

**UNSTABLE AREAS
EXISTING COAL COMBUSTION RESIDUE (CCR) LANDFILL
MUSCATINE POWER & WATER**

REPORT DATE: October 3, 2018

Federal CCR Rule §257.64(a-e) – Unstable Areas – Rule Requirements

- (a) An existing or new CCR landfill, existing or new CCR surface impoundment, or any lateral expansion of a CCR unit must not be located in an unstable area unless the owner or operator demonstrates by the dates specified in paragraph (d) of this section 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.
- (b) The owner or operator must consider all of the following factors, at a minimum, when determining whether an area is unstable:
 - (1) On-site or local soil conditions that may result in significant differential settling;
 - (2) On-site or local geologic or geomorphologic features; and
 - (3) On-site or local human-made features or events (both surface and subsurface).
- (c) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the demonstration meets the requirements of paragraph (a) of this section.
- (d) The owner or operator of the CCR unit must complete the demonstration required by paragraph (a) of this section by the date specified in either paragraph (d)(1) or (2) of this section.
 - (1) For an existing CCR landfill or existing CCR surface impoundment, the owner or operator must complete the demonstration no later than October 17, 2018.
 - (2) For a new CCR landfill, new CCR surface impoundment, or any lateral expansion of a CCR unit, the owner or operator must complete the demonstration no later than the date of initial receipt of CCR in the CCR unit.
 - (3) The owner or operator has completed the demonstration required by paragraph (a) of this section when the demonstration is placed in the facility's operating record as required by §257.105(e).
 - (4) An owner or operator of an existing CCR surface impoundment or existing CCR landfill who fails to demonstrate compliance with the requirements of paragraph (a) of this section by the date specified in paragraph (d)(1) of this section is subject to the requirements of §257.101(b)(1) or (d)(1), respectively.
 - (5) An owner or operator of a new CCR landfill, new CCR surface impoundment, or any lateral expansion of a CCR unit who fails to make the demonstration showing compliance with the requirements of paragraph (a) of this section is prohibited from placing CCR in the CCR unit.
- (e) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in §257.105(e), the notification requirements specified in §257.106(e), and the Internet requirements specified in §257.107(e).

The rule requirements are addressed in the following paragraphs.

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Part §257.64(a)

- (a) *An existing CCR unit must not be located in an unstable area unless the owner or operator demonstrates by the dates specified in paragraph (d) of this section 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.*

CCR Unit Location: SW½, Section 16, T76N R3W, Muscatine County, Iowa

The existing MP&W CCR Landfill is not located in an area that is unstable. Generally accepted good engineering practices for this area have been incorporated into the design and development of the landfill unit. Through review of design and other supporting documents, these declarations are made in consideration of the factors required under §257.64(b).

Part §257.64(b)

- (b) *The owner or operator must consider all of the following factors, at a minimum, when determining whether an area is unstable:*

(1) On-site or local soil conditions that may result in significant differential settling

There are no on-site or local soil conditions that may result in significant differential settling of the CCR unit because the landfill base is entirely cut through, and isolated from, the upper soil profile and into the underlying glacial drift material. That is, the upper soil profile was removed during construction to expose and build upon the low permeable glacial drift (refer to item b.2 below).

Good construction practices were followed in development of the landfill liner and leachate collection system. To limit settlement and for base liner integrity, the construction specifications require removal of unsuitable soils and replacement with suitable materials compacted to a specified moisture and density. Leachate collection piping and associated structures are properly bedded and backfilled.

(2) On-site or local geologic or geomorphologic features

Geologic Features: The geologic setting in which the landfill is situated is very stable, where the dominant geologic feature is a malleable to dense clay-glacial drift material of Pleistocene age, or younger 1.65 million years. These old surficial deposits are the compacted sediment deposited beneath ancient massive continental ice sheets (Landforms of Iowa, 1991).

A Hydrogeologic Evaluation (GES, October 1991) was generated based on an Iowa DNR-approved work plan (GES, June 1990) for the regulatory landfill permitting process. The evaluation incorporated available historical subsurface information, and also new subsurface exploration and testing results at the site. Site-specific

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documentation of the subsurface conditions was established, wherein it presented a detailed description of the field and laboratory investigation procedures employed and it defined the subsurface conditions of the site, including the geomorphic setting, soils, surficial deposits, geologic setting, and bedrock units.

Specifically, the shallow stratigraphy and lithology of the Pleistocene sediments at the landfill site include, in ascending order, (1) clay-rich glacial drift (till), (2) an interval characterized by lenses of sand, silt, and clay, and (3) clayey silt (i.e., loess). In places, discontinuous lenses of fine- to medium-grained sand separate the clay-glacial drift from the overlying clayey silt. The sand lenses are enclosed by glacial drift and represent ancient glacial outwash (meltwater) deposits.

Uppermost bedrock is about 350 feet deep beneath the site and consists of Devonian Cedar Valley limestone (Hydrogeologic Evaluation, GES, 1991). Geologic mapping of eastern Iowa indicates that there is no potential karst within 50 feet of surface within at least five miles of the landfill (Iowa Geological and Water Survey, Open File Map OFM-10-7, November 2010).

There are no known geologic faults in the vicinity of the site; and in fact, there are no active faults in the entire State of Iowa (Geology of Iowa, 1983). Muscatine County is located in seismic risk 0; which is an area with very low probability of damaging ground motion (Muscatine County Multi-Jurisdiction Local Hazardous Mitigation Plan, 2015).

Geomorphologic Features: The landfill is situated on the Southern Iowa Drift Plain, where present-day topography consists of gentle hillslopes and valley floors which mark the extent of erosion into the ancient glacial plain. Most of the landscape slopes toward some drainage-way. This is observed at the landfill site where the pre-landfill surface sloped gently from a topographic ridge (elevation 750 feet) toward an intermittent stream valley (elevation 710 feet).

The dominant geomorphic feature is the ridge-line, which is consistent in elevation with other (non-eroded) ridges in the region. These stable ridges are composed of the subsurface clay-glacial deposits described above. It is into this ridge material that a solid landfill base was established by cutting into the clay deposit. The pre-existing intermittent stream was re-routed as a by-pass storm water control feature and the landfill is set upon the underlying clay-glacial drift.

There are no known landslide susceptibilities regionally or at the site.

(3) On-site or local human-made features or events (both surface and subsurface)

There are no on-site or local human-made features or events that decrease stability of the landfill structure, either on the surface or subsurface. Additionally, IDNR database search indicates that the nearest known underground coal mine is located greater than 10 miles from the landfill (<https://programs.iowadnr.gov/maps/coalmines>).

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Part §257.64(c)

- (c) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the demonstration meets the requirements of paragraph §257.64(a) of this section.*

Based on the above information the MP&W CCR landfill is not located in an unstable area. This document is certified by a professional engineer stating that it meets the requirements of paragraph §257.64(a) of this section.

Part §257.64(d)

- (d) The owner or operator of the CCR unit must complete the demonstration required by paragraph (a) of this section by the date specified in either paragraph (d)(1) or (2) of this section.*
- a. For an existing CCR landfill or existing CCR surface impoundment, the owner or operator must complete the demonstration no later than October 17, 2018.*

Part §257.64(e)

- (e) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in §257.105(e), the notification requirements specified in §257.106(e), and the Internet requirements specified in §257.107(e).*

A copy of this report will be placed in the operating record as required under §257.105(g)(9).

Under §257.84(c) Muscatine Power & Water intends to comply with the recordkeeping requirements specified in §257.105(g)(9), the notification requirements specified in §257.106(g)(7), and the public internet site requirements specified in § 257.107(g)(7).

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CERTIFICATION

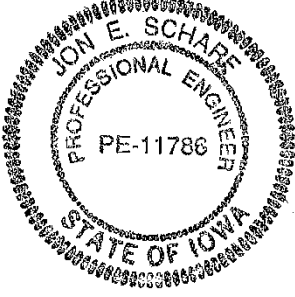
UNSTABLE AREAS

CCR LANDFILL

Permit No. #70-SDP-06-82P-CCR

MUSCATINE POWER & WATER

MUSCATINE, IOWA

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|  | I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa. |
| | Date: <u>10/3/2018</u> |
| | <u>Jon E. Scharf</u> Jon E. Scharf, P.E. |
| | License No. 11786 |
| | My renewal date is December 31, 2019 |
| Pages or sheets covered by this seal: ENTIRE DOCUMENT | |

Prepared By:

Name: Gregory J. Brennan, P.H.G., P.G.
Certified Professional Hydrogeologist
Licensed Professional Geologist

Signature: 

Date: October 3, 2018

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