

A Collapsed Paleocavern System as a Powerplant Wastewater Disposal Reservoir - Cambro-Ordovician Arbuckle Group of Ford County, Kansas
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The Sunflower Electric Power Corporation, Fort Dodge Station Injection Well No. 1 was drilled and conventionally cored to evaluate Cambro-Ordovician age Arbuckle Group carbonates as a potential reservoir for disposal of large volumes of non-hazardous, reverse osmosis wastewater from powerplant cooling towers. A core from the overlying Upper Pennsylvanian age Shawnee Group (Oread Limestone Formation) was evaluated for top-seal potential. Detailed petrographic analysis and core description of the Arbuckle Group in this well indicates the presence of a large-scale collapsed paleocavern system similar to those documented in Arbuckle and Ellenburger petroleum reservoirs, and in Ellenburger Group quarry exposures in Central Texas. Paleocavern facies observed in core include fine-scale clast-supported breccias composed of diverse polymictic clasts (dissolution-cavern fill of transported clasts, sediment, and rare blocks), large-scale blocks and slabs composed of collapsed roof and wall strata, and cave-sediment fill composed of fine transported material and rare clasts. Further compaction and brecciation of these paleocavern facies occurred during burial in the subsurface. Pore types documented in core and thin sections include intercrystalline (matrix) pores and interparticle/intergranular pores within host rock and sediment fill, vuggy solution pores within host rock, clasts, sediment fill, and cements, inter-clast pores, and crackle breccia (fracture) pores. Micropores are also present within chert cements. Calculated flow rates for disposal in this well are estimated to be +/- 600 gpm, 24/7, for 30 years, indicating that paleocavern reservoirs can be excellent candidates for the disposal of large volumes of non-hazardous waste water.