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Successful High Grading of Coal Bed Methane Gas Fields with Soil Gas Geochemistry: A Test of Multiple Methods Over the Prairie Dog Creek Field in the Powder River Basin, Sheridan County, Wyoming

Soil gas geochemistry is shown as a useful tool for locating better gas production in coal bed methane (CBM) fields with structural features. A multiple technique geochemical survey was conducted over the Prairie Dog Creek CBM Field in Sheridan County, Wyoming. The field has multiple coal bearing zones in the Tertiary Fort Union Formation. The largest accumulations of gas are associated with areas that are structurally deformed or lie above the water table. Exploration has been focused on conventional trapping mechanisms associated with the coal seams that produce more gas. A geochemical orientation survey was designed to determine if the areas with better production could be identified using soil gas geochemistry. Three sample types were collected at each location including free soil gas, a deep soil core, and a surface soil sample. Two extraction methods were used on the soils. The extracted and free C1-C6 hydrocarbons were analyzed by flame ionization gas chromatography. The results of the different sampling and analytical methods are compared to the rates of production at different periods of production history. Statistical modeling of the geochemical data over areas of high and low production rates predicts areas with the highest gas production rates. Updated production and well data will be presented to show if the geochemistry predicts future gas production trends.