

# COALBED NATURAL GAS CO-PRODUCED WATER AND ITS EFFECTS ON SOIL<sup>1</sup>

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**Abstract.** Wastewater coproduced from coal seams during natural gas extraction can be an environmental concern in the Powder River Basin (PRB). I propose to gain a better understanding of the chemical and physical processes associated with the hydraulic properties of this waste water on PRB soils as a component of my Ph.D. research project. The applications of this study range from tracing the water using stable isotopes to determining the thresholds for chemical and physical parameters of soils treated with these waters.

The study will consist of a field and a lab component. Saturated and unsaturated hydraulic conductivities will be measured in the field with large field tension infiltrometers. When the saturated and unsaturated hydraulic conductivities have been measured at the site, soil core samples will be taken with a 15 cm diameter by 10 cm tall soil corer. Water samples will be collected from CBNG wellheads, rivers mixing with wellheads, irrigation ditches and ponds, and undisturbed waters. The waters will be initially analyzed for  $\delta^{13}\text{C-DIC}$  in the UW Stable Isotope Facility by the Thermo Finnigan DeltaPLUS XP Continuous Flow IRMS.

Following the field study, saturated and unsaturated hydraulic conductivities will be measured in the laboratory with several water solutions. Each water sample will be applied to the soil several times to determine saturated and unsaturated hydraulic conductivities. The laboratory component will also incorporate an isotope batch adsorption study. CBNG water would be added to disturbed soils in a centrifuge tube. The  $\delta^{13}\text{C-DIC}$  of the water samples would be measured before mixing with the soil and then after mixing. This batch study would then lead to a laboratory isotope leaching study. This information will help trace CBNG water from the source into fields, streams, and groundwater as well as understand the fractionation occurring in different soil types with different types of waters.

**Additional Key Words:** coalbed methane, tension infiltration, stable isotopes

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