

Use of Soil Geochemistry to Define Details of Within-Reservoir Conduits and
Permeability Related to Hydrocarbon Charge at Glodes Corner, a Trenton-Black
River HTD Gas Field in Steuben County, NY

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Surface soil geochemical samples taken at Glodes Corner, NY, 8000 feet above a HTD-hosted gas field have produced a precise definitional tool that defines the overall gas field and also delineates the internal conduit features related to the hydrocarbon charge. The field is within a seismically defined sag feature or collapse caused by the formation of HTD at the Trenton-Black River level. Soil geochemistry was interpreted in terms of a fluid fractionation and a transcurrent

shear-system kinematic model. Significant lateral chemical zonation includes well-developed east to west asymmetrical patterns in CO₂:O₂ and ferric:ferrous ratios, hydrocarbon gases, and Na-As-Zn-K-V-Mg . The east end of the field is characterized by lower oxidation state assemblages, such as higher CO₂:O₂ ratios, lower ferric:ferrous ratios, and greater abundances of C₁ and C₂ hydrocarbons, with respect to C₅ and C₆ hydrocarbons. The east end of the field appears to be closer to a primary northwest-striking conduit system that was operating in left slip during fluid introduction. Fluids ascended through this conduit system, entered the field from the east, and became more oxidized as they migrated westward into east-west-striking Riedel-tensile fractures. The within-reservoir, Riedel-tensile, conduit architecture of permeability and dolomite plugging can be identified by interpretation of hydrocarbon gas distribution (C₁-C₂ high in conduits and trace metals, C-5 and C-6 gases away from the conduits). A possible southerly conduit that may have additional production potential was also defined. The demonstrated resolution of this geochemical tool adds increased precision to current methodologies of reservoir identification and evaluation.

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