

MGS Virtual Luncheon Meeting

Wednesday, February 17th

12:00 – 1:00pm

Open to MGS members via Zoom

RSVP to montanageologicalsociety@gmail.com
by Tuesday February 16th to receive the Zoom link



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PRISEM GEOSCIENCE CONSULTING

Stratigraphy and Sedimentology of Productive Lower Carboniferous Reservoirs in the Bakken Petroleum System, western Montana and Alberta

Lower Carboniferous strata in the Bakken Petroleum System of the United States and Canada are the Banff Formation (part), upper Sappington Shale, Cottonwood Canyon Member of the Lodgepole Formation and to the east, the Upper Bakken Shale. The western facies records major basin reorganization and erosion related to the Antler Orogeny. They overlie an erosional surface that locally rests on the Jefferson/Duperow and extends as far east as Elm Coulee Field. The upper surface is also an erosional boundary beneath the Lodgepole/ Banff limestones that has locally stripped them from paleohighs. This unconformity-bound sequence is its own transgressive systems tract that passes into a correlative conformity in the Williston and Elbow Basins, where the upper Bakken shale has historically been seen as having sharp, but conformable contacts.

Internally, the western facies consist of two members; a lower black shale identical to the Upper Bakken Shale and an overlying sandstone that is not present in the Williston Basin. The sandstone is a very fine-grained, medium bedded, very carbonaceous sandstone with black mudstone laminae intensely bioturbated in the *Zoophycho*s Ichnofacies (intermediate subtidal depth). A high gamma-ray signature makes it difficult to identify on logs. A western source for the sand and plant fragments is postulated, perhaps from an uplifted forebulge extensively colonized by terrestrial plants.

In southern Alberta, this sandstone reaches thicknesses of 45+ feet and produces in the Ferguson field, down dip of the Kevin-Sunburst Dome. Here it is referred to as the Banff Sand or the “Alberta Bakken” emphasizing that it is not correlative to the older Middle Bakken or Exshaw. The Ferguson and related sand bodies are erosional remnants of what was once a much thicker depositional system that has been extensively eroded beneath the basal Lodgepole/Banff unconformity. Trapping occurs by truncation of the reservoir along the flank of a paleohigh in an up-dip position on the northern flank of the Dome.

Biography

Dr. Doughty has 20 years of experience as a field geologist, research project leader, associate professor, and, most recently as the founder of PRISEM Geoscience Consulting. He has extensive international

experience, working on projects in Colombia, Nigeria, the Netherlands, and over a significant part of offshore and on-shore North America. He began his career working for Amoco Production company in 1990 as an Exploration Geologist in the Arkoma basin of Oklahoma. He then moved to Exxon where some of his duties included 2-D and 3-D seismic interpretation, giving lectures at schools and Exxon classes, as well as leading projects using ground-penetrating radar to map fault zone materials. In 2000 he took on an Associate Professor role at the Eastern Washington University, and was involved in structural geology, tectonics and petroleum geology. Currently he is the President of PRISEM Geoscience Consulting and has worked with such respected companies such as Halliburton Colombia, Rosetta Resources, Petrobakken, Crescent Point, Talisman Energy, Hess Corporation, Husky Energy, and Amarak Energy to name a few.