Using the Moisture-Deficient Characteristics of Dry Scrubber Ash and an Arid Location to Develop a State-Approved Alternative Landfill Design: The Sunflower Electric Power Corporation Holcomb Landfill, Holcomb Kansas

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ABSTRACT: Waste powder (fly ash and spent scrubber sorbent) derived from combustion of Powder River Basin coal and dry-scrubbed pollution controls is moisture deficient. When successive lifts of conditioned powder are placed in landfills located in arid regions, the result is a physically stable waste mass that will absorb moisture for decades before reaching field capacity and releasing leachate.

In preparation of a permit for a new landfill expansion, Sunflower Electric used field characterization data and modeling to demonstrate that a design with no liner and an evapotranspirative cover would be protective of groundwater quality in an area with an arid climate. The evapotranspirative cover was designed while using the HELP software to evaluate cap performance. The fate and transport of constituents of concern in groundwater was modeled using the USEPA Industrial D Guidance IWEM software. Results from the IWEM modeling demonstrated the proposed design to be protective of the environment for arsenic, barium, chromium, and selenium—constituents that exceeded the MCL during synthetic (SPLP) leachate testing of fresh powder samples. Conclusions from this study were approved in 2006 by the Kansas Department of Health and Environment as part of capacity additions for the Holcomb Landfill. The processes, models, and approach could serve as a template for electric utilities located in arid climates who desire an environmentally protective demonstration for alternatives to conventional cover and liner designs.

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