

2010 GSA Denver Annual Meeting (31 October –3 November 2010)

Paper No. 15-10

Presentation Time: 10:55 AM-11:10 AM

PREDICTIVE MODELING STRATEGIES FOR PROPOSED URANIUM IN-SITU RECOVERY MINES

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Uranium in-situ recovery (ISR) mining extracts uranium via enhanced dissolution of solid-phase uranium in groundwater aquifers. This changes the pre-existing groundwater geochemistry and makes uranium more mobile in solution. Aquifers within the mining zone are often not suitable drinking-water supplies, but surrounding aquifer zones can be of drinking water quality. Local groundwater users are concerned about future impacts on their water quality with nearby ISR mines (either existing or proposed). This research proposes strategies for addressing the following questions at proposed uranium ISR mines: 1) how well do identified aquitards limit groundwater flow between aquifers?, 2) what is the groundwater quality at the end of mining after restoration efforts are complete?, and 3) what is the long-term fate and transport of any groundwater contaminants away from the mined zone?

In order to address these questions, a number of steps should be taken to determine how surrounding groundwater quality may or may not be affected by ISR mining. First, understanding the basic hydrogeologic and geochemical system is critical. Second, predictive modeling using reactive transport simulations can be used to simulate future groundwater conditions (during mining and post-restoration). Third, predictive modeling can be used to evaluate how well surrounding groundwater quality is protected under the proposed mine plan design and to evaluate possible design alternatives. Fourth, model shortcomings should be evaluated to provide a reasonable range of prediction uncertainties. The goal of this research is to provide strategies for better understanding the most probable fate and transport of uranium and other constituents during and after uranium ISR operations. This information will assist mining companies, permitting agencies, and local groundwater users in making more informed decisions that maximize protection of groundwater quality.

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[General Information for this Meeting](#)

Session No. 15

[Reducing the Environmental Impact of Uranium In Situ Recovery](#)

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