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Reservoir-Fluid Characterization and Reservoir Modeling of Potential Gas Hydrate Resources, Alaska North Slope

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The U.S. Department of Energy and BP Exploration (Alaska), Inc. cooperatively fund this research, which uses seismic and well data to assess gas hydrate volume, distribution, and resource potential on Alaska's North Slope (ANS). The large magnitude of in-place gas hydrate (44+ TCF) and evaluation of conventional ANS gas creates industry-DOE alignment to assess this potential unconventional resource. Many technical, economical, environmental, and safety issues require resolution before proving gas hydrate production economic feasibility.

The gas hydrate-bearing Tertiary Sagavanirktok formation is characterized by stacked sequences of fluvial, deltaic and nearshore marine sands with interbedded terrestrial and marine shales. Facies changes, intraformational unconformities, and high-angle faults disrupt reservoir continuity and quality.

Seismic attribute analyses and development of a new sequence stratigraphic framework reveal sand-rich sequences and parasequences composed of river channel, point bar, mouth bar, and nearshore marine sandstones and shales. Seismic interpretation, normalized log correlation, stratigraphic mapping, facies mapping, and net pay sand maps are used to assess reservoir continuity and estimate in-place gas. The reservoir and fluid characterization will be integrated into reservoir models that define a range of recovery factors, producible gas, and economic potential needed for evaluation of future development scenarios.

The Phase 1 study characterizes reservoirs and fluids, leads to recoverable reserve and resource potential estimates, and defines procedures for gas hydrate drilling, data acquisition, completion, and production. Phases 2 and 3 would integrate well, core, log, and production test data, if justified by results from prior phases. The research program could lead to future ANS gas hydrate pilot development.