

# MODELING OF GROUNDWATER CONTAMINATION OF TRACE ELEMENTS FROM CBNG DISPOSAL PONDS<sup>1</sup>

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**Abstract.** When producing coalbed natural gas (CBNG), water containing trace elements is also produced. A large percentage of this water is stored in disposal ponds, where it slowly evaporates. The evaporation process has the effect of increasing the concentration of trace elements such as arsenic, selenium and barium to much higher levels. The bottom of these ponds is not completely impermeable with the consequent filtration of some of the water into the surrounding soil. The water may eventually flow into underground aquifers. A very important question is to determine if the trace elements actually reach the groundwater and in what concentration. The answer is very important to decide if anything needs to be done to avoid contaminant of sources of drinking and farm-uses water. Mathematical models of flow and transport in porous media will help in this task. We have a two dimensional computer model that will simulate the flow of water from the pond into the non-saturated porous medium beneath it. The model is based on Darcy's law and conservation laws for the trace elements. The mathematical equations were discretized and a computer program was written and implemented on a computer cluster. Sample results will be presented.

**Additional Key Words:** mathematical models; contaminant filtration

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<sup>1</sup> Paper was presented at the 2007 National Meeting of the American Society of Mining and Reclamation, Gillette, WY, 30 Years of SMCRA and Beyond June 2-7, 2007. R.I. Barnhisel (Ed.) Published by ASMR, 3134 Montavesta Rd., Lexington, KY 40502.

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