A Dangerous Situation
This project addressed the urgent environmental and safety risks posed by a weakened levee holding back an abandoned slurry pond. The impoundment was directly adjacent to Mud Creek, which was relocated by a mining company in the mid-1900s to construct the tailings pond. The structural integrity of the levee was inadequate due to poor construction, and complete failure was a possibility.

An Innovative Design
The project goals were three-fold: repair the levee, reclaim the coal refuse, and remediate the acid mine drainage. AML engineers pushed the limits of landform design by proposing to stack the slurry from one side of the tailings pond onto the other. This excavation facilitated levee repair and also provided space to construct a large sulfate-reducing bioreactor.

Geomorphic design principles were used to create variable topography and minimize the potential for erosion gullies. Natural stream design techniques were also utilized to create a sinuous waterway through the new landscape.

A Lasting Impact
A passive treatment bioreactor was constructed to provide continuous remediation of acid mine drainage. Sulfate-reducing bacteria metabolize organic material in the bioreactor, which reduces acidity and causes metal precipitation. Compost provided the sulfate-reducing bacteria in the mixture and hay, straw, and wood chips supplied the organic material. The total volume of substrate used was 72,400 cubic yards.

The bioreactor takes in water from the stream draining the capped slurry and also from a reclaimed gob pile to the south. While water draining from the gob pile has a pH of 2.8, the bioreactor outfall has a pH of 7.6. With increased pH, concentrations of iron and manganese are reduced significantly.

Project Highlights
- 595,500 cubic yards of slurry buried
- 212,600 cubic yards of gob buried
- 1,000 feet of levee stabilized
- 28,900 tons of bioreactor substrate used
- improvement in pH from 2.8 to 7.6