

Geochemical evolution of Piceance Basin groundwater during heating

Carl Palmer, Jessica Little, Earl Mattson

Idaho National Laboratory, USA

During in-situ retorting, groundwater in the vicinity of the operation will be heated. The alteration of the groundwater chemistry as a result of this heating will cause geochemical changes that can alter water quality and impact the permeability of the reservoir. We have conducted geochemical modeling of groundwater in the Piceance Basin to better understand how the groundwater chemistry will evolve during heating. The PHREEQC Interactive code with the llnl.dat thermodynamic database was used to make the calculations. The initial water chemistry is based on reported values found in available reports or the USGS water quality database. Because no mention is made in the published reports concerning pH measurement, we assume that they are either laboratory values or were measured in the field without the use of flow-thru cells. This assumption would suggest that the pH values are high relative to the actual in-situ values due to CO₂ loss. We therefore calculated the pH based on assumption of equilibrium with calcite, a mineral commonly reported throughout the stratigraphic section. We report here on the mineral saturation states of these groundwater samples and how their chemistry might evolve upon in-situ heating.