

RESULTS OF A COGCC-SPONSORED BASELINE ENVIRONMENTAL DATA SURVEY RATON BASIN, COLORADO

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Abstract

Continuing development of coal bed gas (CBG) resources has prompted concerns from local government and the public about the potential impacts to ground water in the Raton Basin. There is a concern of possible de-watering of shallow aquifers due to water being pumped from CBG wells. Some people see the CBG waste water as a valuable resource that is being lost in an arid basin. There is also a safety concern that continued development of CBG may cause gas seepage from coal seams and coal sub-crops. The COGCC conducted a baseline study to document existing conditions and provide data for addressing these concerns. This presentation summarizes the methods and results of the study with respect to the chemical and isotopic data.

A total of 2,749 linear miles were surveyed for hydrocarbon seeps using a truck-mounted infrared spectroscopy detection device. Sixty seven (67) separate seeps were found, and these were confined to an area within the Raton Formation coal outcrop and shallow subcrop. Additional investigations would be required to identify the actual source of each seep. Water wells containing measurable amounts of dissolved methane are geographically distributed in a pattern similar to that observed for methane seeps. Of 240 water well samples analyzed, 47% contain measurable amounts of dissolved methane. The source of methane can be determined by analyzing its stable carbon and deuterium isotope values. Because the range of stable isotopic values found is large, methane in groundwater and shallow seeps can be differentiated from produced methane.

Four hundred and sixty five (465) active and abandoned coal mines were identified, three hundred and twenty eight (328) were digitized, and the location of one thousand one hundred and forty one (1141) core holes were digitized, to provide spatial data of potential methane sources.

The quality of surface water, domestic well water, and springs is variable throughout the basin and composed of mixed water types. These types include calcium-magnesium bicarbonate (dissolved limestone), calcium and sodium sulfate (dissolved gypsum and thenardite), and minor amounts of sodium bicarbonate (dissolved baking soda). Water quality and water well yield are typically affected by fecal coliform bacteria and naturally-occurring coliform, sulfate-reducing, and iron-related bacteria.

Produced waters contain more total dissolved solids than shallow groundwater, and are composed principally of two mixed water types: sodium bicarbonate (dissolved baking soda) and sodium chloride (dissolved table salt). In general produced waters contained little or no sulfate. A few CBG well areas contained elevated dissolved sulfate concentrations. These areas would require further investment to identify the source. The stable isotopic composition of carbon in dissolved inorganic carbon is also a useful indicator for detecting the presence of shallow groundwater in producing wells.