INTEGRATING GEOGRAPHIC INFORMATION SYSTEMS TECHNOLOGY INTO WYOMING'S CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT PROCESS[1]

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Abstract: Geographic Information Systems (GIS) technology is a major component of the Office of Surface Mining's (OSM) Technical Information Processing System (TIPS), a comprehensive set of analytical tools designed to aid Regulatory Authorities in the SMCRA-related technical decision-making process. Currently, GIS is being utilized by the Wyoming Water Resources Center in support of the Wyoming Technical Information Processing System (WYTIPS) Lab's efforts to develop and implement methodologies for carrying out cumulative hydrologic impact assessments (CHIAs) of coal mining activities in Wyoming. Initial CHIA-based GIS applications have focused on the Little Thunder pilot study area, which includes the 250 sq. mile Little Thunder Creek watershed in Cumulative Impact Area #2, one of five preliminary CIAs identified for the Powder River Coal Region in Northeastern Wyoming. Three mines impacting the study area can be found within the watershed boundary; Jacobs Ranch, Black Thunder and North Rochelle.

Within the Little Thunder study area, existing and proposed GIS support of the CHIA modeling effort includes spatial data automation and management, spatial analysis, and model integration.
Fifteen specific spatial data layers have been developed as data inputs for CHIA surface- and ground-water modeling. These data layers include; surface water flow, surficial hydrography network, vegetation, soils, surficial and bedrock geology, faults and folds, coal isopach, scoria, well attributes, backfill/spoil, water rights, climatological data, and topography. Additional data layers developed for cartographic reference include transportation and the public land survey system. In a GIS environment, these data layers may be easily edited, manipulated, synthesized, and graphically displayed, providing surface- and ground-water modelers a flexible method for obtaining results in an efficient and cost-effective manner necessary for the CHIA process.

Additional Key Words: GIS; Database Development; Surface-Water Modeling; Ground-Water Modeling; Powder River Basin, Wyoming.

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