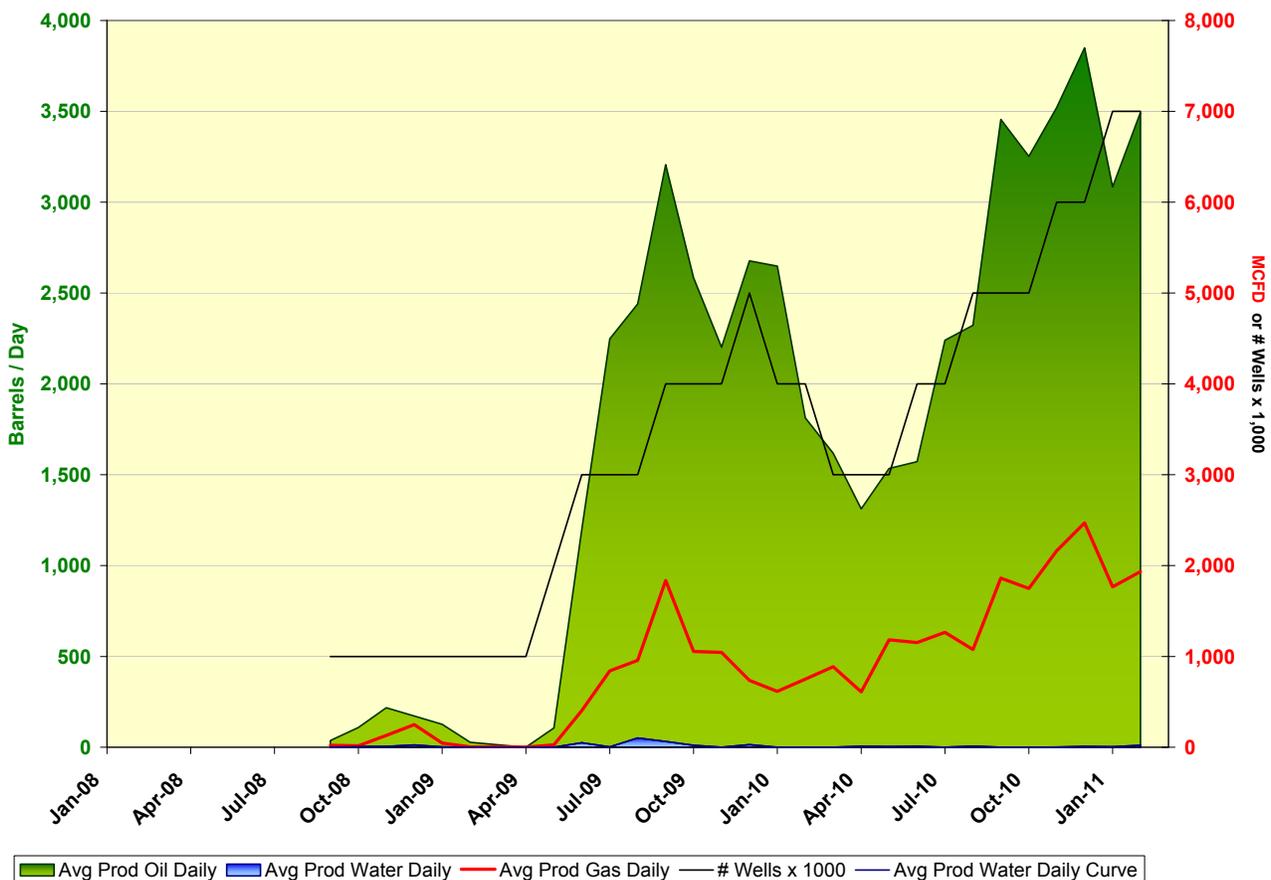


# Oooguruk Unit, Oooguruk-Nuiqsut Oil Pool

## Summary

Discovered in 1992 by ARCO Alaska, Inc.'s Kalubik No. 1 exploratory well, the Oooguruk-Nuiqsut Oil Pool lies in the Beaufort Sea, northeast of the Colville River Delta. It is being developed from a man-made island located approximately 2-1/2 miles from Alaska's northern coastline in about five feet of water.<sup>1</sup> The pool is the accumulation of hydrocarbons common to, and correlating with, the interval between the measured depths of 6,354' and 6,472' on the Dual Laterolog/Micro Laterolog recorded in the Kalubik No. 1 exploration well.<sup>2</sup> Two months of production were reported from the pool in March and April 2003. Pioneer Natural Resources Alaska, Inc. began development drilling of the pool during mid-2008, and regular production and water flooding began in September 2008. The average production rate for the pool peaked at 3,849 barrels of oil per day in December 2010, and for the first two months of 2011 the pool averaged 3,290 barrels of oil per day from seven producers.<sup>3</sup>

## Average Daily Production Rates



## Geology

The Oooguruk-Nuiqsut Oil Pool encompasses a late Jurassic-aged interval of reservoir sandstone beds that were deposited within the inner portion of a marine shelf environment, possibly as offshore sandbars. In general, the Nuiqsut reservoir interval thickens from 20' in the northeast, near Thetis Island to about 170' at the southern boundary of the Oooguruk Unit (OU), but it has been removed by

erosion from the northwestern portion of the unit. Net sand ranges from 40' to 110' in the Affected Area. The Oooguruk-Nuiqsut Oil Pool is not in hydraulic communication with the overlying Kuparuk reservoir sandstone.

Within the OU, the Nuiqsut consists of very fine- to fine-grained, quartz-rich reservoir sandstone with up to 15% siderite and glauconite. Evidence of burrowing and bioturbation is abundant, suggesting relatively low rates of sedimentation. Nuiqsut zone porosity ranges from 10% to 20% and averages about 15%. Permeability ranges from 0.1 millidarcies to 50 millidarcies and averages approximately 15 millidarcies. Estimated water saturations for 1 and 10 millidarcy rock are 60% and 40%, respectively.

Within the Oooguruk-Nuiqsut development area, the structure at Nuiqsut level is a portion of a broad, southeast-plunging anticline nose centered in the southeastern portion of the OU. The crest and flanks of this structure are cut by northwest-trending, syndepositional, normal faults that are generally downthrown to the northeast. These faults range up to 200' in vertical displacement.

Well log and seismic data indicate that the oil in the proposed pool is trapped by both structural and stratigraphic elements. The trapping mechanisms for oil within the Nuiqsut reservoir are erosional truncation to the west, northwest, and north; structural dip to the east; and stratigraphic pinch-outs into very fine-grained, non-reservoir rock to the east, southeast, south, and southwest.

Analyses of reservoir fluid samples recovered from the Ivik No. 1 and Oooguruk No. 1 exploratory wells indicate that the trapped oil measures between 19° and 24° API gravity, has viscosity in the reservoir ranging from 4.5 centipoise to 6.5 centipoise, has a solution gas-oil ratio ranging from 250 to 400 standard cubic feet per stock tank barrel, contains 2% to 4% wax by weight, and may contain asphaltenes. Reservoir pressure is 3,250 psi at 6,400' true vertical depth subsea (TVDSS), and the bubble point pressure is about 1,900 psi. The fluids in the overlying Oooguruk-Kuparuk Oil Pool differ in API gravity, viscosity, GOR, and saturation pressure, indicating that the Nuiqsut and Kuparuk reservoirs are not in communication.<sup>4</sup> Reservoir temperature averages about 160°F.<sup>5</sup>

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<sup>1</sup> Offshore-Technology.com, 2010, Oooguruk, USA

<sup>2</sup> Alaska Oil and Gas Conservation Commission, 2008, Conservation Order No. 597, Oooguruk Field, Oooguruk Unit, Oooguruk-Nuiqsut Oil Pool

<sup>3</sup> Alaska Oil and Gas Conservation Commission, 2011, Well and Production Information Database

<sup>4</sup> Alaska Oil and Gas Conservation Commission, 2008, Conservation Order No. 597, Oooguruk Field, Oooguruk Unit, Oooguruk-Nuiqsut Oil Pool

<sup>5</sup> Pioneer Natural Resources Alaska, Inc., 2010, Reservoir Properties reported annually by operator (see Reservoir Properties table on page 3 of this summary).