Oil & Gas Resources in the Alaskan Arctic

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Gil Mull photo
Global Conventional Oil Resources

Note: Does not include results from USGS Circum-Arctic Oil and Gas Resource Appraisal study.

Global Conventional Oil Resources - Undiscovered, Technically Recoverable

Data sources:
- USGS World Petroleum Assessment 2000 and updates
- USGS National Oil and Gas Assessment, 2006 update
- MMS 2006 National OCS Assessment
- Earth At Night Image courtesy of NASA/GSFC, NOAA/NGDC DMSP Digital Archive

Note: Map does not include results from USGS Circum-Arctic Resource Appraisal
Topical Petroleum-related Studies

Quartz (monocrystalline)-Feldspar-Lithics (total)

Porosity (%) vs. Permeability (mD) North Slope Foothills, 2001

Porosity (%) vs. Permeability (mD) North Slope Foothills, 2001

Killik Bend non-marine to deltaic succession, highstand aggradational system tract
Merging Surface and Subsurface Data

Brookian Sequence Stratigraphic Correlation Section, Umiat Field to Milne Point Field, West-central North Slope, Alaska

- **nonmarine undifferentiated**
- **shallow marine to proximal shelf ss.**
- **distal shelf ss. to sltst.**
- **toe-of-slope turbidites (sand-prone)**
- **shelf to slope mudst. to sltst.**
- **condensed or bentonitic sh.**

Simplified from Decker (2007)
Foothills Structural Plays
Seismic Interpretation

Composite seismic transect west of Canning River, North Slope, Alaska

*Public seismic lines EP81-27S, -27C, & -27N*

PLDecker, Alaska Division of Oil & Gas

Kavik structure
Regional Geology and Petroleum Systems

Oil & Gas Fields on Barrow Arch

Cumulative Production 15.5 BBO
Proved Reserves 6.2 BBO 35.4 TCF

2009 Estimates

Modified from Bird and Bader (1987)
Conventional and “Unconventional” Accumulations
Resource Potential vs Reserves

Prudhoe Bay

Land surface

Conventional structural gas accumulation

Coalbed gas

Conventional stratigraphic gas accumulation

Conventional structural oil accumulation

Gubik

Transition zones

NPRA

Continuous chalk or shale oil accumulation

Continuous chalk or shale gas accumulation

Oil Generation Window

Gas Generation Window

Continuous basin-centered gas accumulation

Tens of miles

Oil

Gas

Water
USGS Assessment Methodology – Geologic Basis

Play A

Probability of Greater than

Closure Area
Reservoir Thick
Porosity
Water Sat
Trap Fill

Probability of Greater than

Number of Containers

Play A

Volume of Oil

In-Place Accumulations

Oil vs. Gas

Prospect Risk
Charge
Reservoir
Trap

Play Risk
Charge
Reservoir
Trap

Tech. Recover.
Undiscovered Mean Field Size Distributions - USGS

State Lands: ~1 undiscovered oil accumulation > 250 MMBO recoverable. ~2 undiscovered gas accumulations > 1.5 TCF recoverable.

NPRA: ~11 undiscovered oil accumulations > 250 MMBO recoverable. ~7 undiscovered gas accumulations > 1.5 TCF recoverable.

ANWR 1002: ~9 undiscovered oil accumulations > 250 MMBO recoverable (~65% of estimated total recoverable oil volume); gas resource not shown.
USGS Potential for Undiscovered Petroleum in Arctic Alaska

**Chukchi Shelf OCS***
- Oil: 15.4 (2.3 - 40.1) BBO
- Gas: 76.8 (10.3 - 209.5) TCF

**Beaufort Shelf OCS***
- Oil: 8.2 (0.4 - 23.2) BBO
- Gas: 27.6 (0.6 - 72.2) TCF

**ANWR 1002 Area**
- Oil: 10.4 (5.7 - 16.0) BBO
- Gas: 3.8 (0.0 - 10.9) TCF

**(Federal + Native + State Resources)**

- **NPRA***
  - Oil: 40.6 (6.7 - 15.0) BBO
  - Gas: 61.4 (40.4 - 85.3) TCF

- **Central North Slope**
  - Oil: 4.0 (2.6 - 5.9) BBO
  - Gas: 33.3 (23.9 - 44.9) TCF

* Oil includes crude oil + natural gas liquids
  Gas includes nonassociated + associated gas
** Oil includes crude oil only
  Gas includes nonassociated gas only
“Unconventional” Gas Resources (continuous resources)

Coalbed Gas

Overpressured, Basin-centered Gas

Gas Hydrates

Evaluation in Progress

Roberts USGS

Houseknecht USGS

Collett USGS

Evaluation in Progress
North Slope Oil and Gas Activity 2009-2010

ConocoPhillips
Alpine West (CD-3) satellite development delayed. Waiting on Corp of Engineers 404 permit. Work requires 2 winter seasons to complete. Initiation of work delayed to at least 2011-2012 season.

BP
Completing heavy oil test facility on S-Pad to produce oil out of the shallow Uliga Formation employing a CHOP (Cold Heavy Oil Production) technique.

Eni

Camelot Oilfield
Disclosed in Eni production report.

Benoit
Continued year-round development drilling in Prudhoe, Kuparuk, Colville, and Milne Point Units.

Chevron
Retained 17 leases in the northern White Hills area; relinquished all 41 White Hills tracts south of the Muskoxen and Bluebuck wells.

Chenery Properties
Reported 1,000 bbl of oil production in the North Slope.

Anadarko–Petro-Canada–BO
Drilled 3 wells (Chandler No. 1, Wolf Creek No. 4 and Guthik No. 4). All 3 wells encountered natural gas. Guthik and Wolf Creek wells P & A'd. Chandler suspended for possible future testing.

Talisman/FEX
Seeking to sell interest in NPR-A and foothills leases.

Sauvage Alaska, LLC

Yukon Flats – Dayon Ltd.
Contracted COO Veritas to shoot 55 miles of 3D seismic data north of Steven’s Village.

State of Alaska Department of Transportation study Evaluating routes for proposed transportation corridor to Umial area.

State of Alaska
Department of Natural Resources
Division of Oil & Gas
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Alaska Equal Area, NAD 1983, TM, UTM