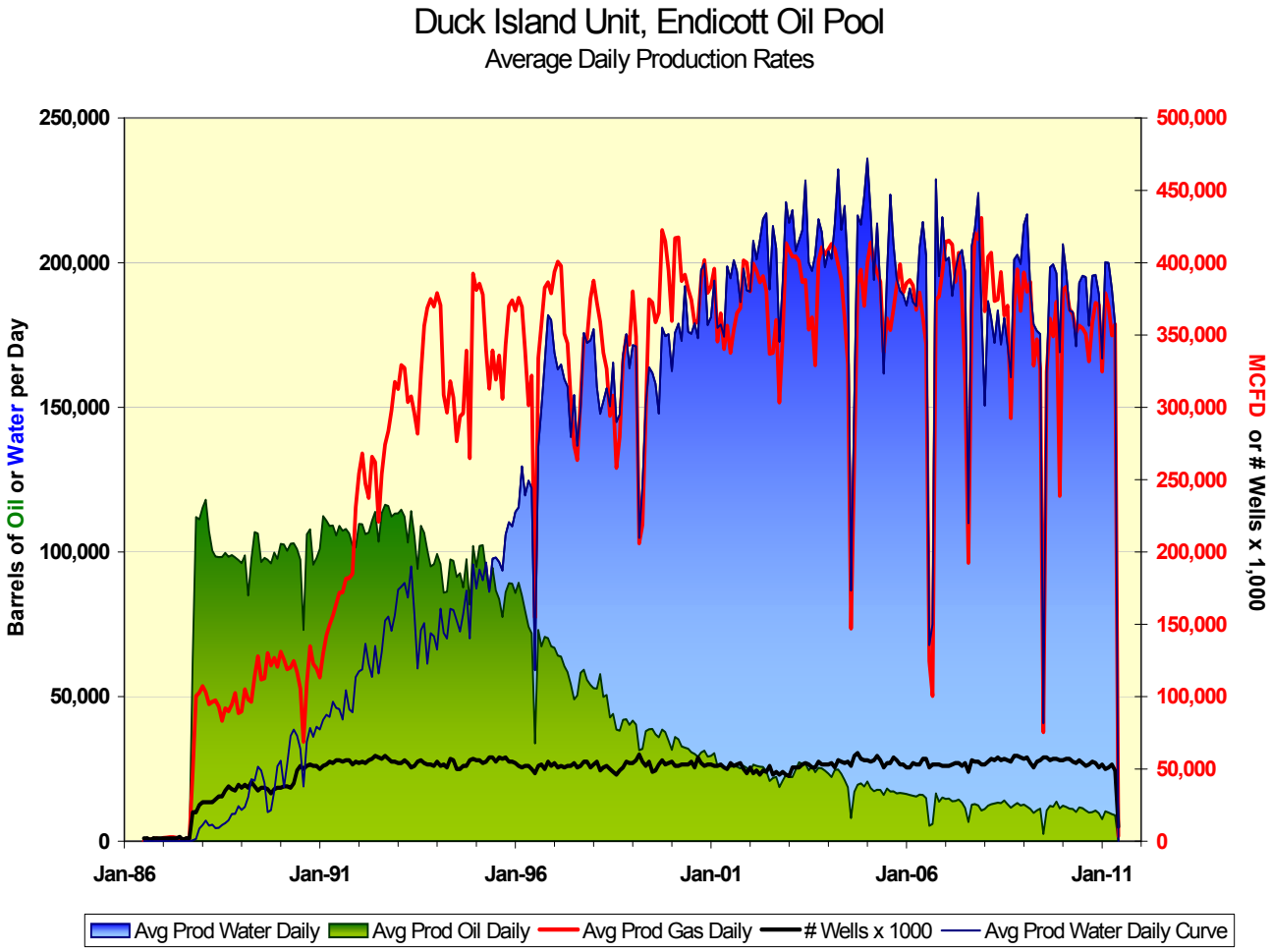
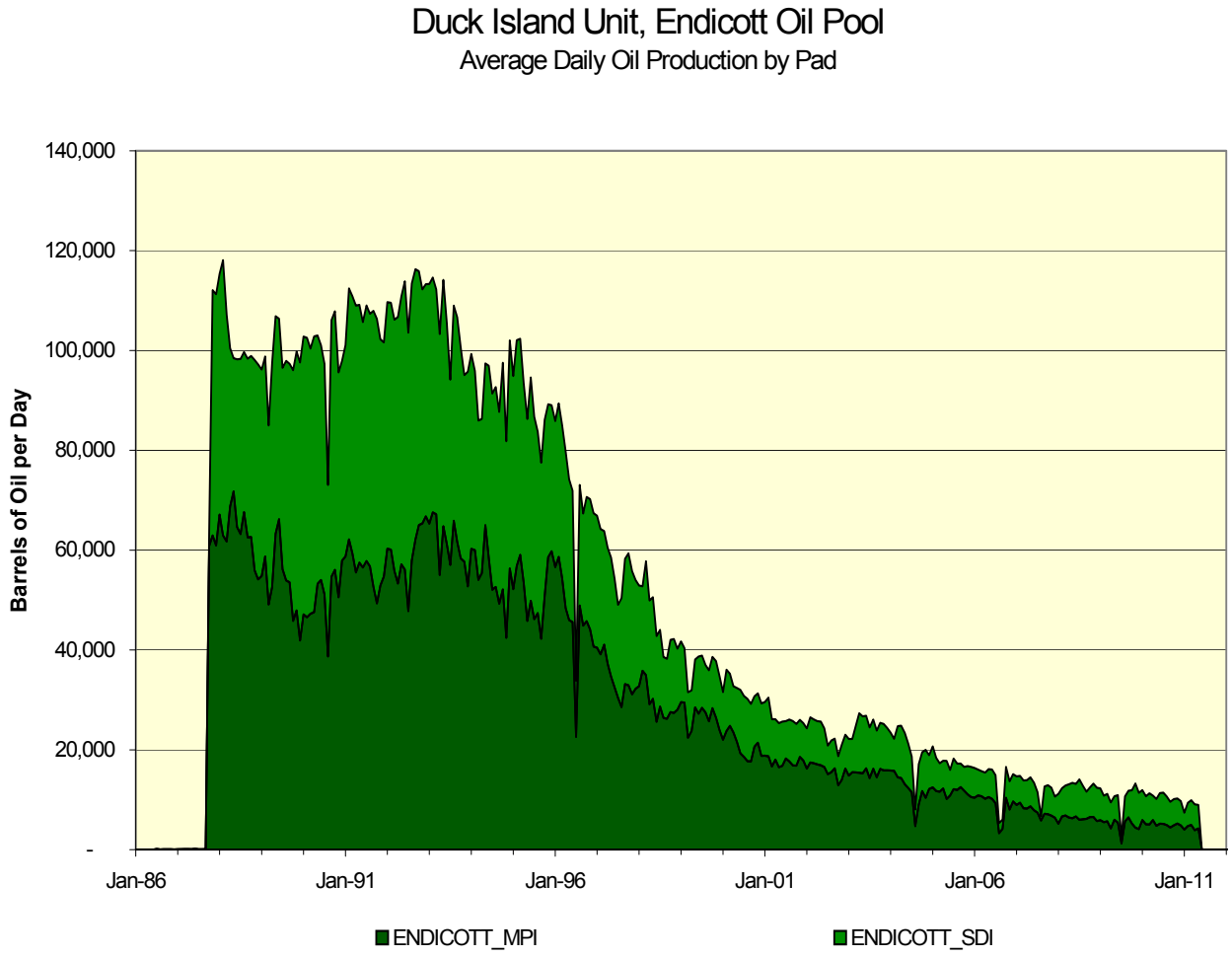
Endicott Oil Pool

Summary

The Endicott Oil Pool ("Endicott") is located in the Beaufort Sea, about 8 miles east of Prudhoe Bay Unit ("PBU"). It was discovered in 1978 by the Sohio Alaska Petroleum Company Sag Delta No. 4 well and confirmed in 1979 by Duck Island No. 1, which encountered 358' of gross oil pay and 67' of gross gas pay within the Kekiktuk Formation ("Kekiktuk"). This pool has been developed from two artificial, gravel islands that are located approximately 4 miles offshore in 2 to 14 feet of water.[1] These islands connected by a 1-1/2 mile long gravel causeway. The northern portion of the pool is produced mainly from the Main Production Island ("MPI"), and the southern portion of the pool is produced mainly from the Satellite Development Island ("SDI").



[1] Wicks, J.L., Buckingham, M.L. and J.H. Dupree, 1991, Endicott Field, Northern Alaska, Offshore Beaufort Sea, in Atlas of Oil and Gas Fields, preprint, American Association of Petroleum Geologists Atlas of Oil and Gas Fields.



Continuous production began in July 1986. During the peak production years from November 1987 to October 1993, Endicott averaged about 104,000 barrels of oil per day ("BOPD"). Between November 1993 and March 1995, production dropped to an average of 94,000 BOPD. From April 1995 to February 2001, production declined steadily at an average annual rate of about 18% (from 93,450 to 30,450 BOPD). For the first 5 months of 2011, production from Endicott Oil Pool has averaged about 9,240 BOPD, with a water cut of 95%. MPI has yielded about 58% of the oil recovered to date from this pool,[2] which is developed on 40-acre spacing.

Geology

The Endicott Oil Pool is defined as the accumulation of hydrocarbons common to and correlating with the interval between 11,496' and 12,812' measured depths in the Sag Delta No. 4 well.[3] This accumulation occurs in Mississippian-aged, fluvial sediments assigned to the

[2] Alaska Oil and Gas Conservation Commission, 2011, Production Database
[3] Alaska Oil and Gas Conservation Commission, 2002, Conservation Order No. 462, available online at: http://www.state.ak.us/local/akpages/ADMIN/ogc/orders/co/co400_499/co462.htm

Kekiktuk Formation (Kekiktuk). The pool is trapped by a combination of structural and stratigraphic elements within a large, northwest- trending fault block that dips toward the northeast. Normal faults border the accumulation to the north and southwest. Structural dip limits the field to the southeast.[4] Upper confinement for the accumulation is provided by the Kayak Shale-Itkilyariak Formation and, in the northeastern portion of the pool, by the Lower Cretaceous Unconformity.[5] The pool is broken by several minor faults that are subparallel to the major bounding faults. One of these faults, termed the Mid-Field Fault, is sealing,[6] and it divides the reservoir into two parts: a northern field area developed mainly from the Main Production Island ("MPI"), and a southern area, which is produced mostly from the Satellite Development Island ("SDI").

Three lithostratigraphic units are defined within the Kekiktuk. They are, in ascending order, Zone 1, Zone 2 and Zone 3, and they have an aggregate thickness of up to 1,200'. Zone 1 consists mainly of the shale, coal and siltstone deposited in floodplain, swamp and lacustrine environments. Associated sand bodies have very limited continuity. Zone 2 contains very porous and permeable, laterally continuous, medium-grained reservoir sandstone primarily deposited in low-sinuosity, coalescing braided channels that extend across the entire reservoir. Associated, locally continuous shales within Zone 2 were deposited in lacustrine environments. Zone 3 consists of fine-to medium-grained sandstone occurring in stacked point-bar channels deposited in a high-sinuosity, fluvial environment. These stacked channel sands are lenticular, and are interspersed with equal amounts of shale, siltstone and coal, which accumulated in between the fluvial channels.[7] A gas-oil contact occurs at about 9,855' true vertical depth subsea ("TVDSS"), and an oil-water contact occurs at approximately 10,190' TVDSS.[8] The areal extent of the hydrocarbon accumulation is about 8,600 acres.[9]

SFD
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[4] Adamson, G. R., Hellman, H.L., and Metzger, R.R., 1991, Design and Implementation of the First Arctic Offshore Waterflood, Endicott Field, Alaska, SPE Paper 21760.
[5] Berman, P., 1984, Oral and written testimony presented at the Public Hearing on Field Rules for the Endicott Field, held August 22, 1984, in Alaska Oil and Gas Conservation Commission, 1984, Endicott Field, Endicott Oil Pool, Conservation Order No. 202 File.
[6] Adamson, G. R., Hellman, H.L., and Metzger, R.R., 1991, Design and Implementation of the First Arctic Offshore Waterflood, Endicott Field, Alaska, SPE Paper 21760.
[7] Berman, P., 1984, Oral and written testimony presented at the Public Hearing on Field Rules for the Endicott Field, held August 22, 1984, in Alaska Oil and Gas Conservation Commission, 1984, Endicott Field, Endicott Oil Pool, Conservation Order No. 202 File.
[8] Alaska Oil and Gas Conservation Commission, 1984, Endicott Field, Endicott Oil Pool, Conservation Order No. 202, available online at: http://www.state.ak.us/local/akpages/ADMIN/ogc/orders/co/co001_299/co202.htm
[9] Berman, P., 1984, Oral and written testimony presented at the Public Hearing on Field Rules for the Endicott Field, held August 22, 1984, in Alaska Oil and Gas Conservation Commission, 1984, Endicott Field, Endicott Oil Pool, Conservation Order No. 202 File.