AIR QUALITY AND VISIBILITY IMPACTS OF POWDER RIVER BASIN COAL MINING AT BADLANDS NATIONAL PARK

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Prepared by:

George E. McVehil
Edward L. Addison
Keith A. Baugues

McVehil-Monnett Associates, Inc.
44 Inverness Drive East
Building C
Englewood, Colorado 80112

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ABANDONED COAL MINE LANDS RESEARCH PROGRAM
University of Wyoming
Laramie, Wyoming 82071

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ABSTRACT

The CALPUFF long-range atmospheric dispersion model was used to calculate pollutant concentrations and visibility impacts in Badlands National Park from air pollutant emissions in the Powder River Basin and surrounding areas. Simulations were carried out for 1990 and 1997 actual emissions (using 1990 meteorological data for both cases). Results were compared to observations over the period 1989 – 1998 that were collected at the Badlands National Park IMPROVE monitoring site.

Only a small portion of observed Badlands pollutant concentrations (less than 20%) were accounted for by modeled emissions, except for nitrate particles, for which the model accounted for 64% of annual mean observed nitrate. The observed changes in pollutant concentrations from 1990 to 1997 were small at the IMPROVE site; model results accounted for about 35% of the observed increase in mean nitrate concentration.

There was an apparent small decrease in "20% cleanest" visual range at Badlands National Park between 1989 – 93 and 1994 – 98. Model results predicted less than 15 percent of the observed change for the 20% of days with best visibility. Increased emissions of nitrogen oxides and carbon particles from coal mining activities and coal transportation were indicated to account for approximately ten percent of the observed decrease in clear day visual range.

Results are presented showing the effects of changes in model input parameters, and of the methodology applied in calculating visibility impacts. Procedures for impact assessment recommended by Federal Land Managers are presented and discussed. It is shown that comparison of model-predicted visibility impacts to natural background conditions can lead to a projection of significant impact on many days, though actual predicted pollutant concentrations may be small.

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