



# **Professional Engineers of North Carolina**

A state society of the National Society of Professional Engineers

## **The Problem with Coal Ash - A Common Sense, Engineering Perspective on Addressing the Next Phase of Remediation**

As North Carolina heads into the closure phase of dealing with its legacy coal ash sites, the Resource Stewardship Action Group (RSAG) of the Professional Engineers of North Carolina (PENC) thinks it will be helpful to provide an update on what has happened thus far, and where we could be headed from an engineering perspective. We have decided to address this response to professional engineers on the North Carolina General Assembly in an effort to encourage a science based, and fiscally responsible approach for the remediation of North Carolina's 14 coal plant sites.

### **Technical and Regulatory Context**

The Coal Ash Management Act (CAMA) in 2014 was passed by the North Carolina General Assembly in response to the Dan River coal ash spill and to address the national problem with coal ash stored in unlined ponds. The CAMA precludes the US EPA Final Rule on Management of Coal Combustion Residuals (CCRs) by almost a year, and was hailed as groundbreaking legislation showing the General Assembly's and Governor McCrory's commitment to addressing these problems.

*"I know that the public and the General Assembly share our concerns about coal ash, and I ask them to work with me to make sure we tackle this problem head-on to address long-standing problems caused by the ash basins," said Governor McCrory.*

Since the time CAMA was passed there have been numerous important developments including: a) the completion and promulgation of the Federal CCR Rule, b) examples of how other states are dealing with coal ash and ash basin closure, and c) lessons learned from the first ash basin closure projects. Several North Carolina engineers have been involved with some of the largest ash basin closure projects in other states, and it is hoped that this experience can provide insights on ways to adjust some of the provisions of CAMA. The RSAG of PENC has observed how the North Carolina Coal Ash Management Commission (CAMC) and the Environmental Management Commission (EMC) were empowered to review the application of CAMA 2014, so that beneficial use was promoted and other practical closure methods were considered. Our comments take into consideration the recommendations and guidelines provided in previous publicly available documents from the NC CAMC and the EMC.

### **Executive Summary**

The response below was developed by experienced professional engineers who are currently working on, or have worked on some of the largest coal ash basin closures in the United States. It includes suggestions for a few minor, but important modifications to CAMA that the RSAG believes would provide equal or better protection to the environment, promote the beneficial use of coal fly ash and provide a more sustainable approach to ash basin remediation in North Carolina. The proposed modifications to CAMA include:

- Allowing flexibility in the risk classification across a site can allow the overall project schedule to be extended in lower priority areas in a manner that still meets the deadlines and schedule requirements of CAMA. For example, on high and intermediate level sites, the sections closest to offsite receptors could be excavated and contained in temporary, lined storage areas, if there are contracts that the fly ash will be used for beneficial use. This approach meets the requirements of the Federal CCR Rule and CAMA. It would also align market demands for beneficial use of fly ash to ash basin closure timeframes.

- Requiring that the ash basin closure design consider other methods than dewater, excavate and dispose in a lined landfill if the methods are equally protective of human health and the environment. These equally effective methods may include: in-place stabilization/solidification, selective excavation and cap-in-place, and temporary containment and storage for beneficial use. In many cases the alternative methods would allow the site to be closed quicker because the time required to dewater and haul is not necessary.
- Recognition that no other state in the United States is requiring complete excavation and storage in a lined landfill for their high and intermediate priority sites. This includes Tennessee for the TVA Kingston coal ash remediation, where the majority of the was coal ash remediated through selective excavation, containment and on-site cap-in-place.
- Recommendation that a constructability review and environmental impact assessment of the remediation method be conducted so that the remedial action does not cause unintended worker safety issues, and/or impacts to the surrounding communities.
- Understanding that the environmental groups are open to alternative methods for remediation for high and intermediate classified ash basins if they are included in the decision process through established methods like a Net Environmental Benefit Analysis (NEBA).

### **Supporting Beneficial Use of Coal Ash**

CAMA has specific guidelines for considering and promoting beneficial use of coal ash, and eliminates the loophole that allowed placement of coal ash in unlined facilities. This is consistent with several key provisions included in the Federal CCR Rule. Although Duke Energy has attempted to increase the amount of coal ash that is beneficially used in North Carolina, the following facts remain:

- The concrete suppliers of the Carolina Concrete Redi-Mix Association still buy the majority of their coal fly ash for concrete production from [outside the state of North Carolina](#).
- The majority of the coal ash in North Carolina ash ponds would need to be “beneficiated” before it could be used for concrete and other products.
- The schedule constraints of CAMA require that the fly ash be excavated, and placed in a lined landfill at a rate that exceeds the market for improved fly ash as a cement replacement.
- Santee Cooper and the South Carolina DHEC are allowing the coal fly at the several plants in South Carolina to be excavated and beneficiated using SEFA’s STAR process over the next 5 to 10 years.
- Most the coal fly ash in Duke Energy’s unlined ash ponds will need to dewatered, removed and placed in new lined landfills or structural fills because of the high and intermediate classifications, and the schedule that is required by CAMA makes dewatering, transport and disposal in a lined landfill the only viable option.

**Suggested Approach:** Based on the current situation the following common sense, engineering solutions are offered for consideration:

- Flexibility in Closure Schedule to Allow Beneficial Use of CCRs: Allowing flexibility in the site classification and timeframe for site closure in CAMA to allow beneficial use would encourage Duke Energy to place coal fly ash from unlined impoundments in lined temporary storage facilities. This approach would only be possible if the coal fly ash were used for beneficial use in the next 5 to 10 years. This would create the environmental protections and business supports that would reduce the liability of temporary off-site storage for both Duke Energy and beneficial use companies.

- Business Incentives for Beneficial Use: One potential change could include providing incentives to North Carolina based beneficial use companies, low interest loans for constructing beneficial use facilities that use coal ash from unlined ash basins in North Carolina, and/or allowing future excavation of fly ash from third-party owned temporary lined facilities designed for beneficial use.
- Minimum Recycle Material Requirements for NC Projects: When California and Texas required a minimum amount of recycled materials in construction they created a clear financial incentive for contractors to seek out fly ash from in-state and out-of-state sources. Requiring a minimum percentage of recycled material for North Carolina road and building construction projects would provide an end use for the ash that is set aside in the aforementioned provision.

### **Risk Classifications and Ash Impoundment Closure**

The high risk and intermediate risk classification outlined in 130A-309.212 of CAMA requires that all the coal combustion residuals (CCRs) be dewatered and removed from the unlined coal ash impoundment, and placed in a lined landfill or structural fill. This requirement will effectively eliminate in-place closure and waste stabilization methods that may be equally or more protective of human health and the environment. The following observations are provided:

The high risk and intermediate risk classification outlined in 130A-309.212 of CAMA requires that all the coal combustion residuals (CCRs) be dewatered and removed from the unlined coal ash impoundment, and placed in a lined landfill or structural fill. If a dewatering and excavation is required for both high and intermediate classifications, then it would effectively eliminate in-place closure and waste stabilization methods that may be equally or more protective of human health and the environment. The following observations are provided:

- The majority of the coal ash impoundments that are being closed in other States (i.e Tennessee, West Virginia and Ohio) are utilizing cap-in-place technology, with vertical impermeable barriers to provide containment of contamination source areas at or near the groundwater table.
- The TVA Kingston coal ash remediation project, as one of the largest coal ash remediation projects completed to date, involved dewatering, removal and transport of approximately 4 million cubic yards of partially saturated coal ash material. Even though 4 million cubic yards of coal ash from TVA Kingston was transported to an off-site landfill, the vast majority of the Kingston coal ash was safely and effectively covered and contained and remains on site.

**Suggested Approach:** Minor modifications to the technical and schedule requirements of CAMA may need to be considered. A few ideas are provided:

- Utilize Basin by Basin Risk Classification and Existing Groundwater Regulations: Recently completed groundwater assessments for Duke Energy's 14 coal plant sites indicate a combination of high, intermediate, and low risk conditions at the coal ash basins. Localized source areas of coal ash in unlined basins could be selectively removed so that cap-in-place, in-place stabilization or vertical barrier walls would be the best option.
- Establish Buffer Areas from Streams, Rivers and Off-Site Receptors: As mentioned in CAMA, ash impoundment closures can be designed to provide a 300-foot buffer from streams and rivers, and 500 foot buffer from off-site receptors. (i.e. drinking water wells). This can be accomplished with vertical barriers and in-place capping closure methods.
- Allow Cap-in-Place Closure, In-Place Stabilization and Vertical Barrier Walls: For unlined coal ash basins that have perimeter dam embankments, and/or a located near the water table it is

often best to not excavate the coal ash and utilize in-place stabilization using cement, lime and other materials instead of dewatering and removal. Unfortunately, CAMA and existing NCDENR/DEQ regulatory guidelines do not appear to allow alternative methods that would provide equal or better containment of the contamination source area.

- Temporary Storage of CCRs for Beneficial Use: Allowing on-site or off-site storage of CCRs for 5 to 10 years, if the coal ash is used for beneficial use would meet several goals outlined in CAMA. The CCRs could be stored in a temporary, lined facility to allow excavation to meet the CAMA schedule now, and still allow beneficial use of CCRs at a later date.
- Longer Time Frames for Safety and Environmental Protection: Review of the record drawings indicates that there are sections of several high and intermediate coal ash impoundments where dam safety requirements, and the time required to dewater and treat the decant water from the ash may take longer than what is allowed by the current CAMA schedule. The CAMA schedule needs to allow the contractor, design engineer, and NC DEQ regulators to agree that if more time is required to ensure that dam and construction worker safety will be provided.

### **Constructability Review and Reasonable Risk Remediation**

Recent experience on large coal ash basin closure projects suggests that constructability reviews would be an essential task for *reducing the implementation risk* of dewatering and excavating many of North Carolina's ash basins. Requiring constructability reviews of the proposed closure methods by experienced contractors and engineers would provide the following:

- Guidelines for monitoring and protection of the perimeter dams as the closure construction is implemented are essential to account for rapid drawdown impacts, and other interim site conditions that could occur during a typical ash basin closure.
- Independent peer review of the proposed methods for the treatment of decant and dewatering liquids, which will complement the regulatory review that is being provided by the NCDEQ.
- Consideration of the potential impact to the communities located near the ash basin closure and/or at the lined facility where coal ash will be deposited.
  - The potential for dust emissions that could occur during dewatering and drying of the coal ash is a concern that has been expressed by those living near the coal ash basins.
  - The potential for unacceptable truck traffic and/or leakage of wet coal ash during truck or train transport.
- Consideration of other equally protective and technically sound coal ash basin remediation methods, such as those successfully employed by other states in coal ash basin closures. The methods may include:
  - Selective excavation of coal ash from high risk areas near streams, rivers and drinking water wells.
  - In-place stabilization and slurry walls for leaching coal ash located adjacent to dams in difficult to excavate areas near dams and ancillary structures or below the water table.
  - Cap-in-place for coal ash in intermediate or low risk basins with no chance for off-site migration of contaminants.

**Suggested Approach:** Requiring a feasibility study and constructability review by an independent and experienced contractor or construction engineer would be helpful. After Corrective Action Plan (CAP) I is complete, and before CAP II is complete the following items could be considered.

- Have Duke Energy and its consultants conduct a Feasibility Study of the 2 or 3 of the most technically/financially feasible options for ash basin closures.
- Have an independent constructability and construction safety review completed as part of the Feasibility Study to determine if the implementation risk of the proposed ash basin closure method is reasonable.

### **Practical Approach – Net Environmental Benefit Analysis**

CAMA outlines a positive and proactive approach for cleaning up North Carolina's ash basins quickly, and provides a framework to consider the concerns of a wide variety of stakeholders. The US EPA has developed the Net Environmental Benefit Analysis (NEBA) method to take into consideration the input from both environmental and industry groups on complex remediation projects. Since protection of the environment has been an area of conflict and litigation, it seems reasonable to suggest that some form of a NEBA evaluation be used as part of the closure plan evaluation process. The NEBA is designed to make sure that the proposed remediation method does not unintentionally cause more damage than the original environmental impact. A framework for NEBA for petroleum contaminated sites can be viewed [here](#) for reference. Utilizing NEBA could provide a systematic way to consider the views of stakeholders and focus on remediation methods that are both cost effective and good for human health and the environment.

**Suggested Approach:** Use of the NEBA process would need to be agreed to by Duke Energy, environmental groups and other key stakeholders. How the NEBA approach could be utilized is an idea that merits further discussion.

In conclusion, the RSAG wants to reiterate that Professional Engineers (PE's) enjoy a level of trust, and that our first priority is to protect the public. As the US EPA observes in the Final CCR Rule, whomever employs a PE (e.g., Duke Energy, university, consulting firm and contractors, etc.) obtains an objective evaluation that does not affect the reliability of the technical findings of any investigation due to licensure laws and the [Engineer's Creed](#).

Consideration and incorporation of these proposed minor, but important modifications to CAMA we believe is of mutual benefit to the public, private industry, and regulatory agencies at the local, state, and federal influence.

Thank you for your time,

Professional Engineers of NC & the Resource Stewardship Group