MUNICIPAL SOLID WASTE LANDFILLS AND COAL COMBUSTION RESIDUALS

Mike McLaughlin

Coal combustion residuals (CCR) are one of the nation's largest industrial waste streams, with more than 100 million tons produced annually. Roughly 40 percent of CCR produced is used beneficially, with the remainder disposed in landfills and surface impoundments.

CCR include fly ash, bottom ash, slag, and flue gas emission control wastes such as flue gas desulfurization (FGD) sludge. As its name implies, FGD sludge can contain elevated concentrations of sulfur - a beneficial use of FGD sludge is gypsum wallboard, which is itself a high-sulfur waste when disposed. CCR also may contain relatively small amounts of "uniquely associated wastes" that might otherwise be considered hazardous wastes, such as boiler cleaning solutions.

EPA's CCR Regulations

The U.S. Environmental Protection Agency (EPA) has published final standards for the disposal of CCR in landfills and surface impoundments. The new rules require specific location, design, operating, groundwater monitoring, corrective action, closure, post-closure care, and recordkeeping criteria to be met by CCR landfills and CCR surface impoundments.

Facilities that do not meet the criteria are considered open dumps, which are prohibited under the Resource Conservation and Recovery Act (RCRA). Open dumps are subject to enforcement via citizens' suits that could force facility owners and/or operators to comply at significant expense. To compound the incentive, successful plaintiffs can be awarded attorneys' fees for enforcing RCRA.

Municipal solid waste landfills (MSWLFs) are not subject to the CCR standards even if they manage CCR. EPA says it expects MSWLFs to evaluate CCR as they would other special wastes, including making changes to groundwater monitoring programs to reflect constituents of CCR. From the preamble of the CCR standards (80 Fed. Reg. 21,342, Apr. 17, 2015):

[EPA] has concluded that CCR can readily be handled in permitted MSWLFs provided that they are evaluated for waste compatibility and placement as required under the part 258 requirements. Furthermore, consistent with the recordkeeping requirements in section 258.29, the Agency further expects State Directors to encourage MSWLF units receiving CCR after the effective date of this rule to do so pursuant to a ''CCR acceptance plan'' that is maintained in the facility operating record. This plan would assure that the MSWLF facility is aware of the physical and chemical characteristics of the waste received (i.e., CCR) and handles it with the additional precautions necessary to avoid dust, maintain structural integrity, and avoid compromising the gas and leachate collection systems of the landfill so that human health and the environment are protected. While [EPA] sees no need to impose duplicative requirements for MSWLFs that receive CCR for disposal or daily cover; development of these acceptance plans as well as a revised list of groundwater detection monitoring constituents will help ensure that CCR is being managed in the most protective manner consistent with the Part 258 requirements.

There will be no federal enforcement of the new standards for CCR disposal. Instead, EPA says that it hopes states will develop programs to regulate (e.g., with permitting programs) disposal of CCR. EPA encourages states to seek EPA approval of state CCR permit programs as being at least as stringent as EPA's standards, in which case EPA assumes that courts will give great weight to EPA's approval and will summarily dismiss citizens' suits where a facility is complying with a state permit.

In fact, many states already have comprehensive programs for managing CCR, although existing state programs will require modifications to

come fully into compliance with the new federal standards. An alternative might be for a CCR landfill to be designated a MSWLF under state law.

Challenges and Opportunities

There are many other challenges facing coal-burning utilities that will affect the amount of CCR being produced and the relative portions being disposed or beneficially used. Some utilities are changing CCR characteristics as they respond to new air pollution controls such as EPA's mercury and air toxics standards. EPA's pending changes to effluent limitations guidelines are expected by many to continue a trend in recent years away from managing CCR in surface impoundments. Pending greenhouse gas regulations for new power plants are expected to add further to the cost of constructing coal-burning power plants in the future. And as if these factors were not enough, the cost advantage that coal once enjoyed compared to other fossil fuels is much smaller in this age of hydraulic fracturing and shale gas and oil.

With these changes come great opportunities. Public and private waste management facilities will have new customers, as utilities that formerly operated their own disposal facilities seek reliable off-site disposal capacity. The cost of managing CCR is going up—EPA estimates the annual costs of its new CCR standards will be between $500 million and $750 million. Other estimates are as high as $2 billion.

However, before accepting CCR materials, MSWLFs should make sure they have modified procedures and otherwise accounted for the unique characteristics of CCR. CCR can have high sulfur content (on the order of 10,000 to 40,000 ppm), and under the right circumstances sulfur compounds can form hydrogen sulfide if CCR is mixed with MSW. To the extent high-sulfur wastes are disposed under conditions that can produce hydrogen sulfide, those conditions should either be controlled (or avoided), or appropriate precautions taken to manage the resulting hydrogen sulfide gas in gas collection and other systems.

There could be other reasons for segregating CCR. For example, placing CCR in monofill areas might increase the potential for later beneficial use, especially if the materials can be kept dry. Moisture content is a critical factor affecting CCR use in pozzolanic cements, but not all ash materials are suitable for pozzolanic cement in any case. CCR also can affect structural stability of fill mass, operation of gas and leachate collection systems (e.g., through clogging with fines), and dust generation.

Conclusion

MSWLFs can safely manage CCR from coal-burning electric utilities, and changing regulations may increase the market for off-site disposal of CCR. But MSWLFs should accept CCR only after adjusting their procedures to reflect the special characteristics of CCR materials.

Mike McLaughlin is a senior vice president of SCS Engineers based in the firm's Reston, Virginia, office. He is a member of the SEER Waste and Resource Recovery Committee.