Geomechanical Characterization of the Farrell Creek Montney Reservoir, Northeast British Columbia

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Abstract

A detailed geomechanical characterization of the Farrell Creek Montney gas field in northeast British Columbia was undertaken to help understand the primary factors controlling well productivity in this unconventional, primarily siltstone reservoir. An unparalleled dataset of in-situ stresses, pore pressures, rock mechanical properties and discontinuity data has been collected and analyzed for this purpose. A comprehensive set of mini-fractures or diagnostic fracture injection tests (DFITs), obtained in the toe stages of 33 horizontal wells, has provided valuable data on the spatial and depth distribution of pore pressure, instantaneous shut-in pressure (ISIP), fracture closure pressure (or minimum horizontal stress, S_{Hmin}) and kh (permeability-fracture height product). In parts of the field, even at true vertical depths in excess of ~2500 m, there is evidence of horizontal hydraulic fractures being propagated where the vertical to horizontal in-situ stress ratio is near unity. High DFIT net pressures (ISIP-S_{Hmin}) suggest evidence of a complex involvement of natural and induced fractures, and near-wellbore fracture tortuosity in these horizontal wells.