

## Duke Energy closure information submitted to NCDEQ

### Background

In November, Duke Energy provided information to the North Carolina Department of Environmental Quality (NCDEQ) that the agency will use to evaluate our proposed closure recommendations for ash basins at Marshall, Allen, Belews Creek, Mayo, Rogers/Cliffside and Roxboro. NCDEQ is presenting the Marshall information to the public at an informal open house on Jan. 17.

Duke Energy's submissions include three bodies of work that support a site-specific closure recommendation for each plant: a closure options analysis, groundwater modeling and a community impact analysis. These form a key portion of the holistic scientific and engineering evaluation the company has performed to develop plans that balance a variety of considerations.

Following its public input process, NCDEQ has indicated it will evaluate the closure options by April 1, 2019; we would then submit our final plans by Aug. 1, 2019. We look forward to discussing these plans with NCDEQ, plant neighbors and our customers.

### Overview of the closure process

- ★ Duke Energy is committed to closing all our ash basins in ways that are safe, efficient, environmentally sound and based on thorough science and engineering.
- ★ Our proposed plans balance environmental protection with disruption to communities, compliance with state and federal regulatory deadlines, impacts to natural resources and costs for customers.
- ★ Effective closure plans are site-specific – the cost and length of community disruption differ greatly among closure options and vary by site.

### Marshall Site-Specific Evaluation

#### Overall recommendation ([click here for the cover letter we provided to NCDEQ](#))

- ★ **Closure in Place or Hybrid Closure.** Both provide similar protection for neighbors and the environment compared to excavation. When comparing key cost drivers related to construction, excavation could cost customers five times as much. Excavation would have lengthier disruption (noise, truck traffic, air emissions) for the local community and could not meet state or federal closure deadlines.

#### Highlights: closure options analysis ([click here for full report on NCDEQ website](#))

*This options analysis considers the many aspects and trade-offs related to basin closure, including environmental protection, cost, schedule and community impacts such as noise, truck traffic and air emissions.*

- ★ The company considered a variety of closure options and then advanced three for more detailed analysis:
  - Closure in Place – also known as capping
  - Closure by Removal – also known as excavation (moved to an on-site landfill)
  - Hybrid Closure – consolidating ash into a reduced footprint inside the basin and then capping
- ★ All three closure plans will protect the environment and people.

- ✦ The most effective way to improve groundwater under ash basins is to safely remove the free water, **which will occur in any closure approach**.
- ✦ The company will recommend either closure in place or hybrid closure for Marshall.
  - These two options provide the best approach to protect people and the environment while minimizing community disruption and managing customer costs. Of the two, a hybrid approach is more costly and challenging, as it will require a stability feature and the removal of deeper ash against the current earthen dam.

<b>Marshall</b>	<b>Closure in Place</b>	<b>Hybrid Closure</b>	<b>Closure by Removal</b>
<b>Estimated construction cost*</b>	\$207 million	\$387 million	\$1.06 billion
<b>Time</b>	15 years**	14.5 years**	32.4 years – would not meet deadlines
<b>Community impact</b>	Construction traffic and noise	Construction traffic and noise	Construction traffic and noise

\* Cost estimates included in the options analysis are directional in nature, representing major cost drivers that were used as a screening tool to allow for a general comparison of the various closure options. They do not represent the total cost estimates for the projects and long-term monitoring.

\*\* Closure in place and hybrid would not appear to be able to be completed before the 2029 CAMA deadline. However, due to the size of the basin, cover system installation of upgradient basin surfaces could overlap with dewatering and regrading in the downgradient portion of the basin to enable potential completion within the state deadline.

### Highlights: groundwater modeling ([click here for full report on NCDEQ website](#))

Groundwater modeling uses real-world data from hundreds of monitoring wells encircling our ash basin to project how groundwater will respond in the future under various closure scenarios.

- ✦ Based on the modeling results, groundwater responds similarly to the various closure options within the next 100 years.
- ✦ Time to achieve compliance for closure in place was several hundred years without additional groundwater corrective action, while closure by removal and hybrid took between 100 - 200 years without additional corrective action measures. This persistence is primarily due to the very slow rate of natural groundwater migration at the site.
- ✦ Closure by removal showed the greatest reduction in boron concentrations over several hundred years but takes substantially longer to implement, so groundwater improvements are delayed when compared to the closure in place and hybrid options; closure in place shows overall lower boron levels after several hundred years compared with hybrid.
- ✦ Corrective action plans (scheduled for completion in December 2019) will aim at shortening the time to meet groundwater quality standards.
- ✦ The simulations indicate **there will continue to be no impact to drinking water wells for Marshall neighbors in the future**. Should circumstances change, Duke Energy can take additional corrective actions as needed.

### Highlights: community impact analysis ([click here for full report on NCDEQ website](#))

The community impact analysis considers various community and customer interests and broader environmental impacts such as trucking emissions and tree clearing.

- ✦ All closure options evaluated would be protective of human health and ecological health.
  - ✦ Closure in place or hybrid would reduce the duration of local community disturbance.

- ✦ Since a grass cap is less valuable habitat than open fields, wetlands or forested areas, closure in place would cause a net loss in ecological services. Hybrid closure would minimize those losses; or, if desired, Duke Energy could offset the loss of environmental services from closure in place by reforesting a 160-acre parcel starting in 2022.
- ✦ In the absence of a reforesting project as described above, hybrid closure better maximizes environmental benefits. A reforesting project as part of the closure in place plan would better maximize environmental benefits.