

Expanding the Heart of the Uinta Oil Play: The Douglas Creek Member of the Green River Formation, Uinta Basin, Utah

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Abstract

The Douglas Creek Member of the Eocene Green River Formation of the Uinta Basin has long been the largest and most important producing zone in the conventional oil fields on the southern margin of the Uinta Basin. There it consists of marginal lacustrine deltaics and is being waterflooded in some fields such as Greater Monument Butte, Antelope Creek and Brundage Canyon. Despite its economic importance, the Douglas Creek Member received scant attention from operators during the horizontal drilling revolution, with only a few short-lateral tests within the southern deltaic trend, which generally resulted in disappointing production. This is changing rapidly as operators focus their efforts on less sand-prone portions of the Douglas Creek Member in the deeply buried basin center. Here TOC enrichment is greater, thermal maturation values are higher and a large volume of interconnected organic porosity has developed. Stratigraphic facies, tied to basin geometry and syndepositional structural trends, have controlled siliciclastic dilution of TOC volumes. Most bed-transported clastics were trapped on the southern margin of ancient Lake Uinta where large volumes of water and sediment were being delivered by fluvial systems from the south from the famous Sunnyside Delta and California River systems. Movement on the Duchesne fault zone provided ample accommodation space to trap coarse siliciclastic sediments on the southern margin of the basin. Much more highly TOC-enriched sediments were being deposited in the lake center to the north where sediment dilution was much lower. This TOC-rich portion of the Douglas Creek was eventually buried deeply enough to generate hydrocarbons. Carbonate shoals developed in the northwest margin of the lake, the furthest from the locus of siliciclastic deposition. Over time, these carbonate shoals prograded eastward towards the center of the lake, but these shoals never covered more than a small portion of the Douglas Creek system. Beginning in 2017 and much more rapidly since 2022, operators have targeted finer-grained sediments in multiple zones within the Douglas Creek where organo-pores have developed, with accelerating success. Daily production volumes do not match those of the deeper and higher pressured Uteland Butte Member, but declines have proven to be relatively flat and estimated ultimate recoveries are calculated to be quite attractive.

References

- Brinkerhoff, A.R. & K. Woolf, 2018, Characteristics of Sandy Hyperpycnite Deposits on the Shallow, Southern Margin of Eocene Lake Uinta, the Green River Formation of Northeastern Utah, Adapted from oral presentation given at AAPG 2018 AAPG Annual Convention and Exhibition, Salt Lake City, Utah, May 20-23, 2018,
http://www.searchanddiscovery.com/pdfz/documents/2018/51495brinkerhoff/ndx_brinkerhoff.pdf.html
- Chaparro, F.R., H.G. Machel, & M.D. Vanden Berg, 2019, Dolomitization in the Uteland Butte Member of the Eocene Green River Formation, Uinta Basin, Utah: Utah Geological Survey Open-File Report; *In Press*
- Chidsey, T.C., 2010, Major Oil Plays in Utah and Vicinity, Utah Geological Survey – Survey Notes, Vol. 42, Number 1
- Eldridge, G.H., 1901, The asphalt and bituminous rock deposits of the United States, in Walcott, C.D., director: U.S. Geological Survey Twenty-second Annual Report of the United States Geological Survey to the Secretary of the Interior, pt. 1, p. 209–364.
- Logan, S.K., Sarg, J.F., and Vanden Berg, M.D., 2016, Lithofacies, deposition, early diagenesis, and porosity of the Uteland Butte member, Green River Formation, eastern Uinta Basin, Utah and Colorado: Utah Geological Survey Open File Report 652, 32 p., Online, ugspub.nr.utah.gov/publications/open_file_reports/ofr-652.pdf
- Markello, J. and Read, J., 1981, Carbonate ramp-to-deeper shale shelf transitions of an Upper Cambrian intrashelf basin, Nolichucky Formation, Southwest Virginia Appalachians: *Sedimentology* vol 28, p. 573-597
- Morgan, D.M. & R.W. Stimpson, 2016, Characterization and Horizontal-Drilling Potential of Oolitic and Ostracodal Limestone Reservoirs in the Eocene Green River Formation, Northeastern Uinta Basin, Utah: Utah Geological Survey Open-File Report
- Ruble, E.T., M.D. Lewan, R.P. Philip, 2001, New insights on the Green River petroleum system in the Uinta basin from hydrous pyrolysis experiments, *AAPG Bulletin*, v. 85, no. 8 (August 2001), pp. 1333–1371
- Rueda Chapparro, F., Machel, H.G., and Vanden Berg, M.D., 2019, Dolomitization in the Uteland Butte Member of the Eocene Green River Formation, Uinta Basin, Utah: Utah Geological Survey Open-File Report 700
- Schmude, D.E., and B.R. Berwick, 2022, Lacustrine Source Rocks and Unconventional Oil Resource Plays, *in* Utah Geological Association Publication 50, M.D. Vanden Berg, R. Brinkerhoff, J.E. Birdwell, E.A. Jagniecki, L.P. Birgenheier, editors
- Vanden Berg, M.D., Wood, R.E., Carney, S.M, and Morgan C.D., 2014, Geological characterization of the Uteland Butte member of the Eocene Green River Formation—an emerging unconventional carbonate tight oil play in the Uinta Basin, Utah [abs.]: Rocky Mountain Section AAPG Annual Meeting, Denver, Colorado