

Investigations of Acidic Discharges from the Historic Mining of the Davis and Dekoven Coal Beds in Southern Illinois¹

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Abstract: Historic surface mining of the Davis and Dekoven Coal members of the Carbondale Formation in the Southern Illinois portion of the Illinois Coal Basin has produced numerous discharges of particularly problematic acid mine drainage (AMD). AMD associated with these seams has been characterized by high loadings of acidity, aluminum, iron, and sulfate as the result of leaching of acid-forming materials associated primarily with the inter-burden material separating the two seams. This paper summarizes the findings of a series of site investigations under the Illinois Abandoned Mined Lands (AML) Program. The investigations studied the geochemistry and quantified the contaminant loading of these discharges in order provide the basis for future remediation which may include passive treatment. In a previous paper, the authors presented the geochemistry of AMD discharges at the Palzo AML mine site in Williamson County, Illinois. Information presented in this study will detail the geochemistry of discharges at two nearby surface mines in Saline County, Saxon/Walnut Grove and Will Scarlet, which also surface mined the Davis and Dekoven seams prior to Federal Surface Mining Control and Reclamation Act (SMCRA) of 1977. Extensive land reclamation has been attempted for each sites under the Illinois AML Program; however, significant AMD discharges remain which, if left unabated, may impact the South Fork of the Saline River. Construction of low-pH iron oxidation cells and sulfate-reducing bioreactors are currently the only viable alternatives for passive remediation of these discharges due to the low pH of high aluminum, iron and acidity (>40 mg/L, >60 mg/L, and >450 mg/L CCE, respectively). The use of a steel slag leach bed exists as another possible passive treatment alternative, but could be limited in these locations due to the economics of an excessively long slag haul and the lack of a viable fresh water leachate source. Passive treatment of Davis and Dekoven seam discharges have not been attempted by Illinois to date. This paper presents conceptual passive treatment designs for several case example AML discharges investigated at these sites in the event that funding becomes available at some future date³.

Additional Key Words: low-pH iron oxidation, sulfate-reducing bioreactors, acid-forming materials.

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 3. Work reported here on the two case example sites was conducted near 37° 39'29" N; -88° 33'29" W and 37° 38' 30" N; -88° 41' 45" W.