

North Cook Inlet Tertiary System Gas Pool

Summary

The North Cook Inlet Tertiary System Gas Pool lies offshore on the western side of the Cook Inlet, 5 miles from the western coastline of Cook Inlet and about 37 miles west-southwest of Anchorage.¹ This pool was discovered by the Pan Am Cook Inlet State 17589 No. 1 exploratory well in 1962,² which blew out on August 23, 1962³ and burned, producing a flame that was visible from Anchorage⁴ until the well was finally killed on October 23, 1963. A Drill Stem Test of the relief well in the interval that blew out indicates a pressure of about 13.5 ppg equivalent mud weight. At the time of the blowout, 11.6 ppg mud was being used to drill the well.⁵ The pool was subsequently delineated by six additional exploratory wells drilled between 1962 and 1966⁶ and found to encompass about 8,000 acres.⁷

This large pool has been developed from the Tyonek Platform using a "cluster" spacing pattern rather than standard 640-acre spacing, as prescribed by Commission regulations.⁸ At the time of initial development, the operator testified that cluster spacing would efficiently and economically drain the entire reservoir from a single platform,⁹ achieving greater initial deliverability than expected from wells located on a regular pattern at the center of their respective governmental sections.¹⁰ The Tyonek Platform, the 12th platform in the Cook Inlet,¹¹ was installed in about 100' of water¹² during 1968. This platform is designed to withstand the harshest expected conditions: 80 mph winds, 27' waves, -40° F, and the impacts of 1500 ton ice floes moving at 10 feet per second.¹³

Production from the North Cook Inlet Tertiary System Gas Pool began in 1969.¹⁴ The liquefied natural gas (LNG) facility at Nikiski was built to make use of this gas. The facility began operations during 1969¹⁵

¹ Alaska Oil and Gas Conservation Commission, 2011, Geographix Geologic Database

² Vigoren, L.L., 1967, Geologic Testimony in Support of Conservation Order No. 40, Temporary Spacing Order Allowing "Cluster" Spacing in the North Cook Inlet Field

³ Alaska Oil and Gas Conservation Commission, Well History File 162-008

⁴ Nelson, K., 2008, Recent Blowout One of Only 18 in State; Petroleum News, V. 13, N. 50, Dec 14, 2008

⁵ Alaska Oil and Gas Conservation Commission, Well History File 162-008, July 28, 1964 letter from A.E. Piper of Pan Am to T.R. Marshall of AKDNR, and November 18, 1964 letter from E.H. Lewis of Robinson, McCaskey and Lewis, to T.R. Marshall of AKDNR.

⁶ Phillips Petroleum Company, 1967, Engineering Testimony, Cluster Spacing Hearing, Tertiary System Initial Participating Area, North Cook Inlet Unit, Cook Inlet, Alaska; Conservation Order No. 40, Exhibit 9, p. 1.

⁷ Thomas, C.P., Doughty, T.C., Faulder, D.D., and Hite, D.M., 2004, South-Central Alaska Natural Gas Study, U.S. Department of Energy, National Energy Technology Laboratory, Arctic Energy Office, Contract DE-AM26-99FT40575, Table 2.5, p. 62

⁸ Alaska Oil and Gas Conservation Commission, 1968, Establishment of Permanent Rules for Pool Designation and Well Spacing in the North Cook Inlet Field, Conservation Order No. 68

⁹ Chrisman, J.E., 1967, Engineering Testimony in Support of Conservation Order No. 40, Temporary Spacing Order Allowing "Cluster" Spacing in the North Cook Inlet Field

¹⁰ Chrisman, J.E., 1967, cited above

¹¹ Visser, R.C., 1993, Platform Information, Cook Inlet, Alaska; Cook Inlet Platform Structural Integrity Study report for Cook Inlet RCAC, Belmar Engineering and Management Services Company, Redondo Beach, CA.

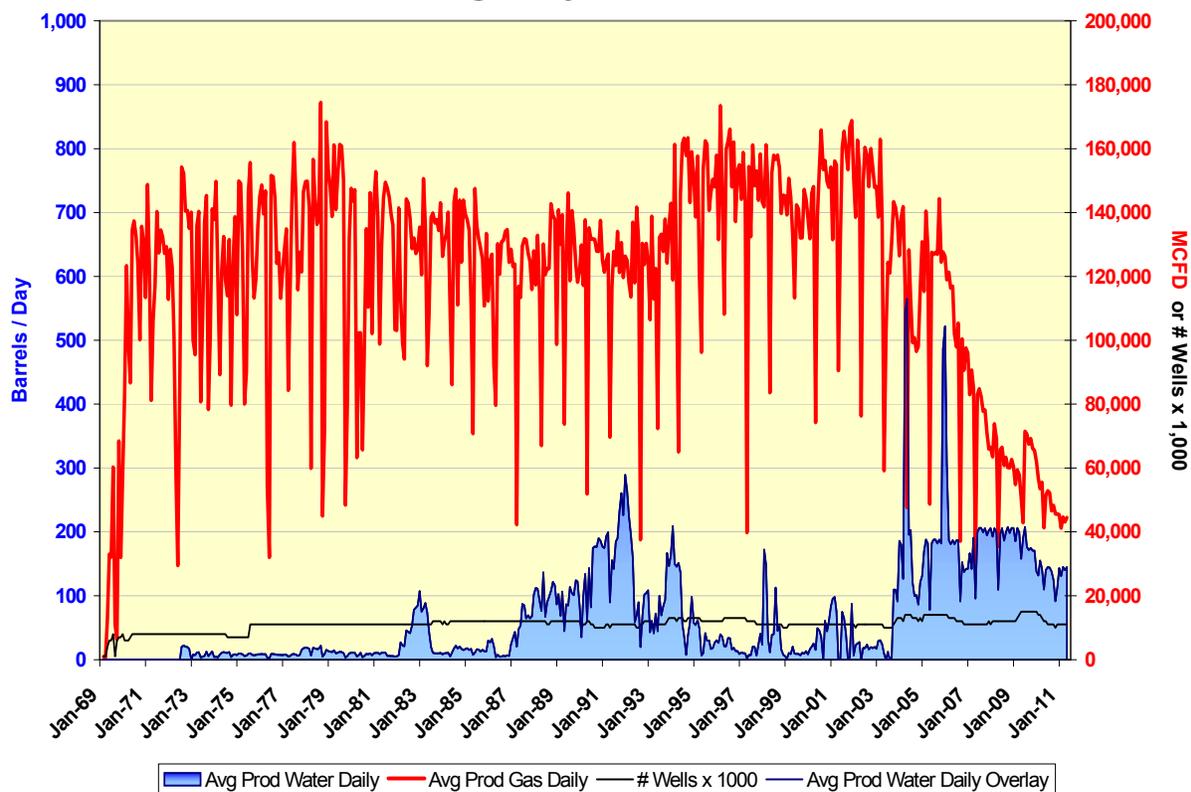
¹² Chrisman, J.E., 1967, cited above

¹³ Visser, R.C., 1993, cited above

¹⁴ Thomas, C.P., and others, 2004, cited above, Table 2.5, p. 62

¹⁵ Nelson, K., 2007, Export Extension Filed; Petroleum News, Vol. 12, No. 4, January 28, 2007

North Cook Inlet Tertiary Gas Pool Average Daily Production Rates



based on long-term contracts with Tokyo Electric Power Co. Inc., and Tokyo Gas Co. Ltd.¹⁶ Although this pool was expected to supply the market for only 20 to 30 years,¹⁷ production continues today from the Sterling and Beluga Formations.¹⁸ Daily production from the pool from March 1994 to March 2003 averaged about 145 million cubic feet per day. Since then, production has declined sharply to an average of 43.7 million cubic feet per day for the first half of 2011.¹⁹

In 2004, a Department of Energy study estimated that the remaining proved reserve for the two fields supplying natural gas for the LNG facility, Kenai and North Cook Inlet, would not be sufficient to continue LNG sales beyond 2009.²⁰ In April 2009, the volume of shipments was cut when the tanker fleet was reduced by half. Current plans are to mothball the LNG facility during August 2011,²¹ leaving it available for possible future use.²² ConocoPhillips reportedly plans to continue operating the Tyonek Platform to fill local gas contracts.²³

Geology

The North Cook Inlet Tertiary System Gas Pool is defined as the interval that correlates to the interval from 3,500' to 6,200' measured depth in the Pan American Petroleum Corporation Cook Inlet State

¹⁶ Lidji, E., 2011, Kenai LNG Plant Set to Close this Spring; Petroleum News, Vol. 16, No. 8, February 20, 2011

¹⁷ Chrisman, J.E., 1967, cited above

¹⁸ Thomas, C.P., and others, 2004, cited above, Table 2.5, p. 62

¹⁹ Alaska Oil and Gas Conservation Commission, 2011, Well and Production Database

²⁰ Thomas, C.P., and others, 2004, cited above, p.163

²¹ Lidji, E., 2011, Kenai LNG Plant Set to Close this Spring; Petroleum News, Vol. 16, No. 8, February 20, 2011

²² Bradner, T., 2011, Kenai LNG Plant Now to Remain Open Until August; Alaska Journal of Commerce, April 21, 2011

²³ Lidji, E., 2011, cited above

17589 No. 1 well.²⁴ The structure at North Cook Inlet, as defined by subsurface well control and seismic data,²⁵ is a northeast-trending anticline that measures about 5-3/4 miles long and 3 miles at its widest point.

The producing intervals are the Sterling Formation (about 350' of net pay) and Beluga Formation (about 160' of net pay).²⁶ The Pliocene-aged Sterling Formation is composed of coarse-grained clastic intervals and interbedded thin carbonaceous mudstones²⁷ and has a high net-to-gross sand ratio. The Miocene-aged Beluga Formation is composed of mudstone, siltstone, coal and sandstone²⁸ and has a low net-to-gross sand ratio. The sandstone layers in the Sterling and Beluga Formations are channel belt and crevasse-splay deposits.²⁹ Well logs indicate that the productive sand members have porosity ranging from 22 to 36% (28% average), permeability averaging about 180 millidarcies, and water saturation averaging about 40%.³⁰

Current exploration activities in the North Cook Inlet area are seeking untapped channel sands³¹ and have reportedly identified a possible "faulted structural nose" to north of the field with potential reservoirs in the Beluga and Tyonek Formations.³²

²⁴ Alaska Oil and Gas Conservation Commission, 1968, Establishment of Permanent Rules for Pool Designation and Well Spacing in the North Cook Inlet Field, Conservation Order No. 68

²⁵ Vigoren, L.L., 1967, Geologic Testimony in Support of Conservation Order No. 40, Temporary Spacing Order Allowing "Cluster" Spacing in the North Cook Inlet Field

²⁶ Thomas, C.P., and others, 2004, cited above, Table 2.5, p. 62

²⁷ Alaska Oil and Gas Conservation Commission, 1998, North Cook Inlet Field, North Cook Inlet Unit, NCIU A-12: Class II Disposal; Aquifer Exemption Order No. 4

²⁸ Alaska Oil and Gas Conservation Commission, 2011, review of mud logs from Well History Files 162-008, 165-030 and 166-025

²⁹ Levinson, R. A., 2011, Beluga River Gas Field, Cook Inlet, Alaska, in 2011 Western Region Meeting, SPE and Pacific Section AAPG, Anchorage, Alaska, Program with Abstracts, p.71 - 72.

³⁰ Chrisman, J.E., 1967, cited above

³¹ Thomas, C.P., and others, 2004, cited above, p.72

³² Lidji, E., 2011, Alaska Offshore Special Report: Buccaneer Sees NW Cook Inlet Potential; Petroleum News, Vol. 16, No. 4 January 23, 2011