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Monitoring the Quality of CBNG Produced Water and Determining Beneficial Uses across the Powder River Basin, Wyoming

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Abstract Text:

The demand for coalbed natural gas (CBNG) in the United States is increasing to meet national energy demands. The extraction of CBNG from coalbed aquifers results in production of large quantities of produced water which is then placed on the surface in large disposal ponds. The quantity of water led government officials, landowners, and citizens of Wyoming to be concerned with optimum use for the produced water. Therefore, the objective of this study was to collect and monitor CBNG water samples at outfalls and corresponding disposal ponds across the Powder River Basin, Wyoming and determine quality and more importantly beneficial uses. Water samples were analyzed for major cations (Na, Ca, Mg, K), major anions (Cl, F, NO2, NO3, SO4, PO4), and trace metals (Al, Mn, Fe, Pb, Cu, Cd, Ba, B, Cr, As, Se, Mo). The analytical data was input into a geochemical model MINTEQA2 to determine quality of CBNG produced water quality. From this water quality data and data from 1999 to 2003, beneficial uses such as irrigation, livestock/wildlife watering, and aquaculture were determined based upon the standards set by the Wyoming Department of Environmental Quality (WYDEQ).

Impact Statement:

This research is helping landowners, industry, regulatory agencies (e.g., EPA and DEQ Water Quality Division), Wyoming Geological Survey and U.S. Geological Survey, and bordering states (e.g., Montana, Colorado) make informed decisions regarding water chemistry, salinity, sodium adsorption ratio, and trace element impacts on soils, plants, channel sediment, aquatic life, livestock, and wildlife. It is also helping clientele develop optimum uses of coalbed methane produced water (e.g., irrigation, livestock and wildlife watering, and aquaculture).