

An Innovative Technique for Coal Mine Refuse Reclamation Using Bauxite Residue

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Alcoa has developed an innovative technique for coal mine refuse reclamation using Bauxite Residue, a byproduct from the alumina refining process. Bauxite Residue (BR) has high alkalinity and soil-like characteristics, it can serve as a reclamation material to neutralize the coal refuse, minimize acid mine drainage (AMD) and support vegetation growth. This technique has been demonstrated at a 2 acre test site at a coal refuse pile in Mather, PA, where the top 24 inches of coal refuse was blended with 10% of Bauxite Residue (BR) through a one-time application. The BR amended plots showed healthier and more diverse vegetation growth as compared to the lime amended plot; they also showed lower surface temperature (~10°C), higher pH (6-7), and >90% reduction of metals in pore water as compared to the control plot. A hydro-geochemical model developed by University of Pittsburgh further proved that BR helped to reduce the concentrations of iron and sulfur dramatically in the amended zone. The reclamation performance of BR amended coal refuse plots have been sustained since 2009, which set a strong technical foundation for the beneficial use permit for Bauxite Residue approved by PADEP in 2011.

The successful demonstration of this coal mine refuse reclamation technique has drawn interests from PADEP, and Bauxite Residue has been selected to be the reclamation material for a 78 acre coal refuse site in West Newton, PA. This site is adjacent to a section of the popular Great Allegheny Passage bike trail maintained by the Westmoreland conservancy and the reclamation project will serve as a showcase for maximizing the synergy between two industrial by-products. In the mean time, Alcoa will be pursuing beneficial use permits for Bauxite Residue in the state of West Virginia and Ohio, and is also seeking opportunities to evaluate techno-economic feasibility of Bauxite Residue for active mine reclamation.