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David A. Lopez, Montana Bureau of Mines and Geology, Billings, MT

Resource Assessment and Analysis of Produced Water Disposal Options North Cheyenne Reservation, Southeast Montana

The Idaho National Engineering and Environmental Laboratory (INEEL) and the Montana Bureau of Mines and Geology (MBMG) are conducting an analysis of environmentally sound and cost-effective disposal methods of water associated with development of coalbed methane (CBM) on the Northern Cheyenne Reservation. Water disposal by re-injection into a zone that will preserve beneficial uses is the main focus of the project. This is being accomplished by (1) reviewing multiple water-handling options within the context of the forecasted gas and water rates associated with CBM development, and (2) geologic analysis to identify beds most suitable for re-injection. INEEL is providing production forecasts and reservoir simulation. MBMG is responsible for accurate geologic description of the reservation, including detailed stratigraphy and distribution of coals and sandstones in the Tongue River Member of the Fort Union Formation. New structural mapping on the Lebo Shale Member has defined several anticlinal structures and has accurately delineated the north-trending axis of the Powder River Basin across the reservation. The reservation is underlain by eight major coal beds, some as thick as 80 feet. Mapping and correlation of channel sandstones in the Tongue River Member have defined stacked north- and northeast-trending paleo-river systems. Some of the channel sandstones are more than 100 feet thick and have porosities as high as 30%. These sandstone bodies and coal beds, may prove to be excellent zones for injection of CBM produced-water.