Disposal of CCRs in Landfills and Impoundments

2016 Summit on Coal Combustion Residuals (CCRs)

Sponsored by:

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Purpose

- Identify what has been accomplished since 1997
- Look at action items/needs for outreach and research for CCRs over the next five to seven years and beyond
- Or is it “to infinity and beyond?”
Historical Disposal Practice 1990s through 2008

- No Federal Law specifically regulating disposal of CCRs
- States had a wide variety of regulations, from very strict to not so strict:
  - Notice of intent to dispose of fly ash as documented in a report to the state (least rigorous)
  - Siting criteria, design criteria, such as double lined landfills, financial reporting (most rigorous)
  - Unlined landfills and ponds not uncommon and legal
  - Natural liners allowed in some states
Historical Disposal Practice 1990s through 2008

- Geomembrane liners with leachate collection systems not uncommon

- Groundwater monitoring varied widely from none to rigorous
Landfill Evolution

1988

1998

2009

2015
Landfill Evolution

MOUNTAINEER LF 4.3.88
1988

MOUNTAINEER LF 4.10.96
1996

MOUNTAINEER LF 8.24.07
2007

MOUNTAINEER LF 10.4.15
2015
“Impoundments”

- Permitted as either ponds (NPDES wastewater permit), or as landfills (Solid Waste disposal permit), or exempt (defined as “inert” or “non toxic”) with limited disposal criteria

- Containment dikes/embankments licensed under:
  - Dam Safety programs
  - NPDES waste water treatment permit
Passage of Clean Air Act amendments caused many plants to add sulfur removal technologies (flue gas desulfurization = “FGD”) adding a new waste chemistry.

- Some FGD suitable for:
  - synthetic gypsum wall board
  - agricultural soil amendments
  - remainder disposed in landfills and ponds

- Companies begin to move to dry disposal
- Some ponds taken out of service
Surface Impoundment Evolution
Surface Impoundment Evolution

1988

1997

2009

2015
RESEARCH

- Research was conducted by a number of universities (Ohio State, University of Kentucky, University of Wisconsin, etc.), Electric Power Research Institute (EPRI), Utilities Solid Waste Activities Group (USWAG), American Coal Ash Association (ACAA), and individual generation utilities.
- Much of the research focused on the characteristics of CCRs and beneficial reuse.
Historical Disposal Practice
Post December 2008 through 2015

- Disposal comes under heightened scrutiny by the public and federal government.
- USEPA begins inspection program of all surface impoundments.

- USEPA identified that there were over 310 active CCR landfills and 735 active CCR surface impoundments as of 2015.
June 2010- Proposed federal rule proposing to regulate CCRs as either hazardous waste under RCRA Subtitle C or solid waste under RCRA Subtitle D.

Utilities make plans to move away from disposal in ponds.

Coal fired plants appear to be becoming less economical and smaller plants appear to be closing.

Beneficial reuse begins to flatten because of unknown future of Bevill Amendment and public perception of the characteristics of CCRs.
Historical Disposal Practice
Post December 2008 through 2014

All CCPs Production and Use with Percent

~48% Reuse
~130 M Short Tons Produced

Source: ACAA
Extensive research has been conducted to further understand behavior of ponded CCRs to help design closures.

- Material characteristics
- Static and seismic liquefaction
- Pond closure guidance
- Construction over closed ponds
- Templates for CCR Rule Reporting
- Potential Failure Mode Analysis (PFMA) guidance

- Generation of hydrogen sulfide gas
- Shear strength and failure mechanisms
- Use of CCRs as a treatment media (acid mine coal drainage), etc.
Disposal Practices 5 to 7 years out and “beyond”

- Disposal of CCRs surface impoundments to be phased out over approx. 5 to 10 year period through ELG rule and CCR Rule
- More zero discharge ponds for sluice water
- Potential plant closures and reduction of CCR generation
- Reuse will continue to increase cutting into the need for more landfill capacity
- CCR Rule landfill technology will increase cost of landfill disposal on average
Disposal Practices 5 to 7 years out and “beyond”

- Commercial disposal historically not economical
- If the “Clean Coal” movement progresses there will be more CCR generated
- Landfill capacity will need to increase and/or reuse will increase
- Post closure care will be generally longer (30 years v. 15 years and less)
- More groundwater impacts may be detected from historic ash practices because more units will be monitored