

14.4 **Saline water disposal into the birds nest aquifer in the Uinta Basin, Utah: Updated research on the implications for oil shale development**

Michael Vanden Berg

Utah Geological Survey, Salt Lake City, UT, United States

During deposition of the upper Green River Formation in the late Eocene, Utah's Lake Uinta transitioned from a balanced filled basin dominated by organic-rich, laminated marlstone, to an underfilled restricted basin. During this time, the saline mineral nahcolite formed within the deep-lake sediments (depocenter in central Uintah County) as isolated crystals, nodules ranging up to one foot in diameter, and beds ranging from less than an inch to 2 feet thick. Post-deposition, the saline mineral shortite formed in fracture zones several feet thick. More recently, the Birds Nest aquifer formed from the dissolution of these saline minerals. The total thickness of the saline zone ranges from <100 feet on the basin margins to >300 feet in the basin's depocenter. The actual aquifer, which is targeted by natural gas operators as a potential saline water disposal zone, lies within the saline zone and is typically divided into two or three stratigraphic zones of dissolution, each roughly 40 feet thick. Ongoing research seeks to determine if these zones are hydraulically connected or if the Birds Nest as a whole is vertically connected via fractures/joints (possibly gilsonite veins) to other water-bearing zones both above and below. Understanding the aquifer's areal extent, thickness, water chemistry, and zones of differential dissolution will help determine possible saline water disposal volumes and safe disposal practices, both of which could directly impact the success of increased petroleum production and potential oil shale development in the region.