State vs Federal CCR Rule Regulations: Comparisons and Impacts

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CONFERENCE: 2019 World of Coal Ash – (www.worldofcoalash.org)

KEYWORDS: coal combustion residual (CCR), state regulation, groundwater standards, landfill design, closure criteria, fly ash

ABSTRACT

When the Federal Coal Combustion Residual (CCR) rule went into effect in 2015, it was a new regulatory layer on top of a widely varying landscape of state regulations affecting CCR management in impoundments and landfills. Some states already had significant regulations on the books for CCR impoundments and/or landfills, while others did not. Where state regulations existed, they varied widely from state to state. While a few states have moved toward closing the gap between state and Federal CCR requirements, many utilities continue to face confusing and conflicting requirements coming from different regulatory programs as they move ahead with managing their CCR facilities.

Through case studies, we will share state-versus-federal regulatory challenges utilities have encountered during landfill design and management, impoundment closure, and groundwater monitoring and reporting since the implementation of the Federal CCR rule. For example, some sites have completely distinct groundwater monitoring programs under state-versus-federal rules, with different well locations, well depths, and monitoring parameters for the same facility. We will highlight unique approaches to bridging regulatory gaps and resolving regulatory conflicts between state and Federal CCR requirements.

We will also share insights gained on the long-term potential for regulatory resolution of these issues based on discussions with state regulators in multiple states.

INTRODUCTION

The implementation of the Federal CCR rule in 2015 introduced new requirements for monitoring groundwater and management of CCR surface impoundments and landfills. The Federal CCR rule differs from many current state regulations for CCR management at landfills and impoundments, as well as groundwater quality management near CCR facilities. While unifying CCR regulations may provide consistency for utilities operating in multiple states, there may also be benefits in the unique decisions made by each state regarding CCR management, storage, and monitoring. Many states currently use

a model that takes into account site-specific conditions where the Federal CCR rule has a “one-size-fits-all” approach with a self-implementing component. Evaluating the challenges that utilities and state regulators face due to parallel regulation under the Federal CCR rule can help to identify and address regulatory gaps, which may help lead to solutions that benefit utility and community stakeholders around the country.

Differences and similarities between the Federal CCR rule and states’ regulations will be highlighted in this evaluation. Overall observations as well as specific case studies of landfill design, impoundment closure, and groundwater quality monitoring issues for sites in Iowa and Wisconsin will be discussed in this evaluation.

OVERALL OBSERVATIONS

While each CCR site/facility, state, and region is unique in its management approach and the challenges it faces, there are some trends across the states.

In many states, CCR landfills are regulated as solid waste facilities and are monitored for groundwater quality, while impoundments are regulated under an industrial wastewater discharge permit through the National Pollutant Discharge Elimination System (NPDES) program, where groundwater quality monitoring may or may not be required. By introducing new requirements for impoundments, the Federal CCR rule adds additional work and evaluation to CCR management in addition to the state requirements. Many states have maintained their regulations even if their programs differed from the Federal CCR rule. Some examples of states that are currently maintaining their own standards are Wisconsin and Iowa.

Another trend appearing across many states is the closure of impoundments and CCR facilities. Many were closed prior to the implementation of the Federal CCR rule which exempts their owners from further Federal level requirements, but not state requirements. Other CCR Facilities are closing due to age or because utilities are diversifying their generating portfolio (Marcacci, 2017).

Many state agencies appear to be waiting to update their state CCR requirements until anticipated Federal CCR rule updates are completed and pending lawsuits are resolved. Not all states or regions are waiting to complete their own rules; some have taken action to move forward with rules. For example, the U.S. Environmental Protection Agency (USEPA) approved a Kansas solid waste management plan (SWMP) which includes references to the Federal CCR Rule requirements in October 2015 (USEPA, 2019). However, since USEPA’s approval of the Kansas SWMP, Kansas has yet to make updates to their current state requirements.

In addition to Kansas, Indiana has conditional approval from the USEPA regarding their own CCR SWMP Amendments. South and North Carolina are also moving forward with their state CCR regulations updates. It was beyond the scope of this study to identify the current rulemaking status in all states; however, we understand from conversations

with regulators and others in the industry that other states are at varying stages in the rulemaking process.

CASE STUDIES

LANDFILLS

Liner Design Requirements

Landfill liner design requirements often vary depending on individual state requirements and site-specific conditions.

In Wisconsin, a CCR landfill completing a design update in 2015 faced conflicts between the previously approved liner design, the current state requirements, and the CCR regulations (Federal CCR rule) that were signed by USEPA in December 2014 and eventually published in the Federal Register in April 2015. The leachate collection and final cover designs were also updated in 2015 to meet the Federal CCR rule requirements.

The Federal CCR Rule requires a composite liner consisting of two components: an upper layer of 30-mil geomembrane (60 mil if HDPE) and a lower layer which must be 2 feet of compacted soil with a hydraulic conductivity no greater than the $1X10^{-7}$ cm/sec (see 40 CFR 257.70(b) for more details). When the landfill was originally permitted in the 1980s, Wisconsin required a 5-foot clay liner, while current state rules require a 4-foot composite liner including a 60-mil HDPE geomembrane.

Based on the new rule, the liner design was revised to match the minimum Federal CCR rule requirement of a 2-foot compacted clay layer plus a 60-mil HDPE geomembrane. While this revision did not meet the prescriptive state design requirements, the Wisconsin rules provide for some flexibility in liner design requirements for industrial waste landfills. The state regulators approved the alternative liner design to be consistent with the Federal CCR rule.

The design change benefited the owner not only by solving the conflict between the two different regulations, but also by resulting in lower landfill base grades and increased CCR disposal capacity.

While this design adjustment required additional design modifications and time for the Utility owner, working with the State to manage the conflicting rules helped to ensure the project would proceed in compliance with both state and federal requirements.

Groundwater Separation

When determining the proper groundwater separation for landfill liners, it is important to consider two questions:

- What are we measuring groundwater separation to?
- What is the required distance for groundwater separation?

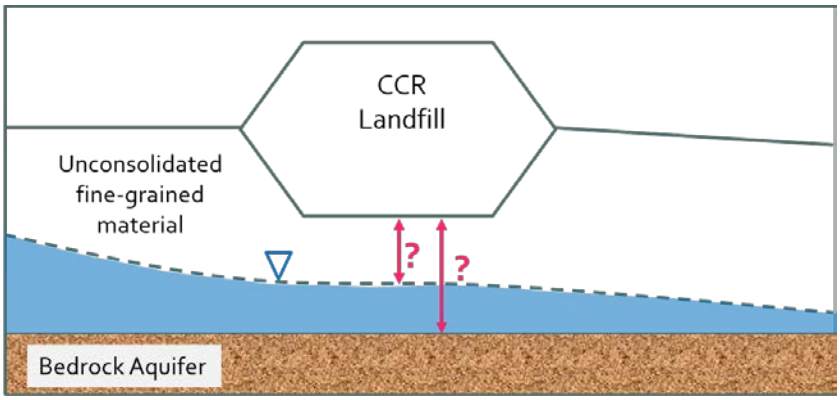

Image illustrating the question of appropriate Groundwater Separation at a CCR Landfill.

Groundwater separation from either the water table or uppermost aquifer, as well as the appropriate amount of distance required, may vary between Federal and state rules, and from state to state. In Wisconsin, landfill liners are required by the state to have 10 feet of separation between the bottom of a clay liner, or the bottom of the clay component of a composite liner, and the seasonal high water table (see NR 504.06(2)(b)). The state does allow for a zone-of-saturation landfill in fine-grained soil environments where the liner is designed to be below the water table, which is what we see at one Wisconsin CCR landfill that was approved due to the fine-grained soil environment identified at the site. A fine-grained soil environment is defined in NR 500.03(86) as "a soil environment in which a majority of the material within 25 feet of the proposed sub-base [i.e., bottom of clay liner or clay component of a composite liner] of the facility has at least 50% by weight passing the #200 sieve and which contains no extensive and continuous deposits of coarse-grained or non-plastic soils." Other Wisconsin requirements include:

- Clay specification, minimum slopes including a 2% liner surface to leachate collection system, and a 3H:1V (max)/ 5H:1V (min) interior sidewalls, liner thickness, and clay liner construction.
- For zone-of-saturation designs, a complete liner uplift analysis that considers effects of an underdrain or a dewatering system.

In Iowa, waste in CCR landfills is required to be a minimum of 5 feet above the high groundwater table per 567 Iowa Administrative Code (IAC) Chapter 103, which is what is present at one Iowa CCR landfill that was installed prior to the implementation of the Federal CCR rule, where there is 5 feet of groundwater separation between the CCR landfill and the high water table in the area. The high water table is defined in 567 IAC 100 as "the position of the water table which occurs in the spring in years of normal or above normal precipitation." The Federal CCR rule regarding groundwater separation requires the CCR unit be constructed with a base at least 5 feet above the upper limit of the uppermost aquifer (CFR 257.60(a)).

The key difference between the Federal CCR rule and the Wisconsin and Iowa requirements is the reliance on the uppermost aquifer definition versus the seasonal high water table. The uppermost aquifer at a site may be a bedrock unit below the surficial fine-grained soil that is 100 feet thick.

Iowa and Wisconsin state requirements were developed in the context of typical geologic settings in each state, while the Federal CCR rule presents requirements in a one-size-fits-all method. New or expanded CCR landfill designs need to address state and Federal requirements.

GROUNDWATER QUALITY MONITORING

Groundwater quality monitoring requirements under state rules and permits can vary significantly from the Federal CCR rule requirements. The following case studies illustrate conflicts between state and federal requirements for groundwater monitoring networks and groundwater sampling parameters.

Groundwater Monitoring Networks

The main requirements for a groundwater monitoring network, in the Federal CCR rule, include at least one background/upgradient monitoring well and three downgradient monitoring wells in the uppermost aquifer. The downgradient monitoring wells must be installed at the waste boundary of the CCR unit.

Under the Wisconsin landfill rules, the process for developing a groundwater monitoring network is based on site-specific conditions. Wisconsin requirements may include many monitoring points depending on the facility size, waste types, facility design, and hydrogeologic and geologic setting of the facility. The monitoring program must be adequate to evaluate upgradient and downgradient groundwater quality and horizontal and vertical gradients, and to detect any groundwater quality impacts from the facility. Monitoring wells intersecting the water table are typically required, regardless of whether the water table occurs in an aquifer or in a low-permeability aquitard, such as a clay unit.

Given these requirements, it is possible that multiple groundwater monitoring systems may exist at the same site. At one Wisconsin site, two entirely separate monitoring systems are employed due to the differing state and Federal CCR rule requirements. This Wisconsin site has shallow monitoring wells installed in clay glacial till at the water table per the state requirements for the groundwater monitoring network, while the Federal CCR rule monitoring wells are installed in the deeper underlying dolomite, which is the uppermost aquifer at this site.

In a similar situation at an Iowa site, the state monitoring program includes shallow wells installed at the water table with some intermediate monitoring wells installed in the underlying shale. However, the Federal CCR rule monitoring wells are installed much deeper in the underlying limestone, which is the uppermost aquifer for this site.

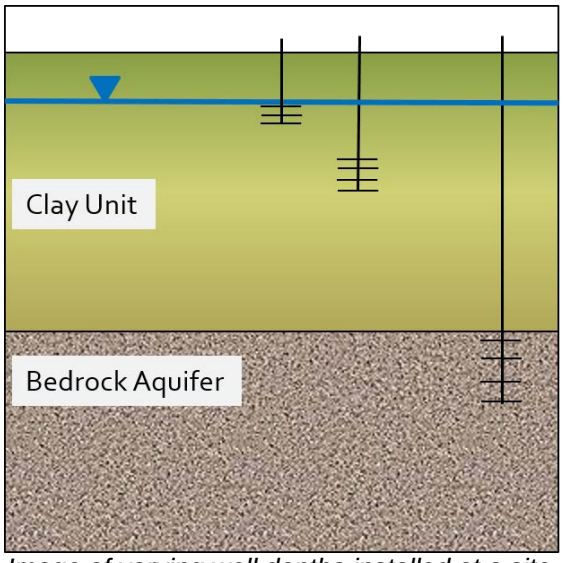

Image of varying well depths installed at a site.

The differences between the state and federal monitoring networks at these sites result in added monitoring costs, both for well installation and sampling. In addition, the site's regulatory status may vary between state and federal if, for example, assessment monitoring is triggered under one program but not the other.

Groundwater Monitoring Constituents

The lists of groundwater constituents for groundwater monitoring at CCR sites can vary from state to state and from site to site. Most have some overlap with the constituents found in the Federal CCR rule, but may not have all of the Appendix III and IV parameters, or may have other additional constituents.

For example, there are many similarities and differences in the required constituents between the Federal CCR rule and the lists of constituents designated for landfill sites in Wisconsin and in Iowa. Two specific constituent lists, each from a Wisconsin and an Iowa landfill site, were compared to the Federal CCR rule constituent list below (including both the Appendix III and IV constituent list).

The yellow highlighted constituents are part of the Federal CCR rule Appendix III list for groundwater quality evaluation. The orange highlighted constituents are on the Federal CCR rule Appendix IV list for groundwater quality evaluation. The non-highlighted constituents are not a part of the Federal CCR rule program but are required for groundwater monitoring under the state program at that specific site.

Federal CCR Rule	Wisconsin Landfill	Iowa Landfill
Appendix III and IV Constituents		
Antimony	Alkalinity	Arsenic
Arsenic	Aluminum	Barium
Barium	Arsenic	Boron
Boron	Barium	Beryllium
Beryllium	Boron	Cobalt
Cadmium	Cadmium	Copper
Calcium	Chloride	Chloride
Chloride	Chromium	Fluoride
Chromium	Mercury	Iron
Cobalt	Molybdenum	Lead
Fluoride	Nitrate + Nitrite	Magnesium
Lead	pH	Manganese
Lithium	Selenium	pH
Mercury	Specific Conductivity	Selenium
Molybdenum	Sulfate	Specific Conductivity
pH	Temperature	Sulfate
Selenium	Total Hardness	Total Dissolved Solids
Sulfate		Temperature
Thallium		Zinc
Total Dissolved Solids		
Radium 226/228 C		

CCR constituents table outlines differences between state and federal requirements at two landfills, one in Wisconsin and one in Iowa.

As the table illustrates, there are some constituent similarities and overlap between the sites and the Federal CCR rule but still a lot of variability.

IMPOUNDMENTS

CCR Impoundment Closure Permits

Prior to the Federal CCR rule, surface impoundment closures around the country were evaluated under different regulatory programs (e.g., solid waste, wastewater, dam safety, etc.). The CCR impoundment closure approval process in Iowa has evolved over time and with the introduction of the Federal CCR rule in 2015. Although generally used to treat generating facility wastewaters to meet National Pollutant Discharge Elimination System (NPDES) permit requirements, Iowa has recently used its sanitary disposal project permit process to regulate the closure of CCR surface impoundments by issuing closure permits.

We reviewed a number of recent CCR surface impoundment closure permits to see how the permits have changed over time and with changes in the Federal CCR rule. All of the impoundment closure permits reviewed included projects where CCR was closed in place under a final cover.

Only one of the impoundment closure approvals predated the Federal CCR rule. That closure project was approved by the Iowa Department of Natural Resources (IDNR) using variances from solid waste disposal and beneficial use requirements, and the closure plan approval was approved as a variance rather than as a permit. The variance relied on the owner's closure plan rather than a conditioned permit approval. However, the outcome was similar to permitted projects to come later in that CCR was left in place under a final cover system.

SCS reviewed closure permits for six additional CCR surface impoundment closure projects in Iowa. From our review of the closure permit or facility operating record, these permits represented the following set of CCR impoundment facilities:

- One legacy facility not subject to the Federal CCR rule.
- Three inactive facilities subject to the early closure provisions published in the April 2015 CCR rule under 40 CFR 257.100 that were later vacated by the United States Court of Appeals for the D.C. Circuit on June 14, 2016.
- Two active facilities subject to the closure requirements in 40 CFR 257.102, both before and after the vacatur of the early closure provisions in 40 CFR 257.100.

Our review of the IDNR solid waste disposal project closure permits for these facilities, and the following summary, show how the closure permits have evolved over time and with changes to the Federal CCR rule. This summary, rather than an individual case study, is used to show the programmatic adjustments the agency has made to their closure permit process. Our summary is provided chronologically as the permits were issued.

Of the permits reviewed, the first two closure permits were issued in 2016 prior to the D.C. Circuit appeals court decision on June 14, 2016. These two permits were written for inactive impoundment closures, and included the notable conditions paraphrased below:

- Direct references to Federal CCR rule requirements in 40 CFR 257.100(b) and 257.100(c).
- A closure deadline of April 17, 2018, or be subject to the state CCR landfill requirements in 567 IAC 103 and all requirements in 40 CFR 257 applicable to active impoundments (i.e., groundwater monitoring, post-closure, etc.).
- A 30-year permit, which would be rescinded with no ongoing state solid waste regulatory obligations once closure was certified by a licensed professional engineer as complete and in compliance with 40 CFR 257.100(b), the approved closure design plans, and the closure permit.

These two permits were later revised after USEPA published the direct final CCR rule on August 5, 2016. The revised permits are consistent with the closure permits issued for active impoundment facility closures in 2017 and 2018 as described later in this summary.

The next permit reviewed was issued to a legacy impoundment facility that is not subject to the Federal CCR rule requirements. Although issued after the June 2016 circuit court decision, the permit was similar to the initial permits written for the inactive impoundment facilities, with the following notable differences:

- No direct references to Federal CCR rule requirements, but conditions include language borrowed directly from the Federal CCR rule.
- No closure deadline.
- More regular closure progress reporting (quarterly versus annual).
- A 10-year permit and post-closure inspection period with no rescission provision as seen in the initial inactive impoundment closure permits.
- An “indemnification” of the agency from legal or financial responsibility for the project.

The remaining closure permits reviewed were all issued after the direct final CCR rule was published by USEPA in August 2016. These included permits for two active impoundment facilities, two revised permits for inactive impoundments, and one inactive impoundment permit. These five permits are all generally consistent and include the following notable conditions paraphrased below:

- Direct references to specific applicable portions of 40 CFR 257, as well as language borrowed directly from the Federal CCR rule.
- Prohibition of pollutant discharges, whether point or nonpoint, from the closed site to the waters of the United States, including wetlands, that violate Clean Water Act (CWA) requirements such as NPDES requirements or areawide/statewide water quality management plans approved under the CWA.
- Semiannual closure progress reporting.
- Annual post-closure inspections and as-needed deficiency repair, reporting, and professional engineer certification.
- 30-year permit with post-closure care of the final cover system and groundwater monitoring.
- Financial assurance required for post-closure care and corrective action using the CCR landfill financial assurance requirements in 567 IAC 103.3.
- An “indemnification” of the agency from legal or financial responsibility for the project.

The evolution of the impoundment closure permit program in Iowa is an example of how states are utilizing existing rules to provide oversight of activities directed by the Federal CCR rule, and adjust to changes in the Federal CCR rule over time. This example shows how states are being creative without undertaking new rule-making activities or expending limited resources, which might otherwise be a limitation to regulatory

progress under the oversight authority granted to states in the January 14, 2016 Water Infrastructure Improvements for the Nation (WIIN) Act.

CONCLUSIONS

The introduction and evolution of the Federal CCR rule has led to challenges for utilities in many states as they adapt to additional and changing rules. Where state rules do not yet exist or differ from the Federal CCR rule, some states are using existing permitting processes to address federal rule requirements. Utilities navigating State and Federal regulations may find themselves in a maze of directions and rules that can be overwhelming and difficult; however, utilities also have an opportunity to educate and influence state regulators on their approach to a specific topic or site, potentially leading to more workable state regulation updates when they occur.

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