

## Reservoir Characterization Studies: Yukon Flats basin, Alaska

**R.R. Reifentstahl** ([rocky@dnr.state.ak.us](mailto:rocky@dnr.state.ak.us)), Alaska Division of Geological and Geophysical Surveys, Fairbanks, AK

Reservoir characterization studies by the Alaska Division of Geological and Geophysical Surveys (DGGS) are currently underway in the Yukon Flats basin. Potential reservoirs are quantified using petrophysics (porosity and permeability) and detailed petrographic analyses (point counting, grain size measurement, cement timing assessment). Other geologic controls include preliminary assessment of: facies analyses, stratigraphic sections, regional facies correlation, distribution, and subsurface and surface geology. Data are integrated with the results of helicopter-supported, basin-wide, reconnaissance geologic fieldwork. The three day field program took place in 2002. Evaluation of principle target reservoirs is part of a basin analysis and undiscovered hydrocarbon program in cooperation with the U.S. Geological Survey.

The Yukon Flats basin is a latest Cretaceous and Cenozoic extensional sedimentary basin associated with the Tintina and Kaltag strike-slip faults. Seismic interpretations suggest more than 15,000 feet of nonmarine and lake sediments locally, with three stratigraphic cycles, each including different proportions of lake and river sediments. Lake sediments may include oil-prone or gas-prone organic material and act as reservoir topseals. Oil and gas plays include reservoir sandstones in structural and stratigraphic traps. Petroleum maturation and expulsion is expected below 7,000 to 10,000 feet based on a geothermal temperature gradient that is reasonable for an interior basin. Existing gravity data indicates a 50 milligal low over the south-central portion of the basin. The U.S. Geological Survey drilled to 390 meters at Fort Yukon in 1994. The stratigraphy includes 7 to 9 meters of lignite coal of Miocene age at 370 to 390 meters. This coal core showed gas seepage (presumed to be methane), and the hole was shut down. The Mesozoic and Paleozoic age Tozitna terrane underlies an unknown part of the northern Yukon Flats basin. Rare oil shale crops out, and has been historically noted 43 km north of the village of Christian on the Christian River. The tasmanite oil shale is composed of marine algae (*tasmanites*), is considered to be Triassic to Permian age, and part of the Tozitna terrane.

Potential energy resources of the Yukon Flats basin include: coalbed gas, shalebed methane, conventional gas, and oil. Porosity and permeability data (40 samples) range from 0.006 to 38.7%; 0.001 to 203mD. The point-counted Yukon Flats basin-margin sandstone samples (12) plot predominantly within the transitional recycled subdivision, of a tectonic provenance triangular plot. One outlier plots in the quartzose recycled subdivision and is the Triassic to Jurassic age sandstone from Step Mountain area, eastern Yukon Flats basin. The lithic recycled subdivision includes one sample of early Eocene age and one of early to middle Eocene age. The goal of this ongoing project is a publicly available reservoir characterization and resource data to minimize exploration, development and production costs, and risk, while maximizing hydrocarbon recovery.