Coal Combustions Products

Coal Ash : CCW, CCB, CCP, CCR
– Fly Ash, Bottom Ash, Slag, FGD & Gypsum
– High Volume Co-Product Stream
– 2010 : 130MM tons generated
– 2010 : 55 MM tons utilized - 42%
– 2010 : 11.7 MM tons replaced cement
Coal Ash Regulation - History

• 1976 – RCRA – Response to Love Canal
• 1980 - Bevill Amendment to RCRA – Exempted CCBs
  – EPA to "conduct a detailed and comprehensive study and submit a report" to Congress on the "adverse effects on human health and the environment, if any, of the disposal and utilization" of coal combustion products
• 1988 and 1999 EPA Reports to Congress
  – Recommended CCPs should not be regulated as hazardous waste
• 1993 EPA Regulatory Determination
  – Found regulation as a hazardous waste “unwarranted”
• 2000 EPA Final Regulatory Determination
  – Concluded CCPs “do not warrant regulation [as hazardous waste]” and that “the regulatory infrastructure is generally in place at the state level to ensure adequate management of these wastes”
Coal Ash Regulation - History

• 2008 – December – TVA Failure Releases CCR
  – EPA States that it will regulate coal ash to prevent similar accidents
• 2010-June 21 – EPA CCR Proposed Rules
  – Regulate disposal as either “C” or “D”
  – Landfill protective features are essentially the same
  – 450K+ comments filed - Utilization industry focus on “Stigma”
  – Economic Justification-Flawed Assumption – “C” drives recycling
• Activist Groups & Industry - Lawsuit to force deadline on EPA
  – Likely to be heard in early 2013
• HR 4348 Transportation Bill - CCP Rider
  – Mandate state control as non-hazardous
Coal Ash Co-Products Industry

• Production – 130+ MM TPY
• Utilized – 55+MM TPY - 42.5% - Value Driven
  – Ready Mixed Concrete
  – Wallboard
  – Roofing Shingles
  – Carpet Backing
  – Lightweight Plastics
  – Lightweight Aggregates
  – Agriculture Sulfur Source
  – Oil & Gas Drilling

• Utilizing ash avoids raw material extraction
• Ash applications reduces CO2 emissions
CCP Production & Utilization

CCP Production and Utilization Chart

- CCP Production
- CCP Utilization
- CCPs Utilized in Concrete
- CCP Utilization %

2002 - 2010

Utilization %

Tons

Charah®
## CCP Concrete Summary

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
<th>Utilization</th>
<th>% Utilization</th>
<th>CCPs Concrete</th>
<th>% in Concrete</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>128,703,572</td>
<td>45,523,256</td>
<td>35.4%</td>
<td>13,090,433</td>
<td>29%</td>
</tr>
<tr>
<td>2003</td>
<td>121,744,571</td>
<td>46,384,405</td>
<td>38.1%</td>
<td>12,679,134</td>
<td>27%</td>
</tr>
<tr>
<td>2004</td>
<td>122,465,119</td>
<td>49,089,818</td>
<td>40.1%</td>
<td>15,239,721</td>
<td>31%</td>
</tr>
<tr>
<td>2005</td>
<td>123,126,093</td>
<td>49,612,541</td>
<td>40.3%</td>
<td>16,353,334</td>
<td>33%</td>
</tr>
<tr>
<td>2006</td>
<td>124,795,124</td>
<td>54,203,170</td>
<td>43.4%</td>
<td>17,194,883</td>
<td>32%</td>
</tr>
<tr>
<td>2007</td>
<td>126,307,998</td>
<td>51,219,310</td>
<td>40.6%</td>
<td>14,515,690</td>
<td>28%</td>
</tr>
<tr>
<td>2008</td>
<td>136,073,107</td>
<td>60,593,660</td>
<td>44.5%</td>
<td>14,015,616</td>
<td>23%</td>
</tr>
<tr>
<td>2009</td>
<td>125,482,586</td>
<td>55,642,011</td>
<td>44.3%</td>
<td>10,610,410</td>
<td>19%</td>
</tr>
<tr>
<td>2010</td>
<td>130,181,364</td>
<td>55,337,426</td>
<td>42.5%</td>
<td>11,669,321</td>
<td>21%</td>
</tr>
</tbody>
</table>

Data retrieved from ACAA: American Coal Ash Association
Cement Shipments

US Total Cement Shipments

Data retrieved from USGS: United States Geological Survey
Economic Impacts

- CCP Resource value - $6-$11B/yr
- CCPs – 3% of new home construction costs - $\frac{1}{2}$$ of replaced products
- Cement-$80-$100/t
- Fly Ash- $20-$40/t
- Life-cycle costs decrease w/ fly ash

- Fuel value recycled – IGCC
- Fly Ash replaces cement
- Lightweight Aggregates
- Gypsum used in wallboard – 45% of US wallboard production
Bottom Ash Lightweight Aggregates

Bottom Ash LWA
• Processed to replace LWA
• Typical Block -35 – 38 lb
• Bottom Ash LWA Block – 28-32 lb
• Product priced in $15-$30/t
• Replaced product - $30-$50/t
• Avoids Mine Operation
• Avoids Kiln Operation
• Avoids Disposal
Agriculture Products

SO$_2$ Reduction - S reduced
FGD Gypsum - Nutrients
Health Risks Assessment

• Health Risk-Based Evaluation of USGS Coal Ash Data
  – Study assumed house built on top of ash landfill and all exposure is to ash instead of dirt
  – Results indicate that with few exceptions, constituent concentrations in coal ash are below levels for residential soils and similar to US background soils
  – Coal ash qualify as a “hazardous substance” and would not be classified as hazardous on a human health risk basis
  – Exposure to coal ash in beneficial use applications will be much lower than a residential scenario
  – CCP uses do not pose direct contact risk to human health

Summary

- Coal Ash is a valuable resource
- Coal ash is non-hazardous – EPA
- Health Risks do not warrant “Toxic Label” nor RCRA “C” classification
- “C” label will not improve landfill design protection features but will harm Co-Products industry
- States can & should maintain regulatory control over coal ash
- Regulate disposal under “D” w/Federal guidelines
- Utilization of CCPs is the best economic and regulatory policy approach
Reference & Contact Info

• American Coal Ash Association
• Utility Solid Waste Activities Group
  – http://www.uswag.org/ccbc.htm
• Veritas Jobs Impact Study
• ARTBA Roads & Bridges Impact Study
• EPRI Technical Reports
  – www.epri.com
    • Comparison of Coal Combustion Products to Other Common Materials – Chemical Characteristics. Technical Report 1020556
    • Comparison of Risks for Leachate from Coal Combustion Product Landfills and Impoundments with Risks for Leachate from Subtitle D Municipal Solid Waste Landfill Facilities. Technical Report 1020555
• Citizens for Recycling First - http://www.recyclingfirst.org/

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