Report on the Status of Assessment, Corrective Action, Prioritization, and Closure for each Coal Combustion Residuals Surface Impoundment as Required by the Coal Ash Management Act
Overview

• Ongoing dry ash excavation operations
• Beneficial use of coal ash rulemaking
• Groundwater Comprehensive Site Assessments & Corrective Action Plans
• Survey of private & public water supply wells
• Decanting/Dewatering, Seeps, & Permitting
• Enforcement Activities
• Prioritization

Department of Environmental Quality
Ongoing Dry Ash Excavation

• Excavation commenced at Riverbend on May 21, 2015
  • Approximately 8 months after enactment of CAMA
• Excavation ongoing at:
  • Riverbend
  • Dan River
  • Sutton
  • Asheville
  • Roger’s (Cliffside)
# Dry Ash Excavation through 12-31-15

<table>
<thead>
<tr>
<th>Site</th>
<th>Storage Location</th>
<th>Transport Mode</th>
<th>Tons Stored</th>
</tr>
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<tbody>
<tr>
<td>Asheville*</td>
<td>Asheville Regional Airport</td>
<td>Truck</td>
<td>4,100,000</td>
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<tr>
<td></td>
<td>R&amp;B Landfill, GA</td>
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<td>38,240</td>
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<td>Cliffside</td>
<td>On-site landfill</td>
<td>Truck</td>
<td>76,766</td>
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<tr>
<td>Dan River</td>
<td>Maplewood Landfill, VA</td>
<td>Rail</td>
<td>53,257</td>
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<tr>
<td>Riverbend</td>
<td>R&amp;B Landfill, GA</td>
<td>Truck</td>
<td>15,762</td>
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<td></td>
<td>Marshall on-site landfills</td>
<td>Truck</td>
<td>78,026</td>
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<tr>
<td></td>
<td>Brickhaven Structural Fill</td>
<td>Truck</td>
<td>5,008</td>
</tr>
<tr>
<td>Sutton</td>
<td>Brickhaven Structural Fill</td>
<td>Truck</td>
<td>5,430</td>
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<tr>
<td><strong>Total Progress to Date</strong></td>
<td></td>
<td></td>
<td>4,372,489</td>
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<td><strong>N.C. 2015 Progress</strong></td>
<td></td>
<td></td>
<td>626,489</td>
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</table>

*Asheville storage at Asheville Regional Airport began in 2007*
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Beneficial Use of CCP Rule

- Rules currently being drafted to be consistent with CAMA
  - Meetings/coordination with NC DOT & UNC Charlotte
- Expected to go to EMC in July 2016
- Will consolidate existing DWM and DWR beneficial use/reuse rules
- CAMA regulates structural fills > 8,000 tons/year or 80,000 tons/project
  - EPA CCR Rule requires reporting for fills > 12,400 tons
Differences Between CAMA Rule & EPA CCR Rule

• EPA CCR Rule threshold >12,400 tons
  • Require reporting and environmental demonstrations

• CAMA Rule Thresholds
  • Small structural fill: < 8,000 tons/acre or 80,000 tons/project – Deemed permitted
  • Large structural fill: > 8,000 tons/acre or 80,000 tons/project: Require liners, caps, leachate control, groundwater monitoring, & financial assurance

• Rule development will consider if any additional requirements for small structural fill to ensure that federal CCR regulations are met
Brickhaven & Colon Mines

- Brickhaven (Chatham) & Colon (Lee) are permitted to receive ash for mine reclamation purposes
- Brickhaven is already receiving trucked ash
- Railroad operations to begin shortly
Comprehensive Site Assessments (CSAs) & Corrective Action Plans (CAPs)

• CSAs & CAPs submitted by Duke
  • Each report containing over 1000 pages of information

• Duke conducted largest investigation of its type
  • Conducted within 6 months
  • 870 wells drilled by 44 drill rigs (some from as far as California)
  • Over 11 miles of wells drilled (60,405 linear feet)
  • Over 7000 samples taken with over 50,000 analyses run on samples
  • 120 technicians employed to retrieve samples
Comprehensive Site Assessments (CSAs) & Corrective Action Plans (CAPs)

- Deficiencies in CSAs & CAPs
  - Horizontal & vertical extent of contamination
  - Establishment of background levels for constituents
  - Critical impact on prioritization
- Duke still submitting additional information as it becomes available
- DEQ unable to determine with current data if some Duke coal ash ponds are impacting private and public water wells
  - Known impacts in some cases: Sutton, Asheville
Survey of Private & Public Water Supply Wells

- Generally conducted out to 1500 feet
- 476 wells sampled
- 424 well owners advised not to drink water by DHHS
  - Approximately 89% of wells sampled
- Primarily exceedances of Hexavalent Chromium (Cr(VI)) & Vanadium levels
  - 369 of 424 “do not drink” notices due to Vanadium and/or Cr(VI): 87%
- Only 12 wells exceeded federal Safe Drinking Water Act levels
  - Used for regulation of municipal water supplies
  - 7 for lead / 5 for arsenic: Lead exceedances normally due to poor well construction; arsenic could be naturally occurring
Hexavalent Chromium (Cr(VI)) & Vanadium in NC

- Both can be naturally occurring in groundwater in North Carolina
- DHHS uses levels of .07 parts per billion (ppb) for Cr(VI) & 0.3 ppb for Vanadium for do not drink notification
- By comparison, the lowest groundwater standard in the United States for Cr(VI) in the US is 10 ppb shared by CA & NC
- Only 8 states in the US have groundwater standards for Vanadium
- Like DHHS, other States recognize that some risk still exists in levels lower than the standards
Vanadium in Groundwater

Inflection Point $V$ (ppb)

- Blue: 0.062
- Cyan: 0.125
- Green: 0.250
- Yellow: 0.50
- Red: 1

Grid Cell Interpolated Thematic
Grid Cell = 1.5 miles

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### Cr(VI) & Vanadium Criteria in the Southeast

<table>
<thead>
<tr>
<th>State</th>
<th>Cr(VI)</th>
<th>Vanadium</th>
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<tbody>
<tr>
<td>Alabama</td>
<td>11</td>
<td>3.6 ppb</td>
</tr>
<tr>
<td>Florida</td>
<td>NA (Total Chrome – 100 ppb)</td>
<td>49 ppb</td>
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<tr>
<td>Georgia</td>
<td>NA (Total Chrome – 100 ppb)</td>
<td>NA</td>
</tr>
<tr>
<td>Kentucky</td>
<td>NA (Total Chrome – 100 ppb)</td>
<td>NA</td>
</tr>
<tr>
<td>Mississippi</td>
<td>Narrative Standard</td>
<td>Narrative Standard</td>
</tr>
<tr>
<td>North Carolina</td>
<td>NA (Total Chrome – 10 ppb)</td>
<td>0.3 ppb</td>
</tr>
<tr>
<td></td>
<td>DHHS- .07 ppb</td>
<td></td>
</tr>
<tr>
<td>South Carolina</td>
<td>NA (Total Chrome – 100 ppb)</td>
<td>NA</td>
</tr>
<tr>
<td>Tennessee</td>
<td>Narrative Standard</td>
<td>Narrative Standard</td>
</tr>
<tr>
<td>Virginia</td>
<td>NA (Total Chrome – 100 ppb)</td>
<td>86 ppb</td>
</tr>
<tr>
<td>West Virginia</td>
<td>NA (Total Chrome – 100 ppb)</td>
<td>NA</td>
</tr>
</tbody>
</table>
Cr(VI) & Vanadium Regulation in Municipal Drinking Water Supplies

- Municipal drinking water regulated by federal Safe Drinking Water Act (SDWA)
- SDWA has standard of 100 ppb for Total Chromium in drinking water
- No standard for Vanadium in SDWA
- **Over 70%** of public water systems in the United States that have sampled for Cr(VI) and Vanadium have identified Cr(VI) or Vanadium in their finished water that exceeds DHHS screening levels.
- Includes major metropolitan areas:
  - Los Angeles, Denver, Washington D.C., Detroit, Las Vegas, Cleveland, Atlanta, Chicago,
  - Charlotte, Raleigh, Winston Salem, Greensboro, Asheville, Wilmington

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Decanting / Dewatering
Basic Seep Diagram (Non-Engineered)

Emerging Water is termed “seepage”
Engineered Seep (Toe Drain)

Internal Drain System

- An aggregate encased perforated collector pipe system
- With solid pipe outfall
- Often referred to as a “toe drain”
Decanting of NC Coal Ash Ponds

• Decanting is a critical activity for pond clean up because it:
  • Reduces the spread of groundwater contamination
  • Reduces and/or eliminates seeps
  • Reduces pressure of the pond dams
  • Reduces the potential for impoundment failures
Timeline for Decanting in NC

- August 28, 2014: DEQ originally authorized decanting to begin under existing NPDES Wastewater Permits
  - DEQ performed comprehensive analysis to prove that decanting would not impact water quality and/or the environment
  - Discharge would be much less than what is authorized in existing permit
- Sept 10, 2014: EPA ordered a halt to decanting in NC
- EPA allowed South Carolina to decant under expired NPDES Permits
- Dec 14, 2015: EPA finally authorized NC to resume decanting under existing NPDES Wastewater Permits
- EPA needed 15 months to determine it was permissible to allow NC to proceed with decanting as DEQ originally proposed in August 2014
- 15 additional months of unnecessary impacts to NC’s environment
Dewatering, Seeps, & Permitting

- Complete dewatering (as opposed to decanting) of ponds requires modification of NPDES Permits
- Dewatering necessary for wet ash excavation
- Permit modification must also address engineered and non-engineered seeps
- EPA still unsure how to address seeps in NPDES Permits
  - Concern that some seeps may be classified as “Waters of the US”
  - Nationwide problem: Approximately 894 impoundments in US
- DEQ submitted first draft of Riverbend permit to EPA in July 2014, in compliance with EPA’s Hanlon policy
  - Submitted numerous revisions in response to EPA comments
- EPA appears to be walking back their written policy and still has not approved language for final permit
  - NPDES Permits on hold for 13 of 14 Duke facilities / No dewatering

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Enforcement Activities

• Duke settled criminal case with US DOJ for $103,000,000
• DEQ began enforcement activities for groundwater violations in NC
• Issued Notices of Violation (NOVs) for groundwater exceedances at the Sutton & Asheville facilities
  • Facilities known to be impacting off-site groundwater
• DEQ issued a Civil Penalty Assessment for Sutton of $25,100,000
• Duke contested this penalty in OAH
Sutton Settlement

- DEQ forced to settle Sutton NOV
- 2011 Memo enacted by previous DENR administration
- Duke was allowed to review & comment on draft
- Contextual e-mails made it clear that the intent of memo was to absolve Duke from NOVs & civil penalties associated with groundwater contamination as long as Duke agreed to eventually remediate problem
- AG’s Office advised that DEQ had no choice but to settle
- DEQ settled Sutton NOV for $7M & accelerated remediation at 4 Duke coal ash facilities
Other Ongoing Enforcement Activities

• DEQ still participating with EPA in joint enforcement action for surface water quality violations
• Includes Dan River spill & other unauthorized discharges to surface waters
• EPA does not appear to share DEQ’s urgency in pursuing these actions
• Approaching two year anniversary of Dan River spill
• Fully expect Duke to litigate which will drive massive litigation costs
Proposed Prioritization of Impoundments

- DEQ issued proposed prioritization of coal ash impoundments on 12/31/15
- Proposals based on scientific data available at that point
- Prioritizations determine timeframe for closure, not method of closure
- Proposals included a range for some impoundments
  - Lack of groundwater data to determine impact of ponds on wells
- Proposals subject to refinement based upon new data / public comment
  - Still receiving additional groundwater data
- Detailed written declaration due Jan 30, 2016
  - May contain changes from Dec 31 proposals
CAMA Criteria for Prioritization Recommendations

- Specified in G.S. 130A-309.211
- Hazards to public health, safety, or welfare
- Structural condition and hazard potential
- Proximity to surface waters/surface water contamination
- Horizontal & vertical extent of groundwater contamination
- Location of receptors & exposure pathways
- Geological and hydrogeological features affecting contaminant movement
- Amount and characteristics of residuals in impoundment
- Whether impoundment is located within 100-year floodplain
- Any other factors the Department deems relevant
Prioritization Criteria

• DEQ’s Prioritization task force incorporated CAMA criteria and additional risk factors into three categories:
  • **Structural Integrity**
    • Structural integrity of dams, risers, and decant structure
  • **Impact to Surface Water**
    • Location relative to 100-year floodplain
    • Location relative to and impact on nearby surface waters
    • Like EPA, DEQ recognizes that most surface water issues should be covered under NPDES permitting
  • **Impact to Groundwater**
    • Horizontal & vertical extent of groundwater contamination
    • Potential threat to nearby water supply wells
Prioritization Process

• Science, data-driven process based upon:
  • DEQ internal data
  • Onsite inspections
  • Data & scientific analysis provided by Duke under CAMA
• DEQ prioritization task force began its analysis in the summer of 2015
  • Multiple revisions as data is received, reviewed, and analyzed
• Scientific analysis is continuing at this time
• Rankings for each of 3 categories combined into overall, proposed ranking
• All 33 impoundments individually ranked
DRAFT Proposed Prioritizations: High & Intermediate

- All impoundments at 4 facilities legislatively mandated as “high”
  - Asheville (2 basins)
  - Dan River (2 basins)
  - Riverbend (2 basins)
  - Sutton (2 basins)

- All impoundments at 3 facilities ranked as “intermediate” due exclusively to floodplain related issues:
  - Cape Fear (5 basins)
  - H F Lee (5 basins)
  - Weatherspoon (1 basin)

- 1 impoundment at Roxboro ranked as “intermediate”
DRAFT Proposed Prioritizations: Low to Intermediate

• Lack of definitive data regarding the extent of groundwater contamination

• 9 basins were assigned a proposed range of “low to intermediate”
  • Marshall (1 basin)
  • Roxboro (1 basin)
  • Allen (2 basins)
  • Belews Creek (1 basin)
  • Buck (3 basins)
  • Cliffside (1 basin)

• Final rankings assigned as definitive groundwater data is available
**DRAFT Proposed Prioritizations: Low**

- Roxboro (1 basin)
- Cliffside (2 basins)
- Mayo (1 basin)

“Low” prioritization is not a determination regarding closure method
  - Impoundments with a final ranking of low could be closed by either excavation, “cap-in-place,” or some other method.
Roxboro Steam Electric Plant

Modeled boron concentrations (ug/L) in the transition zone

2015 Current

2045 No Action  2045 Cap-In-Place  2045 Excavate

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DRAFT Proposed Prioritizations Totals

- High: 8 basins at 4 facilities
- Intermediate: 12 basins at 4 facilities
- Low to Intermediate: 9 basins at 6 facilities
- Low: 4 basins at 3 facilities
**Next Steps**

- Detailed written declaration on proposed prioritizations due January 30
  - Will contain complete description of methodology used for proposed rankings
- Public Input and Comment on Proposed Prioritizations
  - Key component of process
  - Notice of written declaration
  - 14 public meetings; one in each county where a facility is located
  - Written comments accepted until April 2016
  - Public input and additional data critical to determination of final prioritizations
  - Dates, times, & locations for all 14 public meetings is available on DEQ website
Next Steps

• Completion of Site Assessments & Corrective Action Plans
  • Scientific determination of natural background levels of constituents
  • Determination of vertical and horizontal extent of contamination
• Determination of impact on off-site wells/receptors
• Refinement/finalization of prioritizations
  • Based upon public comment & additional data received
• Decanting of ash ponds
• Continued excavation of dry ash
• NPDES Wastewater Permit issuance for dewatering operations
  • Must be completed for excavation of wet ash