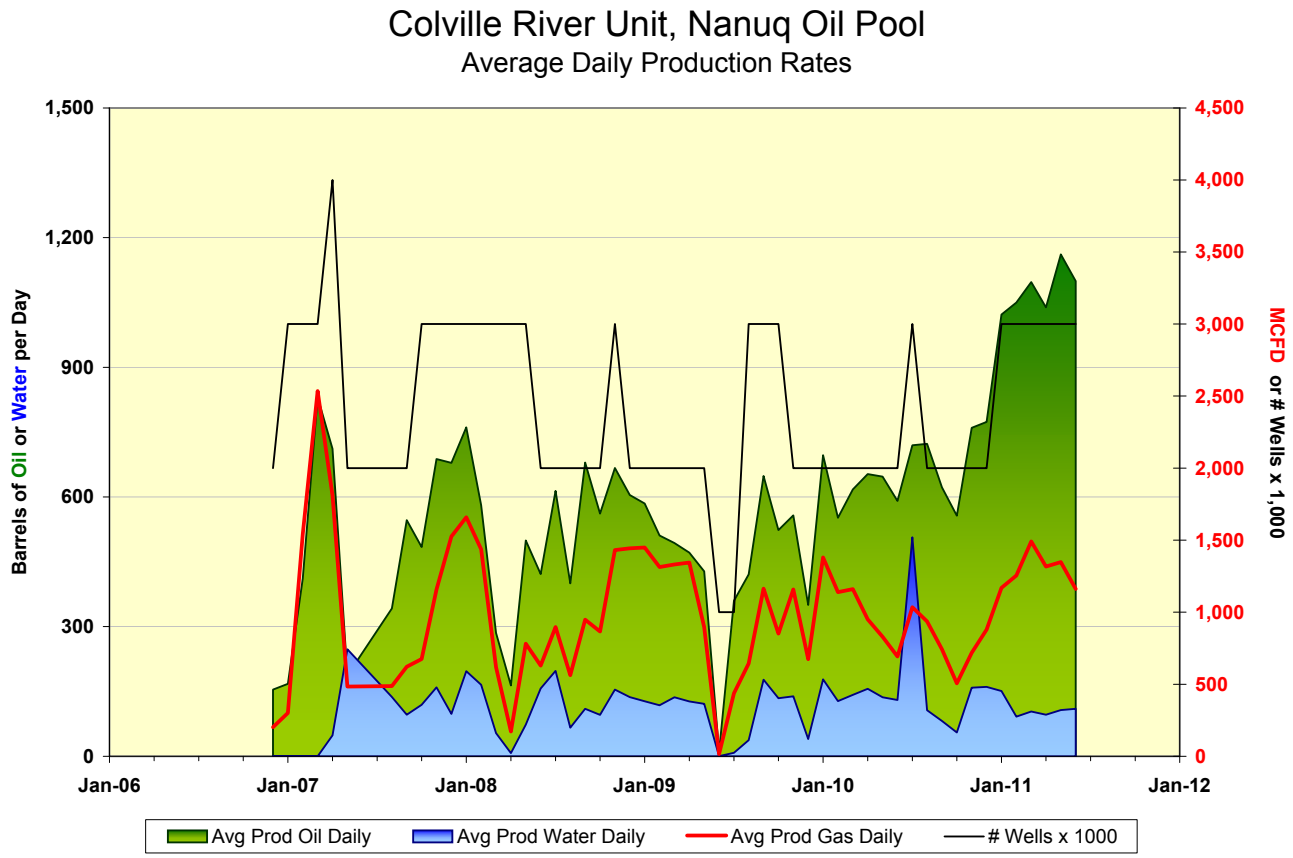
Colville River, Nanuq Oil Pool

Summary

Discovered in 2000, the Nanuq Oil Pool is a satellite to the Alpine Oil Field. This pool was discovered by the Nanuk No. 2 exploratory well, which encountered about 65 vertical feet of oil-bearing sandstone, siltstone and shale.[1] The well tested 1,700 barrels of 39º API oil and 1.3 million cubic feet of gas per day from both the Nanuq and underlying Kuparuk reservoir sands.[2] The Colville River Unit ("CRU") CD1-NQ1 delineation well (subsequently renamed CRU CD1-229) was drilled and tested during 2001. This well encountered about 35 vertical feet of oil-bearing sandstone,[3] and it tested 335 barrels of oil and 5.4 million cubic feet of gas per day from a 4,810-foot long horizontal completion.[4] Between February and July of 2001, CD1-229 produced a total of 66 days, yielding 21,154 barrels of oil and 295.6 million cubic feet of gas, for an average daily rate of 321 barrels of oil and 4,478 million cubic feet of gas.[5]

The Nanuq Oil Pool is currently being developed from the CRU CD4 drill site, which lies about 3-1/2 miles south-southeast of the Alpine Central Facility. Ultimately, the operator plans to drill 16 horizontal



wells, nine producers and seven injectors. Water alternating with miscible gas injection is the planned enhanced recovery mechanism for the pool.[6] Regular production began in December 2006, and peaked in March 2007 at an average rate of 830 barrels of oil per day and 2.5 million cubic feet of gas per day.[7] Water injection began in March 2007.[8] Since mid-2009 production has increased: during the

first half of 2011, the pool averaged 1,078 barrels of oil and 1.29 million cubic feet of gas per day from three wells.

Geology

The Nanuq Oil Pool is the accumulation of hydrocarbons common to, and correlating with, the interval between the measured depths of 7,043 feet and 7,223 feet in the Nanuk No. 2 exploration well. This reservoir is Cretaceous-aged (Albian), and it consists of fine-grained sandstone with interbedded shale layers of varying thickness. This reservoir was deposited in a basin floor submarine fan system dominated by lobe-sheet deposits.[9] The fan system lies 1 to 2 miles east of the time-equivalent, northeast-southwest trending base of slope.

The best reservoir-quality rock is generally found in the upper part of the Nanuq Oil Pool. Reservoir porosity averages about 17%, permeability averages about 2.5 millidarcies, and net pay averages 35 feet. Although there is a localized, northwest-trending high measuring about 2 miles long and 1-1/4 miles wide within the development area, the Nanuq reservoir sandstone generally dips to the south and east. To the north and west, the absence of sand creates a stratigraphic trap. Well log and core data place the oil-water contact for the pool at 6,207 feet true vertical depth subsea. A gas cap is believed to be present, with a gas-oil contact at about 6,100 feet true vertical depth subsea. There are no major faults mapped within the current development area.[10]

Crude oil samples obtained during production tests range from 39 to 42 degrees API gravity. Oil viscosity is about 0.5 centipoise, and the solution gas-oil ratio is about 990 standard cubic feet per stock tank barrel. Original reservoir pressure is 2,740 psia.[11]

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[1] Alaska Oil and Gas Conservation Commission, 2009, Well Completion or Recompletion Report and Log for CRU CD1-229, Received May 1, 2001; in Well History File 200-215, p. 13 (derived from well log diagram)
[2] Alaska Oil and Gas Conservation Commission, 2009, Well Completion or Recompletion Report, cited above, p. 18
[3] Alaska Oil and Gas Conservation Commission, 2009, sandstone count by Davies based on GR curve from well log from CRU CD1-229
[4] Alaska Oil and Gas Conservation Commission, 2009, Well Completion or Recompletion Report, cited above, p. 47
[5] Alaska Oil and Gas Conservation Commission, 2009, Production Database
[6] Alaska Oil and Gas Conservation Commission, 2005, Conservation Order No. 562, p.3; available online at: http://doa.alaska.gov/ogc/orders/co/co500_599/co562.pdf
[7] Alaska Oil and Gas Conservation Commission, 2009, Production Database
[8] Alaska Oil and Gas Conservation Commission, 2009, Production Database
[9] Alaska Oil and Gas Conservation Commission, 2005, Conservation Order No. 562, p.2
[10] Alaska Oil and Gas Conservation Commission, 2005, cited above
[11] Alaska Oil and Gas Conservation Commission, 2005, cited above