Unlocking the Potential of a Tight Gas Sand Giant: Pinedale Field, Wyoming

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FIELD DEVELOPMENT

Pinedale Field, located in the northwestern portion of the Greater Green River Basin of western Wyoming (Fig. 1), has emerged as the 3rd largest gas field in the United States based on 2004 DOE statistics published in 2005. The initial well was drilled on the Pinedale Anticline by The California Oil Company in 1939. This well discovered gas in the stacked sands of what was then called the Fort Union but is now recognized as the Lance Formation. From 1939 to 1997, 22 wells were drilled by various operators attempting to unlock the potential of this large structure. All the early wells encountered gas, but poor completion results and limited market access hampered field development. In 1997, McMurry Oil Company and Ultra Resources, Inc., following on the Jonah Field success, completed the first truly commercial wells in the Pinedale Field. Since then over 300 wells have been drilled in the Pinedale Field, the vast majority of which are completed as commercial producers. Ultra is the largest lease holder and operator in the field. Other operators include Questar, Shell, Anschutz, BP in partnership with Stone Energy, Yates, and Nielson & Associates. Lance Oil & Gas, Williams, and Gemini are non-operating partners in parts of the field.

GEOPHYSICAL AND PETROPHYSICAL TECHNOLOGIES

In developing this giant tight gas field, Ultra has utilized an integrated geological and geophysical approach to gain sufficient understanding of the reservoir to permit the successful unlocking of the huge resource potential found in this 90 mi² field. Early field development was guided by the use of vintage 2-D reflection profiles that were acquired by various parties up to the mid 1980s. In addition, gravity and aeromagnetic data has been used to help fill in the gaps left by the limited 2-D data. The first 3-D seismic survey covering the northern portion of Pinedale was shot by Ultra, Questar, Anschutz, and Lance in 1999. This survey, known as the Mesa 3-D, was acquired as a “Full Azimuth – Full Offset” survey with Western Geophysical as the acquisition contractor. Veritas acquired a similar survey over the area to the Cretaceous Ericson Formation. The Wyoming Oil and Gas Conservation Commission (WOGCC) treats this all as one producing interval referenced as the Lance Pool. The Lance was deposited by a major fluvial system flowing from northwest to southeast through the basin foredeep that was forming between the incipient Wind River Uplift on the east and the Western overthrust on the west (Fig. 2). This fluvial system drained from the Idaho Platform to the Cretaceous Seaway in south-central Wyoming. The Lance consists of over 5700 ft of highly discontinuous sand bodies interspersed with siltstones and mudstones. The sands have very low porosity and low permeability and are laterally very limited in extent.