

1. Coal Ash- Physical Science

The Coal Ash Pond at Plant Barry is in northeast Mobile County near the community of Bucks and situated along a bend in the Mobile River. The area surrounding Plant Barry is located in flood zone AE, designated by FEMA as a High-Risk Area for flooding, subject to a 1% annual chance of flooding.

Three primary hydrogeologic issues have been publicized related to the coal ash pond at Plant Barry:

First, is the material isolated from the surrounding surface-water and groundwater environment (meaning that hydrogeologic characteristics surrounding and underlying the coal ash pond will keep it and its chemical constituents from migrating beyond the pond)? **Second**, will future migration of the Mobile River channel threaten the coal ash pond? **Third**, will combinations of rising sea level, upstream flooding, and severe tropical storms cause catastrophic flooding that could potentially compromise the integrity of the coal ash pond?



Topic	Significance	Applicability to Plant Barry Coal Ash Pond
Geologic Conditions	<p>There are two aquifer units underlying Plant Barry:</p> <ol style="list-style-type: none"> 1. Holocene-aged alluvial deposits (maximum thickness about 125 feet) exposed at the surface composed of coarse-grained sand with gravels and clay. Provides domestic and irrigation water supplies in the Mobile River floodplain area. 2. Thick Miocene-aged subsurface deposits (about 600 feet) of very coarse-grained sands with interbedded clay layers. A regional aquifer providing domestic, agricultural, industrial, and public water supplies in a seven-county area of southwest Alabama. 	<ul style="list-style-type: none"> • Contamination of these aquifers has the potential to negatively impact groundwater resources. • At Plant Barry, groundwater in the Alluvial aquifer moves towards the Mobile River so that any contamination in the aquifer is isolated in a relatively small area of the river floodplain. • At Plant Barry, groundwater in the upper part of the Miocene aquifer is highly confined, so contamination is unlikely. However, this groundwater moves towards the Mobile River and is isolated in a relatively small area. Due to multiple confining layers above the aquifer, contamination of the lower part of the Miocene aquifer in the Plant Barry area is highly unlikely.
Constituent Mobility	<p>Chemical constituents of concern in coal ash, such as arsenic and cobalt, are leached when coal ash is saturated with water. Contamination of groundwater under the ash pond occurs after these constituents are:</p> <ol style="list-style-type: none"> 1. Leached from the ash into water 2. Transported vertically due to groundwater flow 	<p>One of the primary tasks in the current ash pond closure plan is dewatering of the coal ash. This should accomplish two important goals:</p> <ol style="list-style-type: none"> 1. Stop the leaching of constituents of concern from the ash 2. Reduce the downward flow of leached constituents of concern to underlying aquifers
Hydrogeologic Conditions	<ul style="list-style-type: none"> • Lateral and vertical groundwater movement through the ash pond enables leaching and spreading of constituents of concern to surrounding areas. • Natural clay layers that underlie the ash pond form a confining layer that restricts groundwater flow and protects the groundwater aquifers below; however, leached constituents have been detected in groundwater underneath the clay layers. 	<ul style="list-style-type: none"> • A network of monitoring wells surrounding the coal ash pond shows that groundwater is currently flowing slowly towards the Mobile River. • Following dewatering, vertical groundwater flow from the ash pond through the confining layer should cease. Lateral groundwater flow and ash migration above the confining layer is dependent on the integrity of the containment dikes. The plume of relict constituents of concern under the clay layer will be monitored during natural attenuation.
River Course	<ul style="list-style-type: none"> • Plant Barry's coal ash pond is located on a bend of the Mobile River, which is a meandering river with landforms such as cut banks and oxbow lakes indicating that the river channel has migrated over geologic time. • It has been suggested that the river could change course in a direction that would negatively impact the Barry coal ash pond. 	<p>The coal ash pond is located on the interior of a meander along a point bar with a cut bank developing on the opposite bank of the river. This means:</p> <ol style="list-style-type: none"> 1. The river channel is migrating eastward and away from the pond. 2. Any potential relocation of the river channel would happen over geologic time and would be unlikely to impact the Plant Barry facility.
The Perfect Storm	<ul style="list-style-type: none"> • The dike that surrounds the ash pond was constructed to withstand a 1,000-year, 24-hour rainfall event. • Combinations of future climate factors including rising sea level, a major upstream flood, and a significant tropical storm could result in a catastrophic flood event that may potentially compromise the coal ash pond. 	<ul style="list-style-type: none"> • In the future, combinations of high tide with higher sea level, upstream flooding, and a major tropical system could cause a catastrophic event at Plant Barry. At this stage of flooding, Plant Barry itself would be under water as well as the rest of downtown Mobile. • To date, no modeling has been performed to simulate these multiple flood scenarios to estimate river levels at Plant Barry. These simulations would inform decisions related to the closure of the coal ash pond and guide engineering and design plans to ensure a more robust closure plan accounting for potential impacts from extreme flooding conditions.

Sources

Cook, Marlon. Plant Barry Hydrogeologic Conditions Summary. 2019. Cook Hydrology, LLC, MBNEP report.