit Required" letter to Ameren on December 30, 2005.

Water in SCPD discharges into the Recycle Pond and is then pumped back to the SEC for reuse in a closed loop system. There is no NPDES outfall for SCPD.

Sioux also has a Dust Control Plan to minimize CCR from becoming airborne and potentially causing or contributing to significant degradation of surrounding wetlands. The Dust Control Plan includes controls for managing fugitive dusts originating from CCR units, roads and other CCR management and material handling activities from becoming airborne. The primary controls used to minimize fugitive dust include system design, maintenance programs, traffic control, watering, and covering and handling procedures for the CCR materials.

The SCPD is incised with an earthen embankment circling the perimeter of the CCR unit. Reitz & Jens' Structural Integrity Criteria & Hydrologic/Hydraulic Capacity Assessment of Sioux determined that SCPD meets or exceeds the minimum stability factors of safety specified in 40 CFR Part §257.73(e)(1), Safety Factor Assessment. The perimeter embankment is also maintained with vegetative slopes to prevent erosion of exterior embankment material. The perimeter embankment is designed and maintained to prevent catastrophic release, migration of CCR, and/or erosion of embankment material from potentially causing or contributing to significant degradation of surrounding wetlands. In the remote chance that the earthen embankment circling the perimeter of the SCPD were to fail it could impact adjacent wetlands. However, the associated environmental impacts would be minimal.

Ameren also completed a comprehensive evaluation of surface and groundwater data that demonstrates that there are no adverse impacts resulting from coal ash management practices at Sioux on human health or the environment<sup>1</sup>.

---

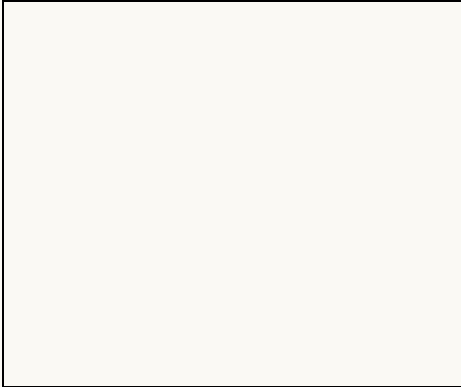
<sup>1</sup> Haley and Aldrich, Inc. (2018). "Human and Ecological Assessment of the Sioux Energy Center, Ameren Missouri." File No. 130182-004, Boston, MA.

**1. Engineering Certification – Wetlands**

New CCR surface impoundments must not be located in wetlands as defined in §232.2, unless the owner or operator demonstrates that the CCR unit meets the requirements of §257.61(a)(1) through (5). An assessment of the active CCR surface impoundment SCPD (Gypsum Pond Cell 2) at the Sioux Energy Center was conducted and used to prepare a demonstration that the CCR unit meets the requirements of 40 CFR §257.61.

CCR Unit	Meets requirements of 40 CFR §257.61
SCPD (Gypsum Pond Cell 2)	Yes

**Engineer's Seal**



Jeff Bertel, P.E.  
License: PE-2010025265, MO  
www.ug&a.com

**C. Fault Areas – 40 CFR §257.62**

Existing CCR surface impoundments must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that an alternative setback distance of less than 60 meters (200 feet) will prevent damage to the structural integrity of the CCR unit. A fault is defined in §257.53 as a fracture or zone of fractures which strata on one side have been displaced with respect to the other side.

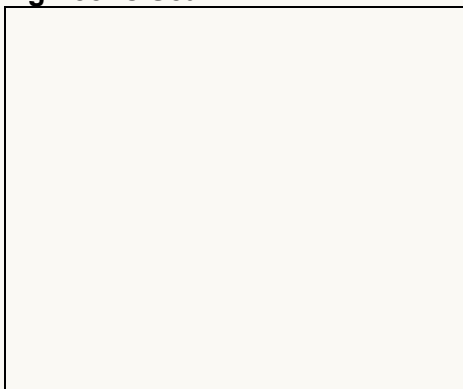
The SCPD surface impoundment is not located within 200 feet of the outermost damage zone of a fault that has had displacement in Holocene time. The closest fault is the Cap au Gres, which is located about 1.6 miles north of the Sioux UWL. The Cap au Gres fault has not undergone any displacements in Holocene time.

**1. Engineering Certification – Fault Areas**

New CCR surface impoundments must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that an alternative setback distance of less than 60 meters (200 feet) will prevent damage to the structural integrity of the CCR unit. An assessment of the active CCR surface impoundment SCPD (Gypsum Pond Cell 2) at the Sioux Energy Center was conducted to prepare a demonstration that the CCR unit meets the requirements of 40 CFR §257.62.

CCR Unit	Meets requirements of 40 CFR §257.62
SCPD (Gypsum Pond Cell 2)	Yes

**Engineer’s Seal**



Jeff Bertel, P.E.  
License: PE-2010025265, MO  
A&A Engineering



#### **D. Seismic Impact Zones – 40 CFR §257.63**

New CCR surface impoundments must not be located in seismic impact zones unless the owner or operator demonstrates that all structural components including liners, leachate collection and removal systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site.

The seismic acceleration determined for the SCPD was based upon the USGS 2014 seismic hazard maps for a Peak Horizontal Ground Acceleration (PHGA) for seismic loading event with a 2% probability of exceedance in 50 years. The PHGA was factored for the seismic site class in accordance with ASCE 7 “Minimum Design Loads for Buildings and Other Structures, International Building Code” to obtain a site specific PHGA of 0.268g. Based on this finding, Sioux is located in a seismic impact zone.

The SCPD was evaluated under seismic loading to determine if the CCR unit design is adequate to prevent harmful release of CCR, leachate, and contaminants both during and after the design seismic event. In order to demonstrate the adequacy of the design we evaluated both liquefaction potential and slope stability.

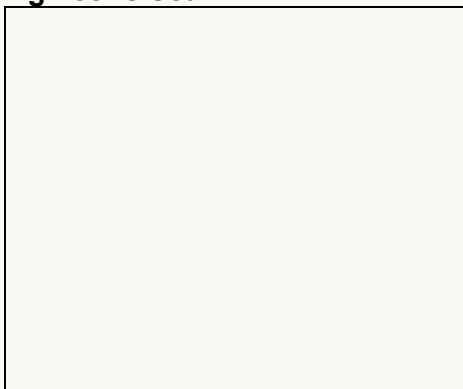
Our analyses estimated probable maximum deformations as the result of seismic acceleration or liquefaction induced settlement. The magnitude of deformation has the potential to require immediate response as detailed in this CCR unit’s Operation & Maintenance Manual. However, it is not expected that these deformations will cause a catastrophic release of CCR. The SCPD design is adequate to prevent harmful release of CCR, leachate, and contaminants both during and after the design seismic event.

**1. Engineering Certification – Seismic Impact Zones**

New CCR surface impoundments must not be located in seismic impact zones unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that all structural components including liners, leachate collection and removal systems, and surface water control systems, are designed to resist the maximum horizontal acceleration in lithified earth material for the site. An assessment of the active CCR surface impoundment SCPD (Gypsum Pond Cell 2) at the Sioux Energy Center was conducted to prepare a demonstration that the CCR unit meets the requirements of 40 CFR §257.63.

CCR Unit	Meets requirements of 40 CFR §257.63
SCPD (Gypsum Pond Cell 2)	Yes

**Engineer's Seal**



Jeff Bertel, P.E.  
License: PE-2010025265, MO  
M&A-FCG

#### **E. Unstable Areas - 40 CFR §257.64**

New CCR surface impoundments must not be located in an unstable area unless the owner or operator demonstrates that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted.

Sioux is located in an alluvial plain between the Mississippi and Missouri Rivers. The subsurface conditions include a heterogeneous deposit of alluvial soils. The uppermost bedrock underlying the thick alluvium, at a depth of about 115 feet, is limestone and dolomite of the Mississippian-age Salem Formation. Outcrops of the Salem Formation exist in the bluffs on the north side of the Mississippi River. The Salem Formation is reported to be 60 feet thick, and is underlain by the Warsaw Formation which principally consists of shale and finely-crystalline dolomitic mudstone.

The CCR units at Sioux were evaluated to determine if they were located in an unstable area using data from existing geotechnical investigations and relevant information including maps showing regional bedrock geology, karst features, mines and other potential unstable features. There are no known springs, caves, sinkholes or rock outcrops within the alluvial plain. No other potentially significant geologic or geomorphic features have been identified at Sioux. No significant on-site or local human-made features or events, either surface or subsurface are in evidence at Sioux within the footprints of the CCR units.

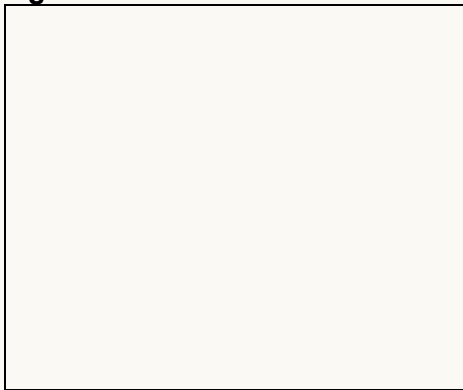
The global stability and settlement of the CCR units were evaluated during design or after construction based on the as-built conditions. These evaluations show that the CCR units are not susceptible to significant differential settling or mass movement.

**1. Engineer's Certification – Unstable Areas**

New CCR surface impoundments must not be located in an unstable area unless the owner or operator demonstrates that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted. An assessment of the active CCR surface impoundment SCPD (Gypsum Pond Cell 2) at the Sioux Energy Center was conducted to prepare a demonstration that the CCR unit meets the requirements of 40 CFR §257.64.

CCR Unit	Meets requirements of 40 CFR §257.64
SCPD (Gypsum Pond Cell 2)	Yes

**Engineer's Seal**



Jeff Bertel, P.E.  
License: PE-2010025265, MO  
M&E