

HYDROLOGIC AND WATER QUALITY CHARACTERISTICS OF LOOSE-DUMPED MINE SPOIL¹

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Abstract: Coal mining in Appalachia is a vital industry, as more than 50% of the nation's electricity is derived from coal-fired generating facilities. Over 34% of the coal produced in this region is through surface mining. Two prevalent surface mining methods in the region are contour mining and area or mountaintop removal mining: methods that result in the generation of excess spoil material that is then placed in head-of-hollow fills. The placement of these fills has become an increasing environmental concern largely due to issues associated with water quality, sediment control, and loss of headwater streams. To address these environmental concerns as well as add economic value to surface mined lands, new reclamation techniques such as reforestation using high-value hardwood trees planted on minimally graded, loose-dumped spoil are being adopted. In Kentucky alone, 60% of new mine permits include provisions for this reforestation reclamation approach. Researchers at the University of Kentucky are actively exploring alternate head-of-hollow fill design options that build upon the loose-dumped spoil reforestation reclamation approach and address hydrology and water quality issues. Unfortunately, minimal information is currently available. To better assess the water quality and quantity characteristics of loose dumped spoil material, a research effort was undertaken in eastern Kentucky. Six one-acre plots consisting of two replications each of 1) predominantly brown weathered sandstone, 2) predominantly gray un-weathered sandstone, and 3) mixed brown weathered sandstone, gray un-weathered sandstone, and shale are being monitored using lysimeters that drain to tipping buckets equipped with HOBO data loggers. Water quality parameters such as pH, electrical conductivity, and selective metal concentrations are being monitored. Precipitation data is also being collected. Preliminary results suggest that hydrologic responses and water quality characteristics differ among the spoil types. The results of this research will directly assist University of Kentucky designers in the development of a stream restoration/creation plan for a head-of-hollow fill reclamation effort.

Additional Key Words: Infiltration, surface mine, coal, stream, spoil

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