Nothing Compares
NORTH CAROLINA

Environmental Review Commission

January 13, 2016

Department of Environmental Quality

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

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

Site	Storage Location	Transport Mode	Tons Stored
Asheville*	Asheville Regional Airport	Truck	4,100,000
	R&B Landfill, GA		38,240
Cliffside	On-site landfill	Truck	76,766
Dan River	Maplewood Landfill, VA	Rail	53,257
Riverbend	R&B Landfill, GA	Truck	15,762
	Marshall on-site landfills	Truck	78,026
	Brickhaven Structural Fill	Truck	5,008
Sutton	Brickhaven Structural Fill	Truck	5,430
	Total Progress to Date		**4,372,489**
	N.C. 2015 Progress		**626,489**
*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
- <u>DEQ unable to determine with current data if some Duke coal ash ponds are impacting private and public water wells</u>
  - Known impacts in some cases: Sutton, Asheville

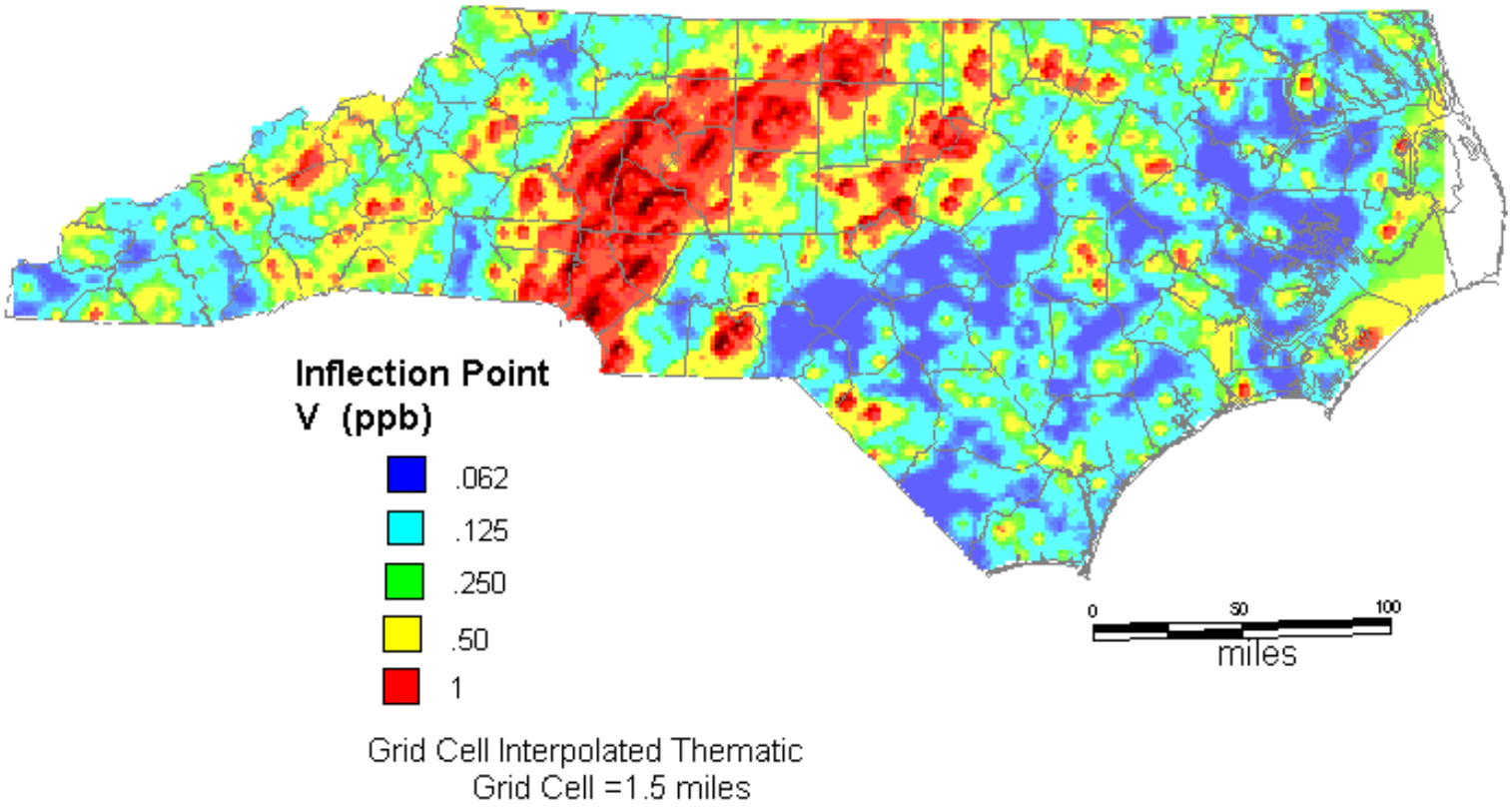
Survey of Private & Public Water Supply Wells

- 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



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Cr(VI) & Vanadium Criteria in the Southeast

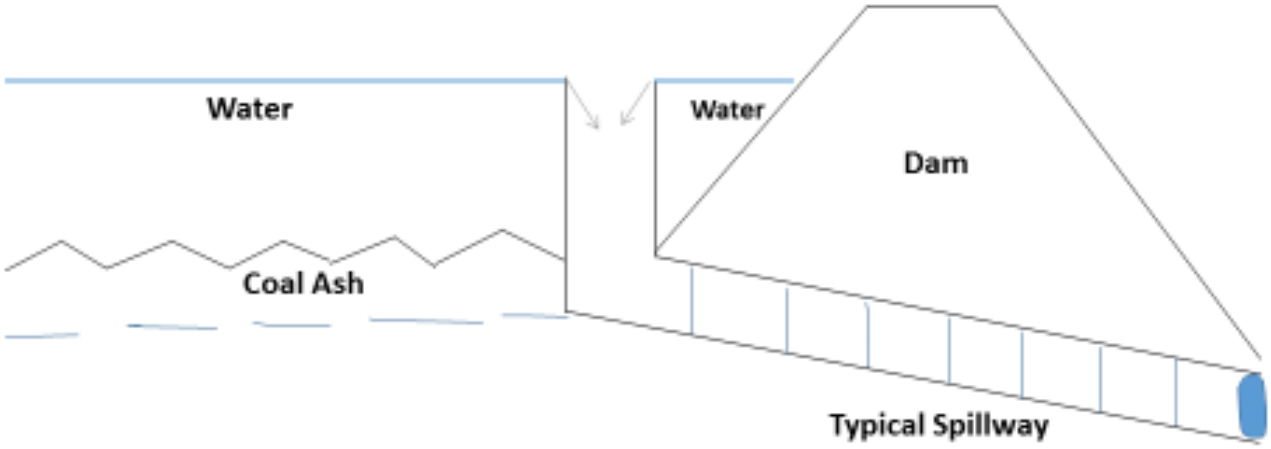
State	Cr(VI)	Vanadium
Alabama	11	3.6 ppb
Florida	NA (Total Chrome – 100 ppb)	49 ppb
Georgia	NA (Total Chrome – 100 ppb)	NA
Kentucky	NA (Total Chrome – 100 ppb)	NA
Mississippi	Narrative Standard	Narrative Standard
North Carolina	NA (Total Chrome – 10 ppb) DHHS- .07 ppb	0.3 ppb
South Carolina	NA (Total Chrome – 100 ppb)	NA
Tennessee	Narrative Standard	Narrative Standard
Virginia	NA (Total Chrome – 100 ppb)	86 ppb
West Virginia	NA (Total Chrome – 100 ppb)	NA

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

Decanting/Dewatering, Seeps and Permitting

Decanting / Dewatering



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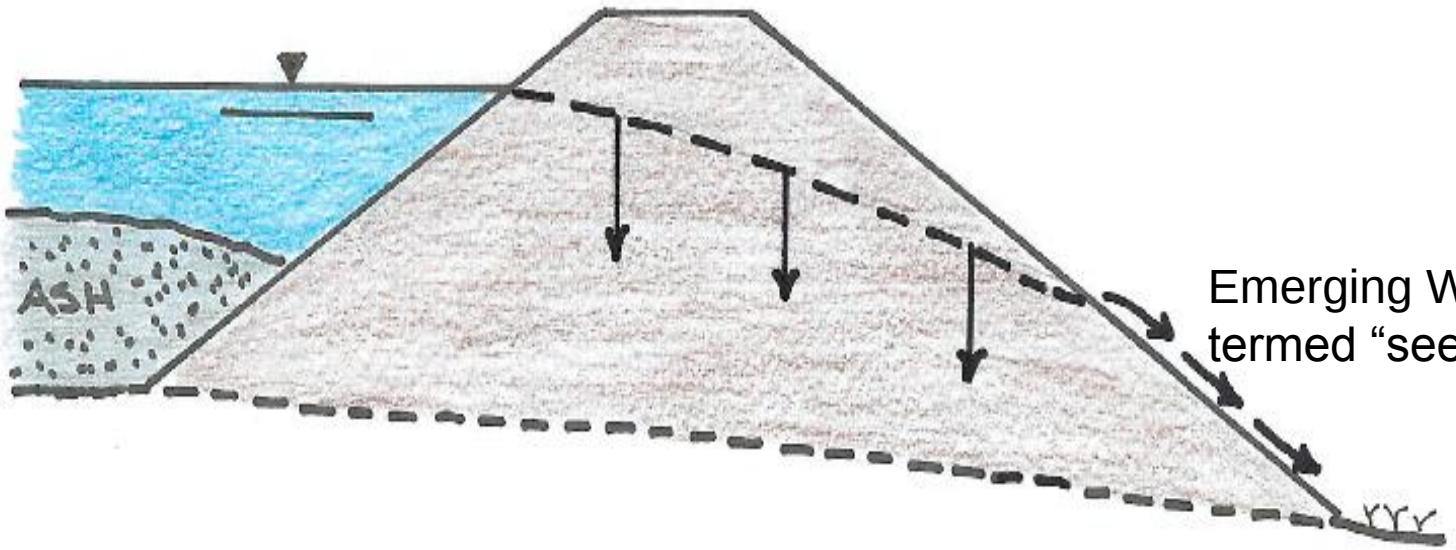
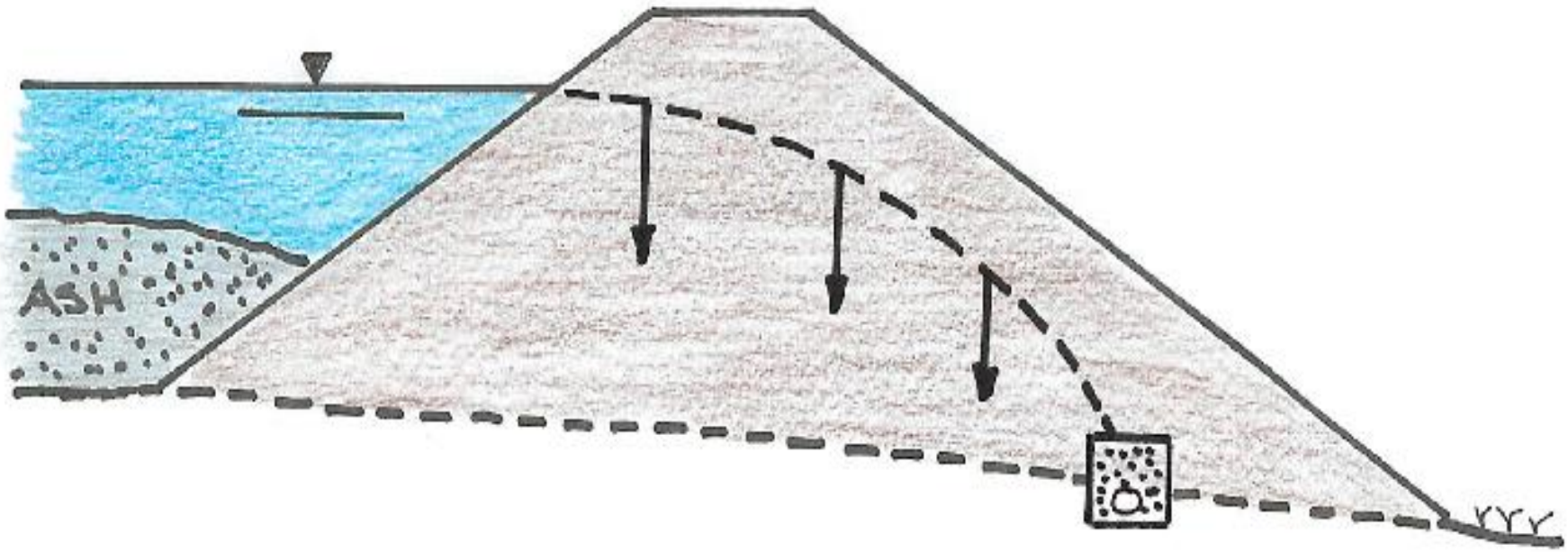
Basic Seep Diagram (Non-Engineered)



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

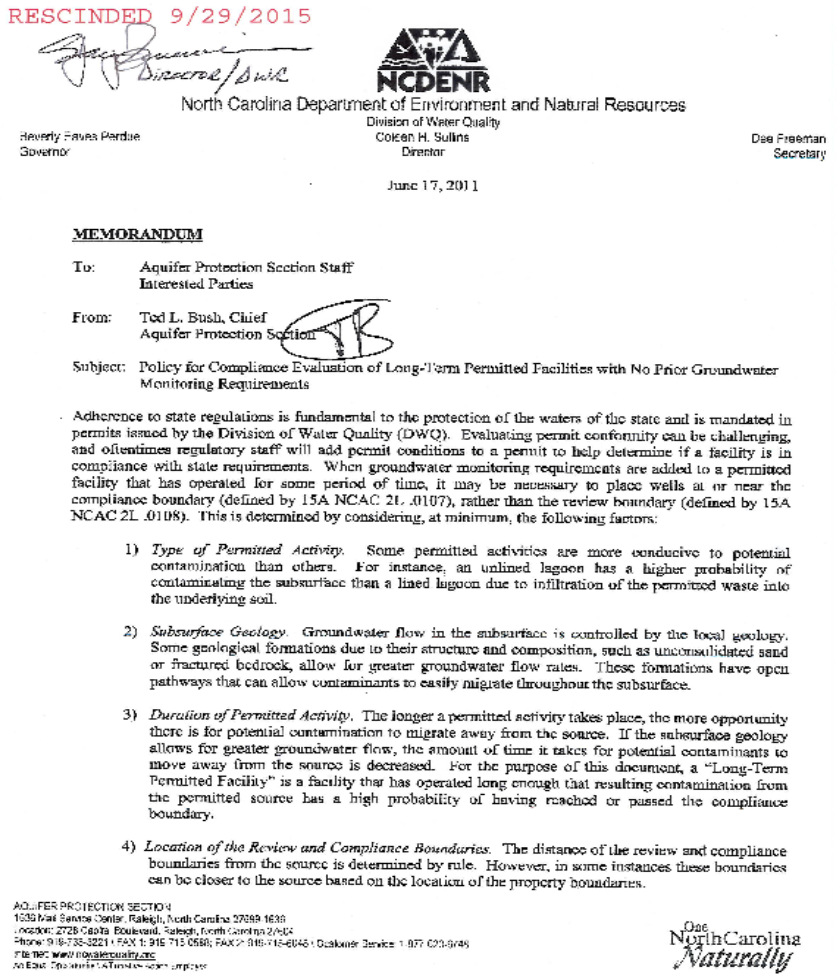
- Complete dewatering (as opposed to decanting) of ponds requires modification of NPDES Permits
- Dewatering necessary for wet ash excavation
- Permit modification must also address engineered and non-engineered seeps
- EPA still unsure how to address seeps in NPDES Permits
  - Concern that some seeps 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 w/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

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 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



RESCINDED 9/29/2015

Director/Chief

NCDENR

North Carolina Department of Environment and Natural Resources

Division of Water Quality

Beverly Eaves Perdue
Governor

Colleen H. Sullins
Director

Dee Freeman
Secretary

June 17, 2011

MEMORANDUM

To: Aquifer Protection Section Staff
Interested Parties

From: Ted L. Bush, Chief
Aquifer Protection Section

Subject: Policy for Compliance Evaluation of Long-Term Permitted Facilities with No Prior Groundwater Monitoring Requirements

Adherence to state regulations is fundamental to the protection of the waters of the state and is mandated in permits issued by the Division of Water Quality (DWQ). Evaluating permit conformity can be challenging, and oftentimes regulatory staff will add permit conditions to a permit to help determine if a facility is in compliance with state requirements. When groundwater monitoring requirements are added to a permitted facility that has operated for some period of time, it may be necessary to place wells at or near the compliance boundary (defined by 15A NCAC 2L .0107), rather than the review boundary (defined by 15A NCAC 2L .0108). This is determined by considering, at minimum, the following factors:

1) *Type of Permitted Activity.* Some permitted activities are more conducive to potential contamination than others. For instance, an unlined lagoon has a higher probability of contaminating the subsurface than a lined lagoon due to infiltration of the permitted waste into the underlying soil.

2) *Subsurface Geology.* Groundwater flow in the subsurface is controlled by the local geology. Some geological formations due to their structure and composition, such as unconsolidated sand or fractured bedrock, allow for greater groundwater flow rates. These formations have open pathways that can allow contaminants to easily migrate throughout the subsurface.

3) *Duration of Permitted Activity.* The longer a permitted activity takes place, the more opportunity there is for potential contamination to migrate away from the source. If the subsurface geology allows for greater groundwater flow, the amount of time it takes for potential contaminants to move away from the source is decreased. For the purpose of this document, a "Long-Term Permitted Facility" is a facility that has operated long enough that resulting contamination from the permitted source has a high probability of having reached or passed the compliance boundary.

4) *Location of the Review and Compliance Boundaries.* The distance of the review and compliance boundaries from the source is determined by rule. However, in some instances these boundaries can be closer to the source based on the location of the property boundaries.

AQUIFER PROTECTION SECTION
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Internet: www.ncwaterquality.org
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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

DRAFT *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*

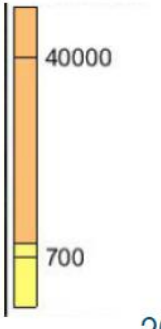
- Lack of definitive data regarding the extent of groundwater contamination
- 9 basins were assigned a proposed range of “low to intermediate”
  - Marshall (1 basin)
  - Roxboro (1 basin)
  - Allen (2 basins)
  - Belews Creek (1 basin)
  - Buck (3 basins)
  - Cliffside (1 basin)
- Final rankings assigned 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

Environmental Review Commission- January 13, 2016

Department of Environmental Quality