

Reclamation of an Abandoned Surface Coal Mined Land Using a Dry Flue Gas Desulfurization Product

Liming Chen¹, Dave Kost¹, Hal Walker², Xiaolu Guo¹, Jerry M. Bigham³, Joel Beeghly⁴ and Warren A. Dick^{1*}

¹School of Environment and Natural Resources, The Ohio State University/The Ohio Agricultural Research and Development Center, Wooster, OH, USA.

²Civil and Environmental Engineering and Geodetic Science Department, The Ohio State University, Columbus, OH, USA.

³School of Environment and Natural Resources, The Ohio State University, Columbus, OH, USA.

⁴Carmeuse Technology Center, Pittsburgh, PA, USA

KEYWORDS: dry flue gas desulfurization, reclamation of surface coal mine, abandoned mined land, soil chemical properties, water quality

ABSTRACT

Abandoned and active coal-mined lands are a worldwide environmental concern due to their potential negative impact on water and soil quality. A field study was conducted to investigate the use of a dry flue gas desulfurization (FGD) product of fluidized bed combustion (FBC) for reclamation of abandoned coal mined land in Ohio, USA. The FGD product was applied to the mine site at a rate of 280 Mg ha⁻¹ alone or with 112 Mg ha⁻¹ yard waste compost, and these treatments were compared to a conventional reclamation treatment that included 20 cm of re-soil material plus 112 Mg ha⁻¹ of agricultural limestone. A grass-legume sward was planted, and plant biomass yields and soil chemical measurements were made as much as 14 years after treatments were applied. Dry weight of plants was higher for the conventional reclamation treatment than the FGD product treatments in the first three years after application but not different four years or longer after application. Calcium, Mg, S, and B concentrations and pH in the mine soil were increased by the treatments with FGD product, while extractable Al and Fe concentrations were decreased. The concentrations of Ca, Mg, S, and B in the soil water increased but Fe decreased when FGD product was used. Heavy metals measured were not significantly increased in the plant biomass tissue and soil water. These results suggest that use of FGD product for reclamation of acidic surface coal mined sites can provide effective, long-term remediation.

Submitted for consideration in the 2009 World of Coal Ash Conference, May 4-7, 2009.