COAL COMBUSTION ASH
Presented by Jeff Marshall, PE

SWANA Mid-Atlantic Conference
June 16, 2011
What Are We Going to Cover?

• Why is this a hot topic?
• Sources and descriptions for Coal Combustion Residuals (CCR) and Municipal Solid Waste (MSW) combustion ash
• Management: beneficial re-use and disposal alternatives
• Provide an overview of the regulatory history and current management and regulatory programs – both federal and state
• EPA’s proposed regulation – subsequent speaker
Confused?
CCR Incidents and Media Attention

- EPA Report - “Coal Combustion Waste Damage Case Assessments”
  July 9, 2007
- Sites evaluated: 85 (excludes minefills)
  - Proven damage cases: 24
    - 16 groundwater: 4 unlined LFs, 5 unlined surface impoundments, 1 liner failure, 6 sand and gravel pits
    - 8 surface water
  - Potential damage to GW and SW cases: 43
  - Not proven or potential damage cases: 18
CCR Incidents and Media Attention (cont’d)

- December 2008 failure of coal combustion residue impoundment at TVA Kingston:
  - Coal ash holding pond retention wall failure
  - ~5.4 million cy slurry released to Emory River
  - ~300 acres covered
  - 3 homes condemned; 23 homes damaged
  - >100 property owners impacted
  - Roads, rail lines and utilities damaged
  - TVA cleanup estimate: $1.1 billion w/substantial completion by 2014
  - Litigation: 60 lawsuits filed against TVA as of 11/10
CCR Incidents and Media Attention (cont’d)
ATSDR & TN DOH Risk Assessment

October 30, 2009: Draft for Public Comment, 237 pages. Some of the conclusions:

- “...it is unlikely that harm occurred to people from touching the coal ash when they had to climb out of their damaged houses...”
- “...no harm to the community’s health is expected from touching the coal ash. This includes children who might touch the ash while playing.”
- “...no harm to people’s health is expected from accidentally eating the coal ash.”
- “…using the Emory River at the site of the coal ash release (near Emory River mile 2) could result in harm to residents or trespassers from physical hazards associated with cleanup efforts.”
- “…using municipal drinking water from the Kingston and Rockwood water treatment plants will not harm people’s health because the raw and finished water has continuously met drinking water standards.”
- “…using well or spring water within four miles of the coal ash release will not harm people’s health from exposure to coal ash or metals in the coal ash because no evidence has been found of groundwater contamination with coal ash.”
- “…cannot conclude whether breathing coal ash from December 22, 2008, through December 27, 2008, harmed people’s health.”
- “…breathing ambient air near the coal ash release is not expected to harm people’s health as long as adequate dust suppression measures are in place.”
- “…radiation from the coal ash is not expected to harm people’s health.”

http://health.state.tn.us/Environmental/PDFs/pha-e-TVA-coalash-initial.pdf
CCR Incidents and Media Attention (cont’d)

- 60 Minutes segment on coal ash, October 2009
- "Out of Control: Mounting Damages from Coal Ash Waste Sites," released Feb. 24, 2010 by Earthjustice and the Environmental Integrity Project (EIP) cites at least 31 cases of coal ash waste contamination in 14 states
# CCR Impoundment Assessments

- **EPA Structural Integrity Assessments** – 5 rounds

<table>
<thead>
<tr>
<th>Category</th>
<th>First Round</th>
<th>Second Round</th>
<th>Third Round</th>
<th>Fourth Round</th>
<th>Fifth Round</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfactory</td>
<td>22</td>
<td>31</td>
<td>15</td>
<td>23</td>
<td>15</td>
<td>106</td>
<td>46.5</td>
</tr>
<tr>
<td>Fair</td>
<td>15</td>
<td>9</td>
<td>12</td>
<td>17</td>
<td>14</td>
<td>67</td>
<td>29.4</td>
</tr>
<tr>
<td>Poor</td>
<td>6</td>
<td>0</td>
<td>10</td>
<td>30</td>
<td>9</td>
<td>55</td>
<td>24.1</td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Total Number of Units</td>
<td>43</td>
<td>40</td>
<td>37</td>
<td>70</td>
<td>38</td>
<td>228</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Coal Combustion Residuals (CCRs)

- a.k.a. Coal Combustion Waste; Coal Combustion By-Products (CCBs); Coal Combustion Products (CCPs); coal ash; etc.
- Fossil Fuel Combustion Wastes – also covers petroleum and natural gas combustion
- Produced from the combustion of coal in coal-fired power plants and boilers:
  - Fly Ash
  - Bottom Ash
  - Flue Gas Desulfurization (FGD) Material
  - Boiler Slag
CCR Sources

- Approximately 495 coal-fired power plants
  - ~ 300 CCR landfills
  - ~ 584 surface impoundments
Typical Steam Generating System

Note: SCR-Selective Catalytic Reduction DeNOx System FGD-Flue Gas Desulfurization System

Fly Ash

- Fine powder, spherical similar to talcum powder
- Contains residual minerals (noncombustibles) – lots of silica, and a little carbon
- Includes cenospheres
- Removed by air pollution control systems – electrostatic precipitators and baghouses
- Specific properties vary with coal type and power plant design/operating conditions
- Cementitious or pozzolanic
- Beneficial re-uses: cement, concrete, road base, asphalt filler, flowable fill, soil amendment, structural/fill applications
Bottom Ash

- Collected from bottom of coal-fired steam furnaces
- Agglomerated ash; coarse, granular, angular, non-combustible coal residue
- Beneficial uses: Aggregate for concrete, road base, asphalt; structural filler; lightweight cement
Flue Gas Desulfurization (FGD) Materials

- Generated by SO$_2$ removal systems; primarily scrubbers
- FGD gypsum produced by calcium-based scrubbers that remove sulfur from flue gas
- Wet sludge to dry powder, depending on FGD process
- Beneficial re-uses: wallboard, agriculture, cement, concrete, flowable fill, road base
Boiler Slag

• Molten ash generated in wet bottom boilers – e.g. slag tap and cyclone boilers
• Molten ash drained from the bottom is quenched in water
• Hard, black, glassy granular material can be ground to various sizes
• Often referred to as “black beauty”
• Beneficial uses:
  • Major: grit blasting, roofing granules
  • Minor: aggregate, snow and ice traction control, asphalt filler, structural filler
• High demand
• Volume decreasing, changes in boiler technology
## Beneficial Utilization versus Production Totals (Short Tons)

<table>
<thead>
<tr>
<th>CCP Categories</th>
<th>Fly Ash**</th>
<th>Bottom Ash**</th>
<th>Boiler Slag*</th>
<th>FGD Gypsum**</th>
<th>FGD Material Wet Scrubbers*</th>
<th>FGD Material Dry Scrubbers*</th>
<th>FGD Other*</th>
<th>FBC Ash*</th>
<th>CCP Production / Utilization Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009 Total CCPs Produced by Category</td>
<td>63,000,000</td>
<td>16,600,000</td>
<td>2,176,054</td>
<td>18,000,000</td>
<td>11,700,000</td>
<td>10,522,601</td>
<td>76,238</td>
<td>12,524,796</td>
<td>134,599,739</td>
</tr>
<tr>
<td>2009 Total CCPs Used by Category</td>
<td>24,716,665</td>
<td>7,000,005</td>
<td>1,834,257</td>
<td>8,951,315</td>
<td>907,543</td>
<td>415,521</td>
<td>67,071</td>
<td>11,748,374</td>
<td>55,542,011</td>
</tr>
</tbody>
</table>

1. Concrete/Concrete Products/Grout
   - 9,796,483
   - 555,906
   - 0
   - 239,376
   - 0
   - 16,555
   - 0
2. Blended Cement/Raw Feed for Clinker
   - 2,435,904
   - 720,828
   - 0
   - 420,994
   - 0
   - 0
   - 0
3. Flowable Fill
   - 254,611
   - 113,395
   - 0
   - 0
   - 16,212
   - 192
   - 20,000
4. Structural Fill/Embarkments
   - 4,040,026
   - 2,944,354
   - 64,727
   - 413,790
   - 394,920
   - 192,397
   - 53,982
   - 145,000
5. Road Base/Sub-base
   - 199,507
   - 765,131
   - 0
   - 0
   - 0
   - 160
   - 4,443
   - 966,291
6. Soil Modification/Stabilization
   - 670,035
   - 188,504
   - 1,200
   - 0
   - 3,332
   - 0
   - 94,045
   - 957,116
7. Mineral Filler in Asphalt
   - 0
   - 0
   - 0
   - 0
   - 0
   - 0
   - 0
8. Snow and Ice Control
   - 0
   - 207,250
   - 45,725
   - 0
   - 50,302
   - 0
   - 0
9. Blasting Grit/Roofing Granules
   - 47,710
   - 76,156
   - 1,617,775
   - 0
   - 0
   - 0
   - 0
   - 1,743,621
10. Mining Applications
    - 2,148,171
    - 498,130
    - 43,511
    - 105,626
    - 462,321
    - 124,320
    - 0
    - 11,425,388
    - 14,807,415
11. Gypsum Panel Products
    - 0
    - 0
    - 0
    - 7,266,404
    - 0
    - 2,351
    - 0
    - 7,288,755
12. Waste Stabilization/Solidification
    - 3,515,289
    - 5,967
    - 0
    - 108,869
    - 0
    - 35,937
    - 13,337
    - 59,500
    - 3,738,799
13. Agriculture
    - 102,908
    - 3,606
    - 0
    - 262,386
    - 0
    - 0
    - 0
    - 368,990
14. Aggregate
    - 97,317
    - 452,066
    - 34,700
    - 0
    - 0
    - 0
    - 574,083
15. Miscellaneous/Other
    - 903,104
    - 467,192
    - 27,080
    - 3,970
    - 0
    - 21,817
    - 0
    - 1,323,172

### Summary Utilization to Production Rate

<table>
<thead>
<tr>
<th>CCP Categories</th>
<th>Fly Ash</th>
<th>Bottom Ash</th>
<th>Boiler Slag</th>
<th>FGD Gypsum</th>
<th>FGD Material Wet Scrubbers</th>
<th>FGD Material Dry Scrubbers</th>
<th>FGD Other</th>
<th>FBC Ash</th>
<th>CCP Utilization Total***</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009 Totals by CCP Type/Application</td>
<td>24,710,605</td>
<td>7,000,005</td>
<td>1,834,257</td>
<td>8,951,315</td>
<td>907,543</td>
<td>415,521</td>
<td>67,071</td>
<td>11,748,374</td>
<td>55,642,011</td>
</tr>
<tr>
<td>Category Use to Production Rate (%)**</td>
<td>39.20%</td>
<td>43.70%</td>
<td>84.20%</td>
<td>50.30%</td>
<td>7.70%</td>
<td>3.90%</td>
<td>88.70%</td>
<td>53.80%</td>
<td>41.30%</td>
</tr>
</tbody>
</table>

** Supplemented: In 2005, the industry established a goal of 50% utilization for CCPs by the year 2011, not including mine reclamation. This year's utilization rate without mine reclamation is 30.5%**

2009 Cenospheres Sold (Pounds) | 9,120,702
<table>
<thead>
<tr>
<th>CCP Production</th>
<th>Fly Ash</th>
<th>Bottom Ash</th>
<th>Boiler Slag</th>
<th>FBC-Ash</th>
<th>Other (1)</th>
<th>SDA-Product</th>
<th>FGD-Gypsum</th>
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</thead>
<tbody>
<tr>
<td>Subtotal 1 - 5</td>
<td>37,476</td>
<td>4,850</td>
<td>1,356</td>
<td>1,025</td>
<td>121</td>
<td>343</td>
<td>11,249</td>
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<tr>
<td>Subtotal 6 - 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total 1 - 7</td>
<td>44,828</td>
<td></td>
<td></td>
<td></td>
<td>11,592</td>
<td></td>
<td>56,420</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>CCP Utilisation</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement raw material</td>
<td>4,174</td>
<td>7.3</td>
</tr>
<tr>
<td>Blended cement</td>
<td>2,529</td>
<td>4.4</td>
</tr>
<tr>
<td>Concrete addition</td>
<td>5,955</td>
<td>10.4</td>
</tr>
<tr>
<td>Aerated concrete blocks</td>
<td>672</td>
<td>1.2</td>
</tr>
<tr>
<td>Non-aerated concrete blocks</td>
<td>1,246</td>
<td>2.2</td>
</tr>
<tr>
<td>Lightweight aggregate</td>
<td>169</td>
<td>0.3</td>
</tr>
<tr>
<td>Bricks + ceramics</td>
<td>428</td>
<td>0.7</td>
</tr>
<tr>
<td>Grouting</td>
<td>428</td>
<td>0.7</td>
</tr>
<tr>
<td>Asphalt filler</td>
<td>95</td>
<td>0.2</td>
</tr>
<tr>
<td>Subgrade stabilisation</td>
<td>299</td>
<td>0.5</td>
</tr>
<tr>
<td>Pavement base course</td>
<td>537</td>
<td>0.9</td>
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<tr>
<td>General engineering fill</td>
<td>2,163</td>
<td>3.8</td>
</tr>
<tr>
<td>Structural fill</td>
<td>2,175</td>
<td>3.8</td>
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<tr>
<td>Soil amendment</td>
<td>47</td>
<td>0.1</td>
</tr>
<tr>
<td>Infill</td>
<td>510</td>
<td>0.9</td>
</tr>
<tr>
<td>Blasting grit</td>
<td>603</td>
<td>1.1</td>
</tr>
<tr>
<td>Plant nutrition</td>
<td>8</td>
<td>0.0</td>
</tr>
<tr>
<td>Set retarder for cement</td>
<td>638</td>
<td>1.1</td>
</tr>
<tr>
<td>Projection plaster</td>
<td>817</td>
<td>1.4</td>
</tr>
<tr>
<td>Plaster boards</td>
<td>5,577</td>
<td>9.8</td>
</tr>
<tr>
<td>Gypsum blocks</td>
<td>303</td>
<td>0.5</td>
</tr>
<tr>
<td>Self levelling floor screeds</td>
<td>1,533</td>
<td>2.7</td>
</tr>
<tr>
<td>Other uses</td>
<td>385</td>
<td>0.7</td>
</tr>
<tr>
<td>Reclamation, Restoration</td>
<td>20,852</td>
<td>36.5</td>
</tr>
<tr>
<td>Temporary stockpile</td>
<td>1,366</td>
<td>2.4</td>
</tr>
<tr>
<td>Disposal</td>
<td>4,071</td>
<td>7.1</td>
</tr>
<tr>
<td>Total utilisation 1 - 23</td>
<td>30,858</td>
<td>54.0</td>
</tr>
<tr>
<td>Utilisation rate in %</td>
<td>77</td>
<td>1.4</td>
</tr>
<tr>
<td>Average utilisation rate in %</td>
<td>54</td>
<td>0.9</td>
</tr>
<tr>
<td>Total utilisation 1 - 24</td>
<td>51,710</td>
<td>90.5</td>
</tr>
<tr>
<td>Utilisation rate in %</td>
<td>87</td>
<td>1.5</td>
</tr>
<tr>
<td>Average utilisation rate in %</td>
<td>96</td>
<td>1.7</td>
</tr>
<tr>
<td>Reuse of stockpiled CCPs</td>
<td>727</td>
<td>1.3</td>
</tr>
<tr>
<td>Total production 1-26 incl. reuse</td>
<td>57,147</td>
<td>100.0</td>
</tr>
</tbody>
</table>

(1) cenospheres, sludges, fly ash and slag from coal gasification.
Coal Combustion Products Partnership

• Initiated in 2003
• Goal: to promote the **beneficial use** of CCPs and the environmental benefits that result from their use. ([www.epa.gov/osw/partnerships/c2p2/index.htm](http://www.epa.gov/osw/partnerships/c2p2/index.htm))
• Participants: EPA, American Coal Ash Association (ACAA), Utility Solid Waste Activities Group (USWAG), Department of Energy, Federal Highway Administration, the Electric Power Research Institute (EPRI), and the United States Department of Agriculture - Agricultural Research Service
“EPA has suspended active participation in the Coal Combustion Products Partnership program while we are taking and assessing comment on the beneficial use of coal combustion residuals (CCR) through the CCR proposed rulemaking. While the Agency continues to support safe and protective beneficial reuse of coal combustion residues, the C2P2 program webpages have been removed while the program is being re-evaluated.”
While included in the ACAA survey in the category of beneficial use, the EPA does not count mining applications as beneficial use toward its goal of achieving an overall 45% beneficial use rate.
The **GREEN** Benefits?

• Reduce waste to landfills
• Reduce energy production + costs
• Each ton of fly ash that replaces cement in the production of concrete reduces greenhouse gases emissions by a little less than a ton of CO$_2$ equivalents
• In 2008, the total use of fly ash in concrete reduced greenhouse gas emissions by about 11.4 million tons of CO$_2$ equivalents
CCR Re-use Projects

Great Belt East Bridge, Denmark

Puylaurant Dam, France

Road Base, United States

Fly Ash Storage Silos, Power Plant, Belgium
Current CCR Storage and Disposal

- Wet ash processing and dewatering ponds (aka surface impoundments)
- Dry ash storage and landfills
- Lined and unlined coal ash landfills
Federal Regulation

• Congress introduced proposal to regulate as hazardous waste in 1980
• EPA regulatory determinations in 1993 (58 FR 42466; August 9, 1993) and 2000 (65 FR 32214, May 22, 2000)
• EPA ultimately decided to classify as non-hazardous solid waste
• As part of the 2000 assessment; EPA drafted (but did not formally issue) a set of regulations that included a “contingent” HW listing for select fossil fuel combustion wastes, depending upon how such wastes are generated, managed, disposed, or beneficially re-used. Approach similar to that proposed for cement kiln dust. Neither contingent HW proposal was finalized.
• EPA’s hazardous waste exclusions appears in the Subtitle C (haz waste) regulations for the Identification and Listing of Hazardous Waste, Exclusions: “Solid wastes which are not hazardous wastes. The following solid wastes are not hazardous wastes: ....(4) Fly ash waste, bottom ash waste, slag waste, and flue gas emission control waste, generated primarily from the combustion of coal or other fossil fuels, …” (Reference 40 CFR §261.4(b)(4).
• CCPs can also be exempt from solid waste via beneficial use exemptions
• No detailed set of Subtitle D regulations for CCPs (as there are for MSW)
State Regulations

• While EPA provides the hazardous waste exclusion, EPA has *not* developed regulations for CCB management and disposal.

• EPA Subtitle D authority may be limited to MSW, and CCB regulation is left to the states under Subtitle D.

• **State programs vary!**
<table>
<thead>
<tr>
<th><strong>Maryland CCR 2009</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Generation (tons)</strong></td>
</tr>
<tr>
<td>- Fly Ash</td>
</tr>
<tr>
<td>- Bottom Ash</td>
</tr>
<tr>
<td>- Boiler Slag</td>
</tr>
<tr>
<td>- Total</td>
</tr>
<tr>
<td><strong>Disposition (tons)</strong></td>
</tr>
<tr>
<td>- MD Disposal</td>
</tr>
<tr>
<td>- Coal Mine Reclamation</td>
</tr>
<tr>
<td>- Beneficial Use</td>
</tr>
<tr>
<td>- Transported Out of State</td>
</tr>
</tbody>
</table>
Maryland CCB Regulations

- COMAR 26.04.10: Management of Coal Combustion Byproducts
- Effective date: 12/1/2008
- New disposal facilities must meet the same standards required for industrial solid waste landfills - permitting, leachate collection, groundwater monitoring, liners, and closure requirements.
- Annual reporting
Maryland Existing CCB Facilities

**Existing** facilities, as of 12/1/2008:
1. Must notify MDE in writing
2. May continue to operate under MDE’s existing authorization, except that the MDE reserves the right to modify an existing authorization to require additional controls or requirements as it considers necessary to protect public health and the environment or to prevent nuisance conditions. For example, this could include a requirement that the proposed expansion obtain an industrial waste landfill permit for the expansion.
Maryland CCB Transportation Regulations

• COMAR 26.04.10.03 - Regulations for the “beneficial use and transportation of CCBs” proposed 2/26/2010; effective date 10/8/2010

• Summary: Enhanced procedures to control fugitive dust and other CCB losses associated with loading, transportation, unloading

• Covers, external inspections and dust removal, wetting, documentation, etc.
Utilization Of Coal Combustion Byproducts In Noncoal Surface Mine Reclamation

• COMAR 26.21.04: Standards similar to industrial solid waste landfills – liners, leachate collection, groundwater monitoring, dust control, post-closure monitoring & maintenance, financial assurance

• Permitting through Mine Reclamation Plan, not landfill permit
MD CCB Beneficial Use Regulation

• COMAR 26.04.11: Proposed 2/26/2010
• Approved beneficial uses of solidified CCBs: cement, concrete, asphalt, gypsum board, plastic products, roofing materials
• Approved beneficial uses of unconsolidated CCBs - bottom ash only: aggregate, pipe bedding, traction control aid
• MDE documentation and user notification requirements
• MDE monitoring and analytical reporting requirements
• Comments currently under review
CCR Info Sources

• EPA C2P2: www.epa.gov/epawaste/partnerships/c2p2/index.htm
• American Coal Ash Association: www.acaa-usa.org/
• European Coal Combustion Products Association: www.ecoba.com/
• World Wide Coal Combustion Products Network: www.wwccpn.org/
• Electric Power Research Institute (EPRI): www.epri.com
• University of North Dakota, Coal Ash Research Center: www.undeerc.org/carrc/
• University of Kentucky, Ash Education Site: www.caer.uky.edu/kyasheducation/index.html
MSW Waste-to-Energy

• ~40 Plants nationwide
• Incinerate ~13% of the MSW stream
• MSW incineration reductions:
  – Mass: ~75%
  – Volume: ~90%
• Two ash streams – bottom and fly – generally combined
• Bottom ash > fly ash
MSW Waste-to-Energy

Source: http://www.recycledmaterials.org/tools/uguidelines/mswca1.asp
MSW Ash

• EPA’s hazardous waste exclusion for CCBs does NOT apply
• MSW ash is not a listed hazardous waste
• Generator is responsible for waste characterization:
  – Periodic sampling and analysis, and/or
  – Generator knowledge
• Periodic sampling and TCLP analysis recommended to evaluate Toxicity Characteristic
• TCLP failures are rare
MSW Ash Disposition

- Ferrous metals recovered + recycled
- Monofills
- Co-mingled with MSW
- LF daily cover
- Beneficial re-uses include road base; very small fraction
- Re-use challenge: physical and chemical properties more variable than coal ash
Maryland MSW Incinerator Ash in 2007

- Total Generation 258,097
- Daily Cover at 2 MSW LFs 247,734
- Disposal 10,363

units = tons
2009 Nationwide Generation

- CCPs
  - Re-used 55.6
  - Disposal 79.1
  - Total CCP 134.7
- Total MSW 243.0
- Total Hazardous Waste 38.6
  - Landfill/Surface Impound Disposal 2.0

units = million tons
EPA’s Proposed CCR Rule

• Proposed June 21, 2010 – two approaches
  – Subtitle C
  – Subtitle D

• Engineering requirements (e.g., liners, groundwater monitoring) of the two options are similar; differences are primarily in enforcement and implementation

• Bevill exemption from regulation remains in place for beneficial uses of CCRs

• Minefilling is not covered by the proposal
Subtitle C Option

- Listed as a “special waste subject to subtitle C” – S001
- Subject to existing Subtitle C requirements, e.g., generator, transporter, permitting, ground water monitoring, corrective action, and financial assurance. LDRs and treatment standards apply
  - Single composite liner
  - 5 years for surface impoundments to comply with requirements; no requirement for annual dredging
  - Structural Stability Requirements
  - **Existing landfills** must install groundwater monitoring within 1 year of effective date of rule, but do not need to install composite liners
  - **New landfills** or lateral expansions of existing landfills must install composite liners and groundwater monitoring before landfill begins operation
  - **Surface impoundments** must meet LDRs and liner requirements within 5 years of effective date of rule or close within an additional 2 years; LDR requirements have the practical effect of phasing out surface impoundments
Subtitle D Option

• CCRs would remain classified as a “non-hazardous” waste.

• National minimum criteria governing facilities disposing of CCRs.

• Many of the engineering requirements are very similar to the Subtitle C option, e.g., groundwater monitoring, liner and structural stability requirements.

• Requirements are self implementing.

• Owner/operator required to:
  – obtain certifications by independent professional engineers/minimum qualification requirements for those who make certifications.
  – document how various standards are met. Must be kept in the operating record and the State notified.
  – maintain a web site available to the public that contains the documentation that the standard is met.
<table>
<thead>
<tr>
<th><strong>Key Differences Between Subtitle C and Subtitle D Options</strong></th>
<th><strong>SUBTITLE C</strong></th>
<th><strong>SUBTITLE D</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Effective Date</strong></td>
<td>Timing will vary from state to state, as each state must adopt the rule individually—can take 1 – 2 years or more</td>
<td>Six months after final rule is promulgated for most provision: certain provisions have a longer effective date</td>
</tr>
<tr>
<td><strong>Enforcement</strong></td>
<td>State and Federal enforcement</td>
<td>Enforcement through citizen suits; States can act as citizens.</td>
</tr>
<tr>
<td><strong>Corrective Action</strong></td>
<td>Monitored by authorized States and EPA</td>
<td>Self-implementing</td>
</tr>
<tr>
<td><strong>Financial Assurance</strong></td>
<td>Yes</td>
<td>Considering subsequent rule using CERCLA 108 (b) Authority</td>
</tr>
<tr>
<td><strong>Permit Issuance</strong></td>
<td>Federal requirement for permit issuance by States</td>
<td>No</td>
</tr>
<tr>
<td><strong>Requirements for Storage, Including Containers, Tanks, and Containment Buildings</strong></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Surface Impoundments Built Before Rule is Finalized</strong></td>
<td>Remove solids and meet land disposal restrictions; retrofit with a liner within five years of effective date. Would effectively phase out use of existing surface impoundments.</td>
<td>Must remove solids and retrofit with a composite liner or cease receiving CCRs within 5 years of effective date and close the unit</td>
</tr>
<tr>
<td><strong>Surface Impoundments Built After Rule is Finalized</strong></td>
<td>Must meet Land Disposal Restrictions and liner requirements. Would effectively phase out use of new surface impoundments.</td>
<td>Must install composite liners. No Land Disposal Restrictions</td>
</tr>
<tr>
<td><strong>Landfills Built Before Rule is Finalized</strong></td>
<td>No liner requirements, but require groundwater monitoring</td>
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</tr>
<tr>
<td><strong>Landfills Built After Rule is Finalized</strong></td>
<td>Liner requirements and groundwater monitoring</td>
<td>Liner requirements and groundwater monitoring</td>
</tr>
<tr>
<td><strong>Requirements for Closure and Post-Closure Care</strong></td>
<td>Yes; monitored by States and EPA</td>
<td>Yes; self-implementing</td>
</tr>
</tbody>
</table>
Thanks!

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