

Optimizing the Development of the Giant Tight Gas Sandstone Reservoir at Jonah Field, Sublette County, Wyoming

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Jonah Field is a giant tight-gas reservoir that produces from lenticular, discontinuous, Upper Cretaceous fluvial sandstones within overpressured fault-bounded compartments. During field development, well spacing has become progressively denser as a result of improvements in reservoir understanding and optimization of drilling and completion operations. Initial field development took place on 160-acre spacing but well density was increased to 80-acre and then 10-acre spacing from 1998 to 2004. Well density recently was increased to approximately 8-acre spacing over much of Jonah Field in October 2009 due to further refinements in reservoir understanding.

Jonah Field's key reservoir-description refinements are the result of a new core-calibrated petrophysical model that increases estimates of the original-gas-in-place (OGIP) and provides more accurate characterization of reservoir effective porosity, effective water saturation, and permeability. Important revisions to pressure data used in the petrophysical model result from isolating data from separate fault-bounded reservoir compartments.

Available Jonah Field subsurface well and seismic data are insufficient to determine the fluvial sandstone-body geometries and connectivity. Outcrop-calibrated thickness-to-width ratios enable construction of a geologic model that provides estimates of sandstone-body geometry and connectivity. Estimated sandstone connectivity ranges from 38 to 90 percent, depending on model parameters and average well-spacing.