Mobile Bay National Estuary Program
Government Networks Committee
Structural Integrity Review for Alabama Power's Plant Barry CCR Closure Plan
Zoom Meeting
May 4, 2020
1:30-3:30 P.M.

Meeting Attendance: Mike McMillan, Billie Jo Underwood, Charles Murphy, Scott Hughes, Merceria Ludgood, Connie Hudson, Sandy Stimpson, Robert Snow, Scott Story, Chris Blankenship, Casi Callaway, Elizabeth Roney, Ashley Henderson, Wayne Dyess, R. Cink, Marlon Cook, Rosemary Ginn Sawyer, Seven individuals participated by phone only.

Staff: Ben Brenner, Jason Kudulis, Roberta Swann, Christian Miller

Key Takeaways

- It is the opinion of the Professional Engineer in charge of conducting this independent review that acceptable structural integrity and performance is demonstrated by the proposed Plant Barry coal ash pond closure plan procedures, design, and engineering analysis.
- It is the opinion of the Professional Engineer in charge of conducting this independent review that the structural integrity criteria have been met, and in some cases surpassed, providing confidence in the closure plan.
- Riverine and coastal storm surge analyses were performed and indicated that exterior dikes would not be overtopped in the event of a 1,000-year storm.
- Recommendations were made for Alabama Power to:
    - Analyze the stability and performance of the storage yard in the NW corner of the facility.
    - Supplement post-dewatering and preloading geotechnical exploration with CCR saturation and shear strength characterization.
    - Incorporate geotechnical instrumentation and monitoring program.
    - Evaluate the potential of erosion of exterior perimeter dikes due to river flooding and implement slope protection if warranted.
- Recommendations were made to the local watershed community to
    - Monitor and review publically disclosed project records and inspection reports to check progress and confirm conditions.
    - Ensure that the EAP is updated as conditions change and that scheduled meetings with emergency management agencies are conducted and reported.

This presentation in its entirety can be accessed here:
Approximate time stamps are provided in parenthesis in their respective sections of this synopsis.

The meeting began at 1:35 P.M. Christian gave a brief overview of the agenda then mentioned that MBNEP had been charged by the GNC to investigate the critical factors influencing Alabama Power's (APCO) plan to close the ash ponds at the Barry Steam Plant and reviewed the Purpose and Objectives of this project:

TAC-3: Build capacity of local governments to manage and enhance coastal environmental resources.

- Improve understanding of the legal framework and critical hydrogeological and structural factors influencing APCO's Coal Combustion Residuals (CCR or coal ash) pond closure plan.
    - Review of legal framework and hydrogeologic factors is complete; fact sheets available.
    - Structural integrity review is complete.
    - Film summarizing findings is expected to be completed in May.

Next, Christian introduced Robert (Bob) Snow, P.E. with D'Appolonia Engineering to present findings of a structural integrity review for the Plant Barry ash pond closure plan. MBNEP contracted with D'Appolonia to conduct a review of this closure plan which consisted of a limited review of permit application submittals and available design documents related to the ash pond closure.

Bob mentioned that he reviewed several publicly available documents as part of his review process including:

- 2019 Amended Coal Combustion Residual (CCR) Closure Plan for Ash Pond
- Closure Plan Design Drawings (Draft 100% Design, Not for Construction)
- 2019 Plant Barry Ash Pond Dewatering Plan
- 2018 Permit Application for CCR Surface Impoundment

Additional exploration, testing, and engineering documents supporting the CCR closure plan were also reviewed that are not publically available.

The purpose of this independent review was to evaluate aspects of the engineering, design, and permitting of APCO's proposed closure plan to identify potential areas of concern or gaps in information that may be important to decision making with respect to structural integrity of the closed and consolidated coal ash facility.

Bob mentioned that the Hazard Potential Classification and Emergency Action Plan are two components of this review. The Hazard Potential Classification is a reflection of the potential impact that a failure would have, if one were to occur (not of the imminent threat of a facility). These classifications generally fall into either one of low, significant, or high hazard potential categories. The Plant Barry ash pond currently has a classification of "significant", meaning there could be significant downstream environmental impacts were a failure to occur but no anticipated loss of life (which would elevate it to the "high" category). The Hazard Potential Classification establishes specific design criteria for the closure plan and the requirement for an Emergency Action Plan (EAP); this provides for emergency response and coordination with local emergency management agencies should the need arise.

Key current site conditions at Plant Barry (Fig. 1):

- 597-acre ash pond containing over 21 million tons of coal ash adjacent to the Mobile River
- The coal ash within the pond typically varies from 20-30' thick, is composed of fly ash and bottom ash, and is generally loose and saturated with water
- Ash is contained by an extensive perimeter dike founded on clay
- Ash is underlain by clay and sand layers
- Underlying sand represents a semiconfined aquifer that flows towards, and discharges to, the Mobile River

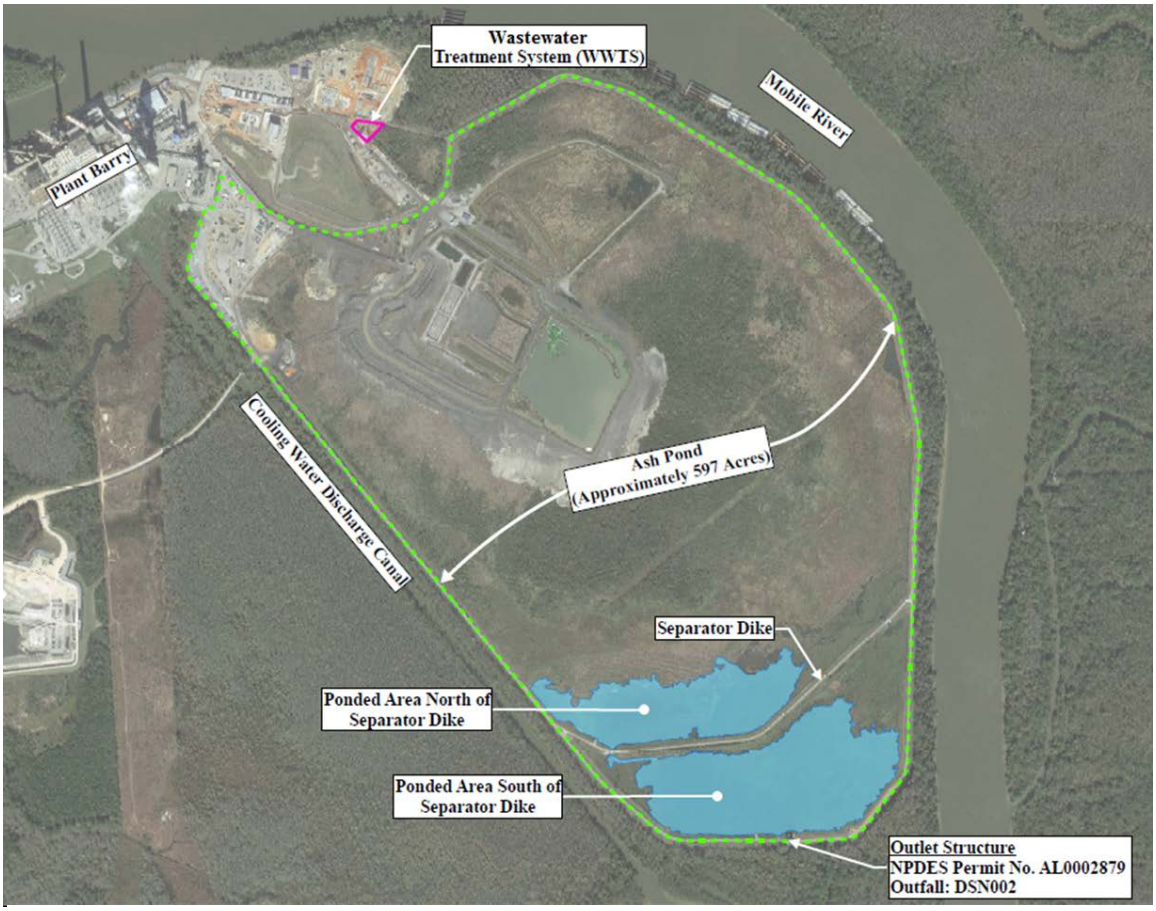

Figure 1. Current site conditions at the ash pond at the Alabama Power Company's Barry Steam Plant located along a bend of the Mobile River in Bucks, AL.

Key Components of the CCR Closure Plan (8:38)

The main concept of the closure plan is to consolidate ash into a reduced footprint of ~330 acres on the north end of the site and the closed structure will rise above the current grade (Fig 2 and Fig 3). This consolidation results from removal of ash along the inner perimeters of the dike and creates a buffer between the river and allows installation of containment structures and stormwater management infrastructure. A stormwater settling basin and NPDES outfall on the south end of the site will be maintained. Key components of the closure process include:

Dewatering & Stabilization (11:28)

- Removal of free water and reduction of interstitial water within the coal ash will be accomplished by pumping from open pooled areas and creating sumps in the ash.
- Water that is in contact with coal ash will pass through a filter berm to reduce solids and then pumped to a wastewater treatment system prior to discharge.
- Dewatering will continue throughout closure and contributes to stabilization of the ash material during the excavation process.

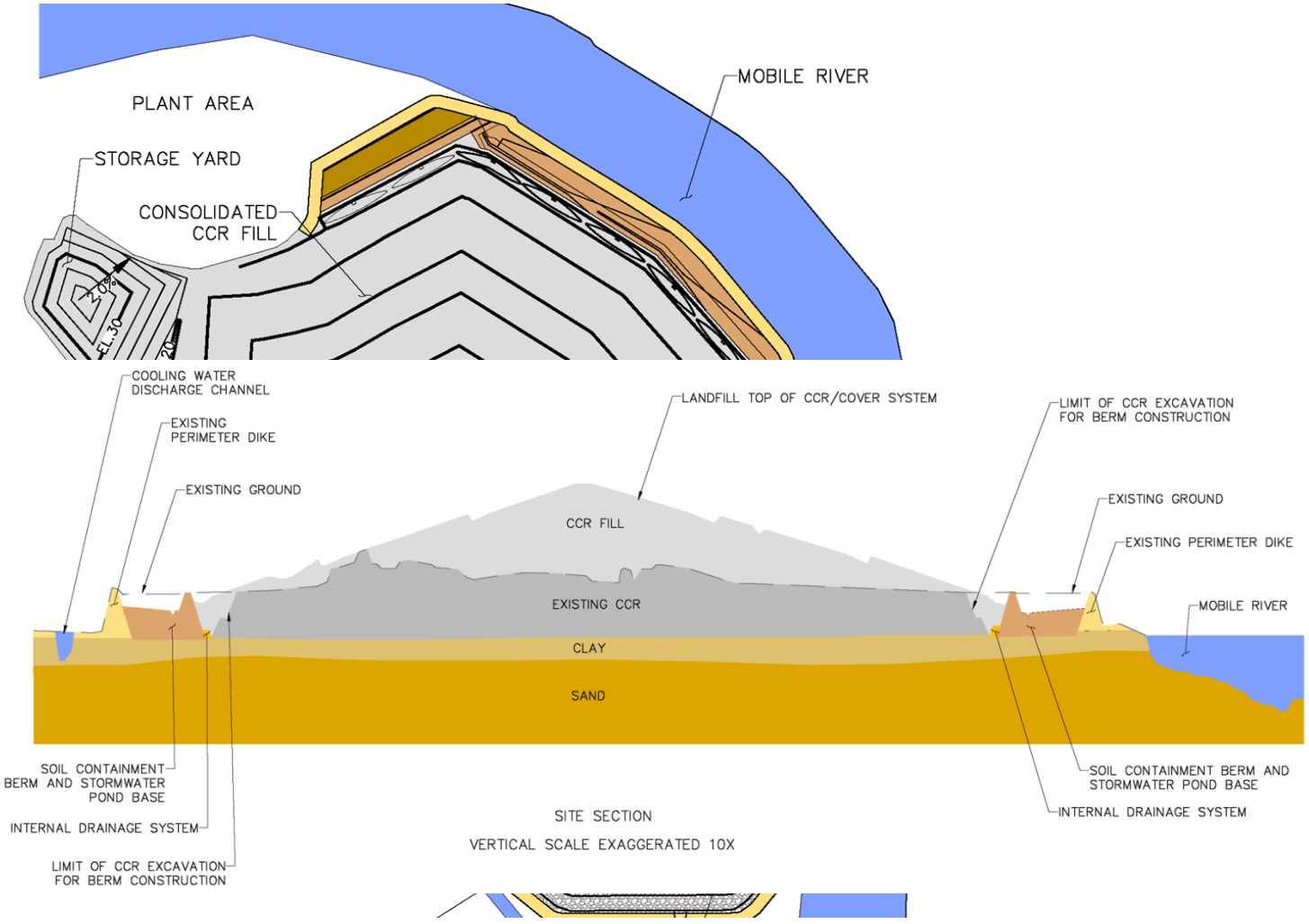

Figure 3. Side cutaway view of the closed and capped ash pond facility at the Alabama Power Company's Barry Steam Plant located along a bend of the Mobile River in Bucks, AL.

Figure 2. Top down view of the closed and capped ash pond facility at the Alabama Power Company's Barry Steam Plant located along a bend of the Mobile River in Bucks, AL.

CCR Excavation (14:03)

- Excavation follows a preloading program and geotechnical exploration. Preloading consists of loading fill material over the ash resulting in consolidation/stabilization of both the ash and underlying clay layer.
- Sequential excavation of coal ash occurs after the preloading while dewatering continues. Bridging lifts will be employed over wet/soft grades for equipment access. A bridging lift is drier material that allows access for construction equipment and will be removed after excavation.
- Temporary pressure relief wells will be installed as needed within the foundation's sand sublayer to lower the groundwater potentiometric level (pressure level), reduce seepage induced forces on the clay, and facilitate excavation of the ash. (16:20)

CCR Removal Verification (17:39)

- CCR/Clay interface within the ash pond will be established prior to excavation:
    - Design exploration borings have been conducted that established the bottom of CCR material within the ash pond.
    - Additional borings and samplings on 300-foot centers will use visual and tactile examination to confirm the CCR/clay interface and determine effectiveness of preloading.
    - Cone penetration tests on 100-foot grids will be conducted following preloading and based on penetration resistance/pore pressure measurements to refine the interface.
- Excavation of CCR will extend 6-inches into the underlying clay with GPS guided equipment.
- Upon achieving CCR removal, the subgrade will be sampled for visual classification on a ~200-foot grid.

CCR Placement and Containment (19:42)

- A soil containment berm will be constructed to provide a physical barrier along the east, south, west, and a portion of the north perimeter.
- A stormwater pond base will protect clay sublayer and control runoff.
- An internal drainage system will be constructed on the inside slope of the soil containment berm to collect interstitial water from CCR.

CCR Closure Cover System (20:58)

- An impermeable cap consisting of a geomembrane overlain by an engineered synthetic turf will be installed over the consolidated CCR.
- The cap is designed to: control, minimize, or eliminate post-closure infiltration into CCR; preclude future impounding; provide slope stability; and minimize future maintenance.

Surface Water and Stormwater Management (22:10)

- Contact water will be collected and treated along with stormwater from events less than the 25-year storm.
- Stormwater exceeding the 25-year event will be discharged through the NPDES outfall.

- Final grades of 3.5%, synthetic turf overlay, riprap lined channels, and flow dissipation structures will provide erosion control.
- The current stormwater settling basin on the south end of the site will be maintained.

A question was asked in regards to why stormwater treatment was only provided for events up to the 25-year event when larger storms occur with regularity in coastal Alabama. In smaller events, the concentration of pollutants is much greater and the effluent often times exceeds allowable limits so treatment is required before discharge. Events in excess of the 25-year storm generally result in diluted concentrations of these constituents falling within allowable limits established by regulatory agencies (ADEM).

The next portion of the presentation focused on criteria evaluated under the structural integrity review of the closure plan: **slope stability**; **settlement**; **slope protection**; and **stormwater management (27:18)**.

Hazard Potential Classification and Emergency Action Plan (27:40)

- The ash pond has been classified as a significant hazard, which establishes the inflow design requirement that must be maintained throughout the closure process (design to withstand 1,000-year event).
- The EAP must be maintained until a reduction in hazard potential is achieved.
- The stormwater basin will continue to serve as an outfall through and after closure, although little water will be retained except during storm events.

The **slope stability review (31:00)** evaluated components of the closed CCR facility including the perimeter dikes, consolidated CCR area, soil containment berm, final cover overlay, interim condition of the facility during the closure process, and the stormwater basin at the south end of the facility.

Slope Stability Findings (33:00)

- Stability analyses indicate acceptable structural integrity and performance, with a focus on critical areas along the east, south, and west perimeters of the dike. Engineering analysis did not include the storage yard in the northwest corner of the facility.
- Successful dewatering and stabilization of the ash pond depends on pumping and removal of surface and interstitial water from the CCR. Dewatering promotes consolidation and stabilization of the ash material and allows for excavation.

Slope Stability Recommendations

- The saturation of CCR and slope stability of the storage yard area in the northwest corner should be assessed as CCR is closed in place without the soil containment berm and internal drainage system within this area of the facility.
- Geotechnical exploration, instrumentation, and monitoring should be performed during the closure process to confirm the design basis for the closure plan.

Settlement Findings (37:15)

- Long term settlement is considered with regard to construction grades in order to maintain function of the cover system and stormwater control structures.
- Settlement analyses and mitigation measures are based on:
  - Design exploration and testing of CCR and foundation materials
  - Dewatering and stabilization measures
  - Preloading to initiate consolidation and settlement
  - Geotechnical exploration to confirm foundation characteristics

Stormwater Management & Flooding Protection Findings (38:20)

- Stormwater Management
  - Water in contact with ash is retained and treated up to the 25-year storm event.
  - For events in excess of the 25-year storm water is discharged through the NPDES outfall.
  - Overtopping protection of the perimeter dike is provided for greater than a 1,000-year storm event.
- River Flooding
  - Riverine flooding evaluations were performed and determined protection from overtopping of the perimeter dike is provided for greater than a 1,000-year flood.
- Coastal Storm Surge Flooding
  - Coastal storm surge evaluations were performed and determined protection from overtopping of the perimeter dike is provided for greater than a 1,000-year storm/flood event.

Slope Protection Findings (40:14)

- The cover system on the consolidated CCR area and soil containment berm includes components to reduce/eliminate potential erosion.
- Stormwater channels and ponds include riprap to provide erosion protection.
- Existing vegetation will be maintained on the exterior of the perimeter dike for erosion control.

Slope Protection Recommendation

- The potential for erosion of the exterior of the perimeter dikes due to extreme Mobile River flooding should be evaluated and additional slope protection should be considered if warranted.

A question was asked regarding the date of the mapping that was used to evaluate flood protection for the facility. Flood frequency analyses were performed to estimate flood levels at the Ash Pond location considering riverine floods and coastal storm surge based on the 2019 FEMA Letter of Map Revision Determination and 2019 FEMA Preliminary Flood Insurance Study maps.

Operation and Maintenance Plan Findings (43:12)

- Operations and Maintenance Plan includes: Construction Best Management Practices; Fugitive Dust Control Plan; Surface Water Management; Groundwater Monitoring Plan; Recordkeeping and Notification compliance procedures; and procedures for updating plans and assessments.
- The Closure Plan Recordkeeping and regulatory agencies (ADEM) require that changes, updates to structural assessments, and inspection reports be submitted and disclosed to the public.

Operation and Maintenance Plan Recommendation

- Disclosed project records should be monitored to provide an opportunity for public awareness of any significant closure plan changes and periodic updates of structural assessments during the closure process.

Inspections Findings (45:07)

- Weekly inspections are required to identify structural weaknesses and to ensure proper operation of all outlet structures.
- Annual inspections are required by a qualified Professional Engineer.
- Annual inspection reports should document the status of the closure progress, instrumentation information, and changes that may have affected the operation or stability including any appearances of an actual or potential structural weakness.

Inspections Recommendation

- Inspection reports should continue to be disclosed to the public and include information on geotechnical instrumentation, monitoring, and interpretation, along with inspection observations to confirm conclusions of the structural assessment.

Next, Bob summarized his findings of the structural integrity review to state that acceptable structural integrity and performance is demonstrated by APCO's proposed Plant Barry coal ash pond closure plan. Bob also recommended that supplemental analyses, exploration, instrumentation, and monitoring programs be conducted to confirm conditions during the closure process. These recommendations include:

Recommendations for Alabama Power (48:14)

- Analyze stability and establish structural performance the storage yard in the northwest corner.
- Supplement post-dewatering and preloading geotechnical exploration with CCR and shear strength characterization.
- Incorporate geotechnical instrumentation and monitoring program into the closure plan.
- Evaluate the potential for erosion of exterior perimeter dikes due to Mobile River flooding and implement additional slope protection if warranted.
- Pursue reevaluation of hazard potential classification upon completion of the closure plan to demonstrate risk reduction of the facility.
- Regarding the Emergency Action Plan, continue to perform annual review and updating EAP during closure, with scheduled meetings with emergency management agencies concerning scope and responsibilities of parties. Include documentation of meeting participation, topics reviewed, and training activities.

A question was asked about the shear strength related to the ash and whether the ash will consolidate and become compacted. With the removal of the ponded water and interstitial water is drained from the ash, the level of saturation within the ash will decline. This will ensure that the material is consolidating and material strength is improving. It is expected that the ash will consolidate with dewatering and increase in strength in a dewatered state.

A question was asked; as the ash consolidates will it be less susceptible to erosion in the event of a breach of the levee? By dewatering, the ash should consolidate and should not represent a flowable material.

Another question was asked related to the long-term environmental safety of the proposed closure plan and it relates to complete excavation and removal. Bob stated that this was hard to evaluate since complete excavation and removal was not an option that was included in the proposed closure plan. Bob stated that he didn't see one as being better or worse, rather there are conditions to be evaluated and satisfied for each. Christian reiterated that the scope of Bob's review included only the proposed closure plan and complete excavation and removal was not an option that was currently being considered. Bob stated that the challenges related to complete removal include having to deal with large quantities of material and the risks associated with moving it, including spills and airborne dust, which can be significant compared to consolidating and keeping it on site.

Recommendations for the Watershed Community (1:04)

- Monitor publically disclosed project records including closure plan updates, periodic structural assessments, and inspections during the closure process to check progress and confirm conditions.
- Review publically disclosed inspection reports for information related to geotechnical instrumentation, monitoring, and interpretation along with inspection observations to confirm structural assessment.
- Ensure that the Emergency Action Plan is updated as conditions change with closure implementation, and scheduled meetings with emergency management agencies are conducted with documentation on participants, topics reviewed, and training activities.

The meeting concluded at 3:30 P.M.