

Yukon Flats Basin, Alaska: Reservoir Characterization Study

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The Yukon Flats basin is located in east-central Interior Alaska. To characterize the potential siliciclastic reservoirs of selected Tertiary outcrop samples and selected Exxon core material, 26 Exxon drill core samples were analyzed for porosity and permeability (P&P), and petrographic composition. The Exxon drill holes were located on the basin margins. In addition to the core samples, about 40 outcrop samples were collected from Tertiary basin fill. Gravity and seismic geophysical information suggest 15,000 foot thick depocenters locally. Potential energy resources include coalbed methane, shalebed methane, and conventional gas and oil. A summary of the P&P data from the basin margin cores include porosities of 1.1 to 11.7 percent (average about 4 percent) and permeabilities of 0.001 to 171.3 md (average 0.4 md). A summary of the P&P data from the 11 Yukon Flats basin outcrop samples includes porosities of 2.7 to 38.7 percent (average about 13 percent) and permeabilities of 0.006 to 203 md (average about 20 md). P&P reduction is common in the vast majority of the drill core sandstones, in which ductile grains (shale, mudstone, argillite and phyllite) total from 2 to 27 percent. Potential reservoir sandstones crop out northeast of Rampart, along the Yukon River, where a more than 1-kilometer-thick stratigraphy of probable Eocene units include thick, meandering stream deposits of sandstone, conglomerate, and lignite coal beds up to 10 centimeters thick. At Schiefflin Creek, on the Yukon River, several hundred meters of Eocene to Oligocene fluvial sandstone, pebbly sandstone with lesser conglomerate, and minor coal are well exposed and yield good petrophysical characteristics (8.8 millidarcy permeability and 15.8 percent porosity). Petrographically, drill core samples from the Yukon Flats basin perimeter wells range from litharenite sandstone (10), to sublitharenite sandstone (1), to quartzarenite sandstone (1), and are erosional products of a provenance dominated by quartz-rich and chert-rich rocks, with lesser contributions from quartz-poor rocks such as shale, mafic and intermediate igneous rocks, and metamorphic rocks. Seven of the 12 point-counted drill core sandstones are volcanoclastic-rich and Paleogene to Eocene in age.