

Saline water disposal in the Uinta Basin, Utah: The single most pressing issue with regard to increasing petroleum production and protecting freshwater aquifers

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Saline water disposal is the single most pressing issue with regard to increasing petroleum and natural gas production in the Uinta Basin of Utah. Conventional oil and gas fields in the basin provide 67% of Utah's total crude oil production and 71% of Utah's total natural gas, the latter of which has increased 175% in the last 10 years. As petroleum production increases, so does saline water production, creating an increased need for economic and environmentally responsible disposal plans. Current water disposal wells are near capacity and permitting for new wells is being delayed because of a lack of technical data regarding potential disposal aquifers and questions concerning contamination of fresh water sources. Many Uinta Basin operators claim that petroleum and natural gas production cannot reach its full potential until a suitable, long-term saline water disposal solution is determined.

We have begun efforts to re-map the base of the moderately saline aquifer within the Uinta Basin using more robust data and more sophisticated GIS techniques than previous efforts. Below this base, we believe that saline water can be injected without damage to the overlying freshwater reservoirs. Water chemistry data are being collected from wells of operators and governmental agencies. These ground-truth data are supplemented with water chemistry information calculated from geophysical logs. In addition to the new GIS-based map, we are constructing cross sections showing the stratigraphic position of the moderately saline to very saline transition and its relationship to potential seals and disposal zones in the Uinta Basin.

A potentially suitable disposal zone for large volume saline water disposal is the fresh to slightly saline Bird's-nest aquifer. This aquifer is located in the oil shale zone of the Green River Formation's Parachute Creek Member and is 200 to 300 ft above the kerogen-rich Mahogany zone. A significant concern is that saline water disposal into the Bird's-nest by conventional gas producers may hinder oil shale development by creating unforeseen economic and technical hurdles. With increased saline water disposal, the water quality in the Bird's-nest could degrade and create additional water disposal problems for oil shale development companies. We have examined this aquifer in outcrop, core, and geophysical logs, and have gained a better understanding of its areal extent, thickness, and zones of differing water chemistry.