

The Origin and Fate of High Arsenic Concentrations in a Coalbed Natural Gas Produced Water Impoundment

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Abstract. A study was conducted to determine whether a Coal Bed Natural Gas (CBNG) produced water impoundment transports contaminants such as arsenic into a shallow groundwater table. CBNG produced waters contain small amounts of trace metals which can accumulate over time in impoundments. An impoundment with a maximum historic arsenic concentration of 146 ug/L (2004) was chosen for this study as it represents a worst case scenario from a water quality perspective (~15 times higher than EPA drinking water limit). Well head and impoundment water quality, subsurface hydrology, infiltration, isotope signatures, and computer modeling were examined to assess the hydrology of the impoundment. Modeling studies included geochemistry (Minteq), subsurface hydrology (Hydrus2D), and contaminant transport (Hydrus2D). Preliminary data indicates high SAR CBNG produced water causes a hydrologic disconnect between the impoundment and the shallow ground water before the high arsenic concentration occurred in 2004. Minimum water and contaminant transport into the groundwater is predicted. Arsenic and other trace metals are predicted to adsorb to the top several cm of the soil and sediment under the impoundment. The contaminated sediment/topsoil from the impoundment will need to be reclaimed at the end of the impoundments life.