

The Kempton Man Shaft Project: Application of CCP Grout as a Seepage Barrier

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ABSTRACT

The Kempton Man Shaft project is one of several projects sponsored by the Maryland Department of Natural Resources Power Plant Research Program (PPRP), and funded in part by the US Department of the Interior Office of Surface Mining, to demonstrate the replacement of concrete with coal combustion products (CCPs) as the cementitious material in standard geotechnical applications. The 420-foot deep Man Shaft is located in the former Kempton deep coal mine in Kempton, Maryland. Fractures intercepted by the shaft at roughly 130 feet below ground surface (bgs) convey good quality ground water into the shaft and ultimately to the Kempton Mine Pool, where it contributes to the millions of gallons of acid mine drainage (AMD) that discharge into Laurel Run. The project objective was to reduce the amount of ground water lost to the mine pool by installing a seepage barrier around the shaft using a cementitious grout consisting of 100 percent local CCPs. The CCP formula for this project was developed through laboratory tests and field adjustments to form an optimal grout mixture that combined 35 percent dry fluidized bed combustion (FBC) ash and 35 percent dry pulverized fly ash (PFA) mixed with 30 percent water (e.g., 30 pounds of water per 70 pounds of dry FBC and PFA). The 70 percent solids mixture created the greatest strength while still maintaining flowability of the grout mix. The seepage barrier was installed from September through November 2003 by pressure injecting the grout through a series of boreholes surrounding the Man Shaft.

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