Chemically based permeability modifiers for groundwater diversion around in-situ oil shale retorts

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Several methods, (freeze walls, polymer, cements/grouts, low permeable geologic isolation) to control groundwater intrusion near in situ oil shale retorts have been suggested. These water control methods must be viable for several years. Relative permeability modifiers (RPMs) have long been used in the oil industry as a method to reduce permeability in enhanced oil recovery. We are investigating the potential use of two types of chemically based permeability modifiers, polymers and silica gels, as an agent in the fractured oil shale to divert water around an in situ retort. These RPGs would be injected around the proposed retort prior to heating. In the retorting zone, the expected high temperatures would destroy the RPGs thereby maintaining permeable pathways for resource recovery. Outside this high temperature retort zone, the RPGs can be stable to temperatures up to 120ºC. We are performing laboratory batch studies on several classes of polymers and silica gels to evaluate their stability as a function of temperature and their injectivity into fractured media. We will use these data with numerical heat transport models to evaluate the effectiveness of polymer and silica gel injection as a potential groundwater diversion method.