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March UGA Luncheon Meeting

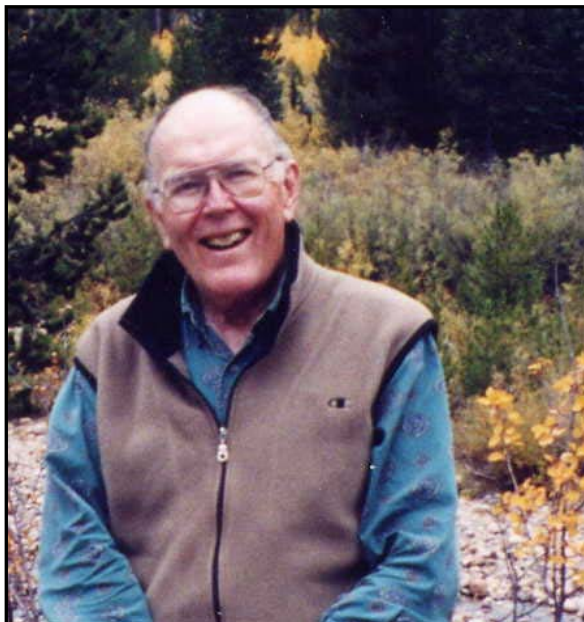
March 8, 2010

Diagenetic characteristics of the Jurassic Navajo Sandstone in the Covenant oil field, central Utah thrust belt

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ABSTRACT

The Jurassic Navajo Sandstone is an important reservoir unit that shows striking coloration patterns reflecting iron cycling and past fluid flow history. In the Covenant field, the Navajo Sandstone includes eolian dune interbedded with carbonate playa lake and fluvial interdune facies. Dune facies samples are bleached but not depleted in iron; bleached dune facies outcrop samples are depleted in iron. Bleached dune facies in the core samples contains ferroan dolomite, quartz overgrowths that do not completely fill pore spaces, grain-coating and pore-filling illite, coarse-grained gray hematite, kaolinite, and trace pyrite. Reddish brown interdune facies are typically very fine-grained sandstone and siltstone, and contain dolomite and ferroan dolomite cement, illite pore filling, and very fine-grained, red hematite. Diagenetic mineralogy and chemical compositions overlap the mineralogy and compositions of outcrop samples.



Carbon and oxygen isotopic composition of dolomite in interdune facies and adjacent dune facies is derived from groundwater discharge modified by evaporation in a playa lake interdune environment, not from interaction with hydrocarbons.

The iron in bleached dune facies is incorporated in coarse-grained hematite, ferroan dolomite, and trace pyrite. The bleached diagenetic mineral association of ferroan dolomite-hematite-pyrite with SO_4^{2-} is metastable relative to more reducing conditions produced by petroleum. The reservoir temperature of 188°F (87°C) is too high for bacterial sulfate reduction and too low for geologically significant thermochemical sulfate reduction accounting for association of abundant SO_4^{2-} in produced water and trace pyrite in the core.

Biographies: Bill Parry is professor emeritus of geology and geophysics at the University of Utah. His former positions include associate professor of geoscience at Texas Tech University, Lubbock, Texas, and exploitation engineer for Shell Oil Company, Midland, Texas. He received his B.S., M.S., and Ph.D. degrees in geological engineering from the University of Utah, where he taught geology and engineering. His research interests are geochemistry and mineralogy related to ore deposits and faults.

Margie Chan is professor of geology at the University of Utah. She received her B.S. degree from the University of California, Davis, and her Ph.D. from the University of Wisconsin, Madison. Her recent and current research focuses on Mesozoic sedimentology and stratigraphy on the Colorado Plateau, with applications to eolian reservoirs and terrestrial iron oxide concretion analogs to Mars.

***** **LUNCHEON LOCATION** *****

The March luncheon meeting will be at 12:00 noon, **Monday March 8th**, 2010, at the Utah Department of Natural Resources, 1594 West North Temple. *Enter on south side.*

Please make your reservations (537-3300) no later than 4:00 p.m. on Thursday March 4th.

Click to make reservations for the Luncheon Meeting by sending email to reservations@utahgeology.org.

Lunch at 12:00 noon. Meeting begins at 12:30. Cost: \$10.00 w/ reservations; \$5.00 for students. Cash or Checks only please.

