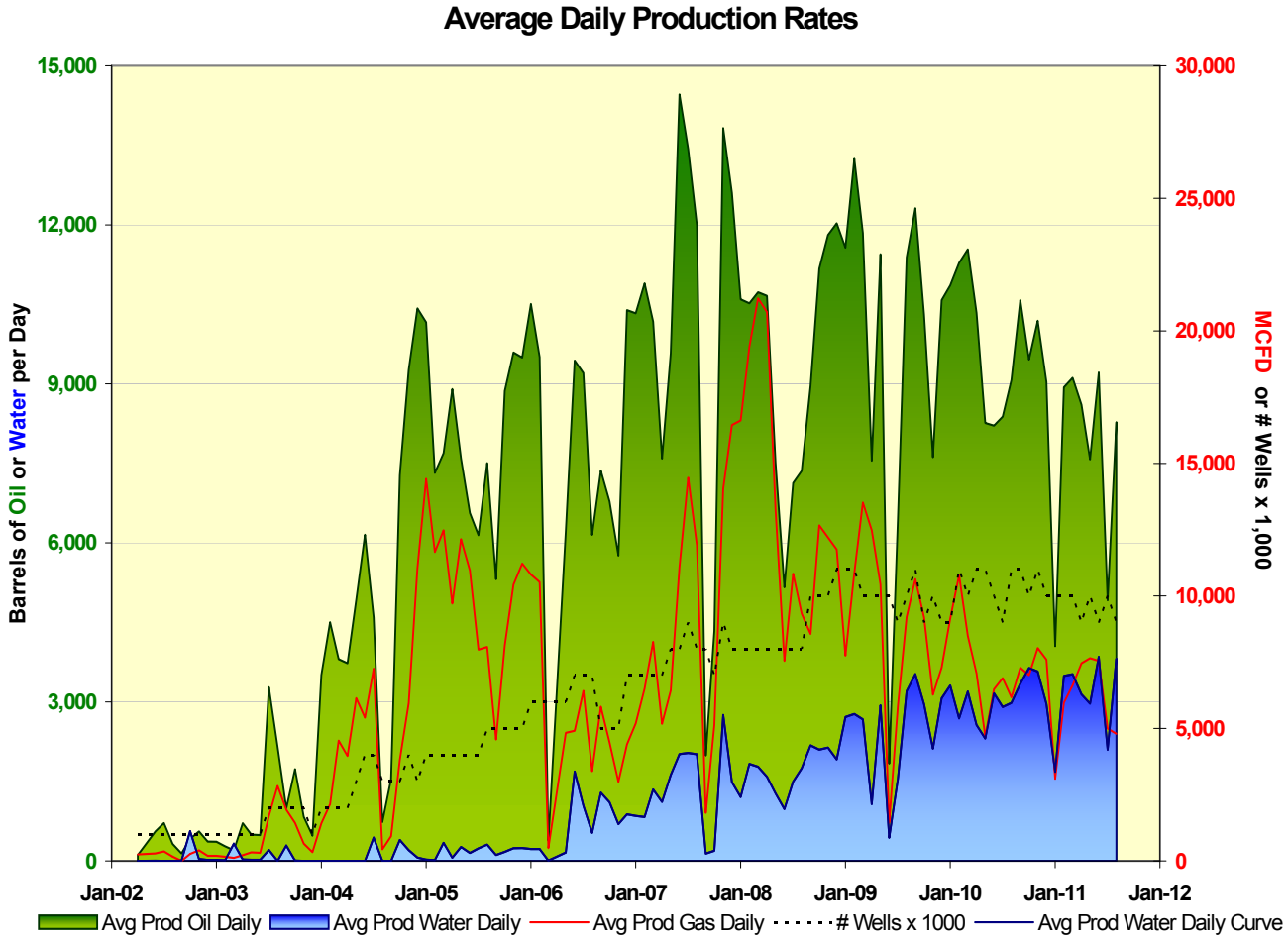
Schrader Bluff Oil Pool – Orion Development Area

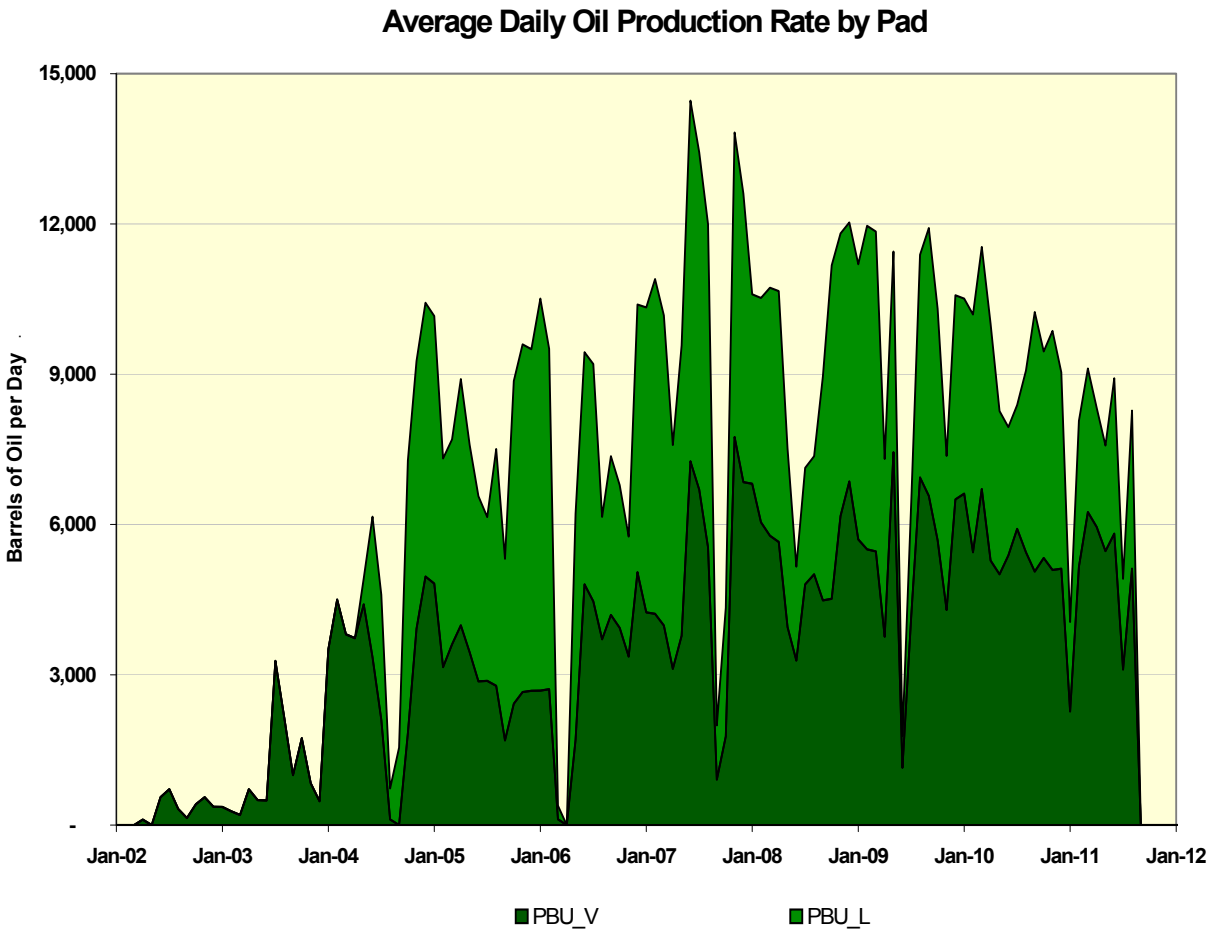
Summary

The oil-bearing sands of the Late Cretaceous-aged Schrader Bluff Formation ("Schrader Bluff") are present in the Milne Point, Kuparuk River, and Prudhoe Bay Units. This pool is that portion of the Schrader Bluff oil that lies within the Orion Development Area of the Prudhoe Bay Unit ("PBU"). This accumulation was discovered in 1968 by the Kuparuk State #1 exploratory well, and confirmed in 1998 by Northwest Eileen 2-01. The pool is defined as the accumulation of hydrocarbons common to, and correlating with, the interval from 4,549' and 5,106' measured depth in PBU V-201.[1] The pool ranges in depth from about 3,900' to 5,000' true vertical feet subsea.[2] The pool has been producing continuously since April 2002 from the PBU V- and L-Pads.



[1] Alaska Oil and Gas Conservation Commission, 2003, Conservation Order No. 505

[2] Derived from BP Exploration (Alaska) Inc., 2003, Orion Pool Rules and Area Injection Order Application, submitted to the Alaska Oil and Gas Conservation Commission in support of Conservation Order No. 505: Non-confidential exhibit I-4A shows pool at top of OA sand ranging from about 4,060' to 4,700'; N-Sands are 140-180' thick, so top is about 3,880'; O-Sands are about 300' thick, so base is about 5,000'.



V-Pad initially dominated production; however, in June 2004, two additional L-Pad wells were brought on-line, and by October L-Pad production abruptly increased to more than 5,000 barrels of oil per day ("BOPD"). Oil production peaked in June 2007 at 14,460 BOPD, then began to decline. For the first six months of 2012, oil production rate averaged about 7,900 BOPD. Of this, about 5,300 BOPD (67%) was produced from V-Pad and about 2,600 BOPD (33%) was produced from L-Pad.

Horizontal well drilling technology has been used extensively to development this pool. There are currently only five producing wells located on V-Pad, but these five original well bores are fed by 15 additional lateral well branches. Two of the wells, V-203 and V-207, each have a main well bore that is fed by four additional, lateral well branches. Together, V-203 and V-207 open a total of 33,100 feet (6-1/4 miles) of reservoir sand to production. On L-Pad, there are only seven producing wells, but these seven main wellbores are fed by 24 additional, lateral wellbores. The main wellbores of two of these wells, L-203 and L-205 are each fed by five additional lateral well branches, and together these two wells open a total of 31,100 feet (5.9 miles) of reservoir sand to production.[3]

[3] Alaska Oil and Gas Conservation Commission, 2005, Production Database and Well History Files

Geology

The pool contains two stratigraphic intervals that are designated, from deepest to shallowest, the O-Sands and the N-Sands. These sediments were deposited in a marine shoreface and shallow shelf environment. They are unconsolidated and display lateral facies changes and local diagenetic alteration. They are present across the entire Orion development area and, as a package, thin slightly from SW to NW. Reservoir quality sand units within each interval are regionally extensive, but are locally characterized by substantial variations in thickness and net-to-gross sand ratio. The O-Sands are subdivided into two intervals that are termed, from deepest to shallowest, the OB and OA. OB ranges in thickness from 220' to 300', and OA is 45' to 80' thick. Measurements are scarce, but reservoir sand porosity and permeability are thought to from 25% to 30% and from 50 md to 250 md, respectively.[4] The N-Sand interval ranges from 140' to 180' in thickness,[5] and it consists mainly of non-reservoir mudstone and siltstone interbedded with a limited number of thin, but generally extensive, unconsolidated reservoir sands. The O-Sands are the main development horizon at Orion because O-Sand oil ranges in API gravity from the low twenties to the mid-teens, and is lighter and higher in quality that that found in the N-Sands. The top of the Schrader Bluff OA sand in the Orion development area has structural dip ranging from 1 to 4 degrees to the E and NE, and it is broken by three sets of normal faults that trend from NW-SE, N-S, and E-W. Collectively, the fault sets subdivide the pool into isolated reservoir compartments. The NW-SE faults, with throws of up to 200 feet, dominate the structural fabric of the pool and form the boundaries of the major structural blocks in the area. N- and O-Sand oil water contacts are thought to vary by sand unit and by fault block. No gas/oil contacts or free gas have been observed.[6]

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[4] Alaska Oil and Gas Conservation Commission, 2003, Conservation Order No. 505
[5] BP Exploration (Alaska) Inc., 2003, Orion Pool Rules and Area Injection Order Application, submitted to the Alaska Oil and Gas Conservation Commission in support of Conservation Order No. 505.
[6] Alaska Oil and Gas Conservation Commission, 2003, Conservation Order No. 505