

# CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT OF THE POWDER RIVER BASIN: SURFACE WATER PILOT STUDY<sup>1</sup>

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**Abstract:** Under an interagency cooperative agreement, we are developing a methodology for dynamic Cumulative Hydrologic Impact Assessments (CHIA) of coal mining related development within Wyoming. The cooperators include Wyoming State Engineers Office, State Geological Survey, and Department of Environmental Quality/Land Quality Division; United States Department of the Interior Office of Surface Mining and Bureau of Land Management; and the University of Wyoming.

This poster presents some of the progress we have made in the surface water model application to the pilot study area, Little Thunder Creek in the Powder River Basin. The Little Thunder Creek Basin includes the Jacobs Ranch, Black Thunder, and North Rochelle coal mines. Progress includes the selection of a surface water model, hydrologic and spatial data assembly and analysis, and preliminary application and analysis to the study area. The model selected is the Precipitation-Runoff Modeling System (PRMS) developed by the United States Geological Survey. Ongoing modifications to this model will include: (1) the incorporation of water rights; (2) the simulation of control structures in attenuating peak flows and sediment reduction; and, potentially, (3) the incorporation of water quality simulation abilities.

In the future, we hope to provide an integrated Geographic Information System (GIS), surface water model, and groundwater model. We are currently using ArcInfo as our data manager. Potential future developments will use ArcInfo to calculate surface water (and groundwater) parameter values directly to the simulation models based on land use, soil type, and other spatial coverage data. The pilot study will, in part, provide information on how the integration of the simulation models with the GIS should proceed.

**Additional Key Words:** Coal Mines, Surface Water Modeling, Cumulative Impact Assessment, Powder River Basin, Wyoming.

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