

Effects of Arctic Change on Energy Exploration and Production

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Impact of an
Ice-Diminishing Arctic
on Naval and Maritime
Operations
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Topics

- Arctic Activity
 - Present
 - Future
- Research
 - Environmental
 - Technical
 - Spill response
- Thoughts



MMS: An Ocean, Energy, & Mineral Agency

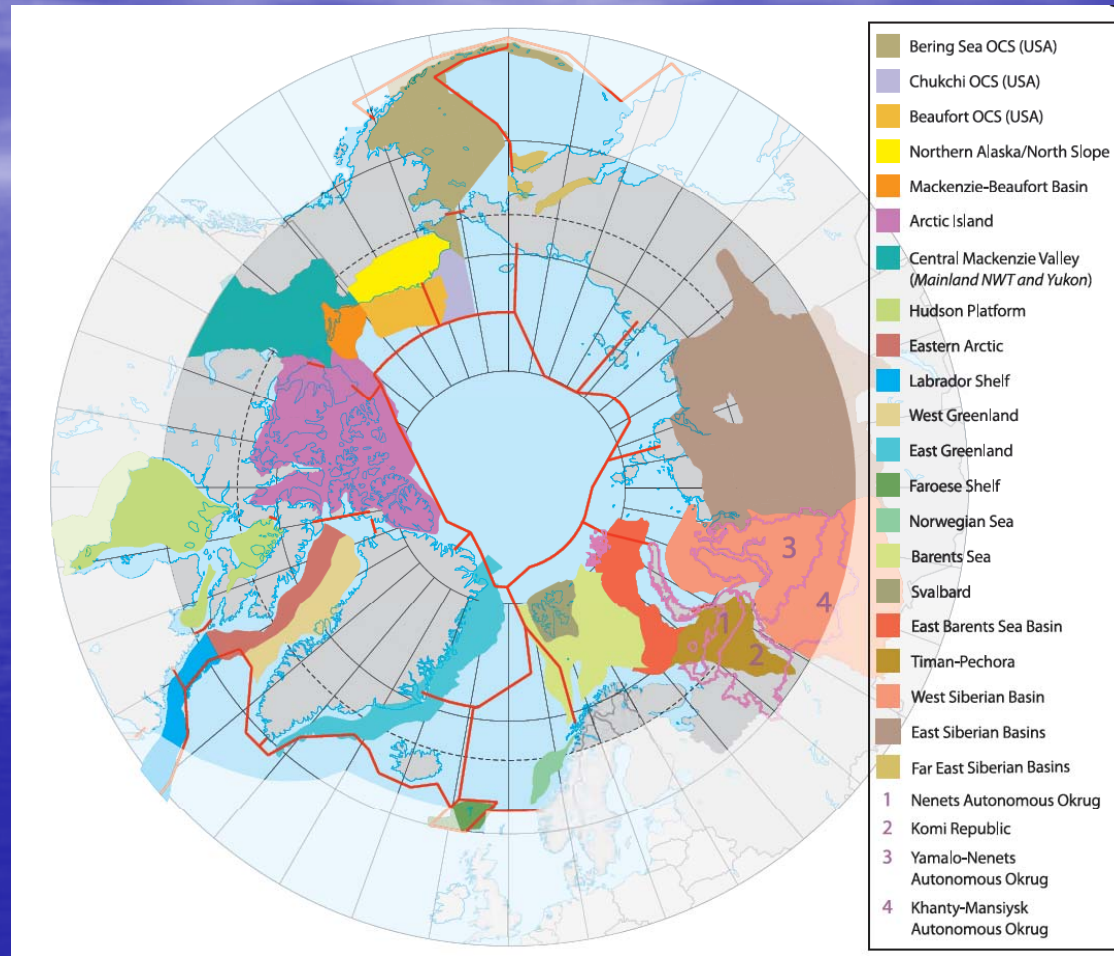
- The Outer Continental Shelf
 - off the coast beyond 3 miles
- Oil and Gas Leasing, Regulation, Monitoring, Inspections
- Sand, gravel, gold, and other minerals,
- *New >>* Energy from wind currents, waves
- Royalty Collection and Disbursement



- Environmental & Technical Research

Current and Future Activities

- **Currently producing Arctic areas**
 - Russia's Timan-Pechora and NW Siberia areas
 - Alaska's North Slope and Beaufort Sea.
 - Norwegian Sea
- **Possible future exploration and production**
 - Alaska's North Slope and Beaufort and Chukchi seas
 - Pechora and Kara Sea
 - Russia and Norway's Barents Seas
 - Canadian Beaufort Sea, Mackenzie Delta, and Mackenzie Valley.
 - Possible Exploration offshore Greenland
 - Possible Exploration offshore Faroe Islands



Law of the Sea Implications

State of Alaska

- 3.6 million acres under lease
- Over 3500 wells active on the North Slope
- Production offshore islands; ERD

MMS Arctic offshore

- 600 million acres
- Only 59 exploration wells
- Northstar only federal production.

BLM onshore

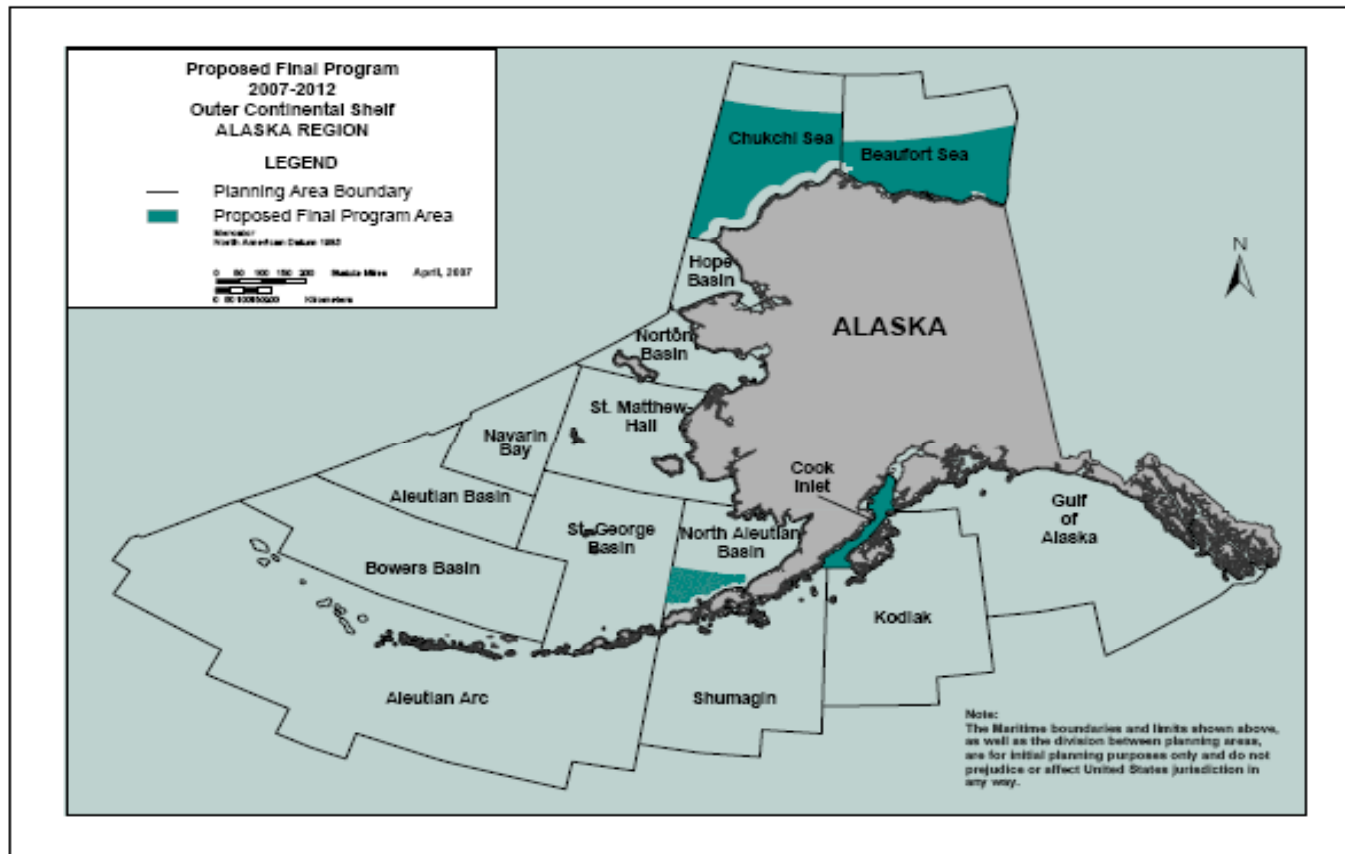
- NPR-A 23.5 million acres
- 16 exploration wells in recent years

U.S. Arctic Oil and Gas

Arctic Ocean and Bering Sea



Alaska 2007-12 OCS Program

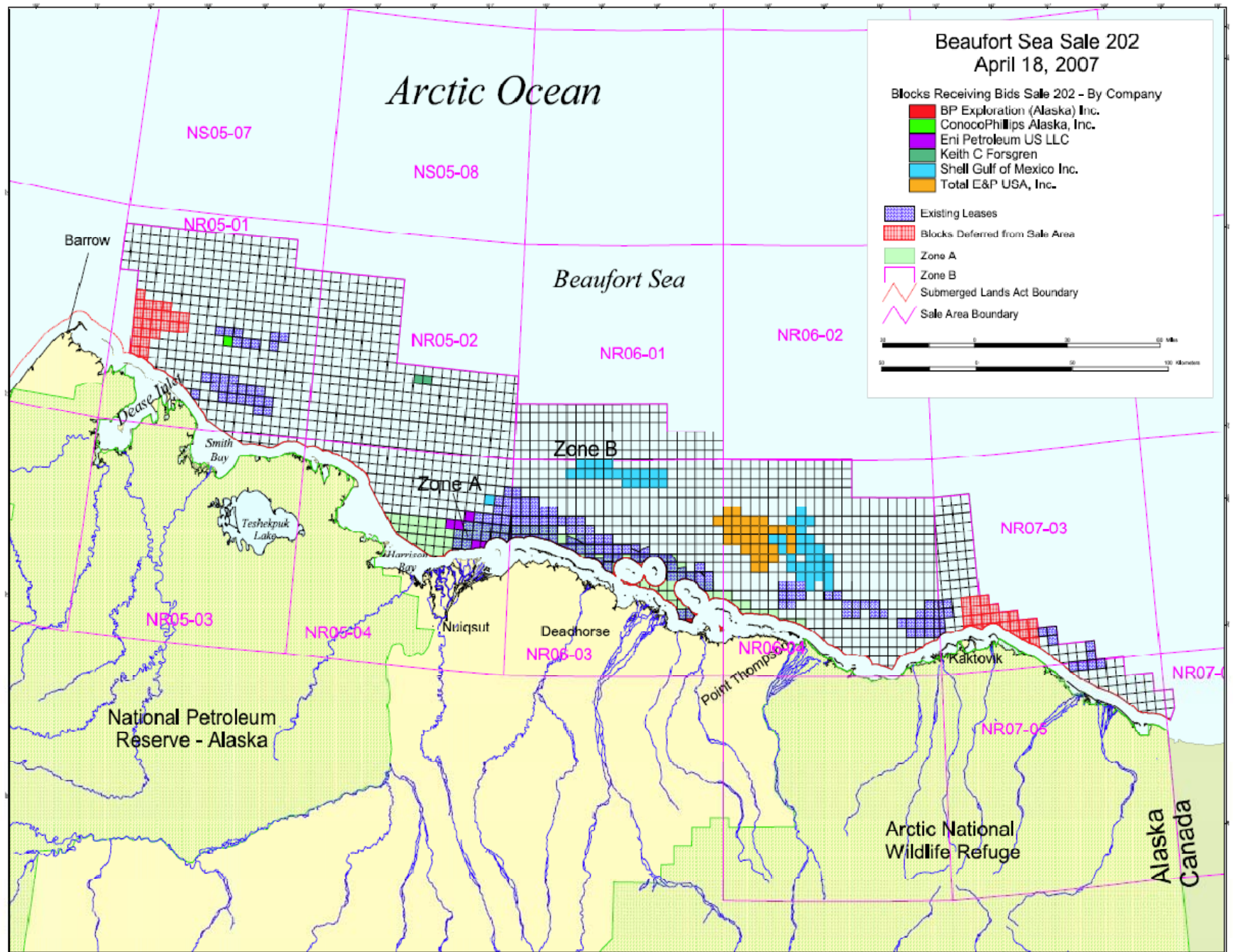


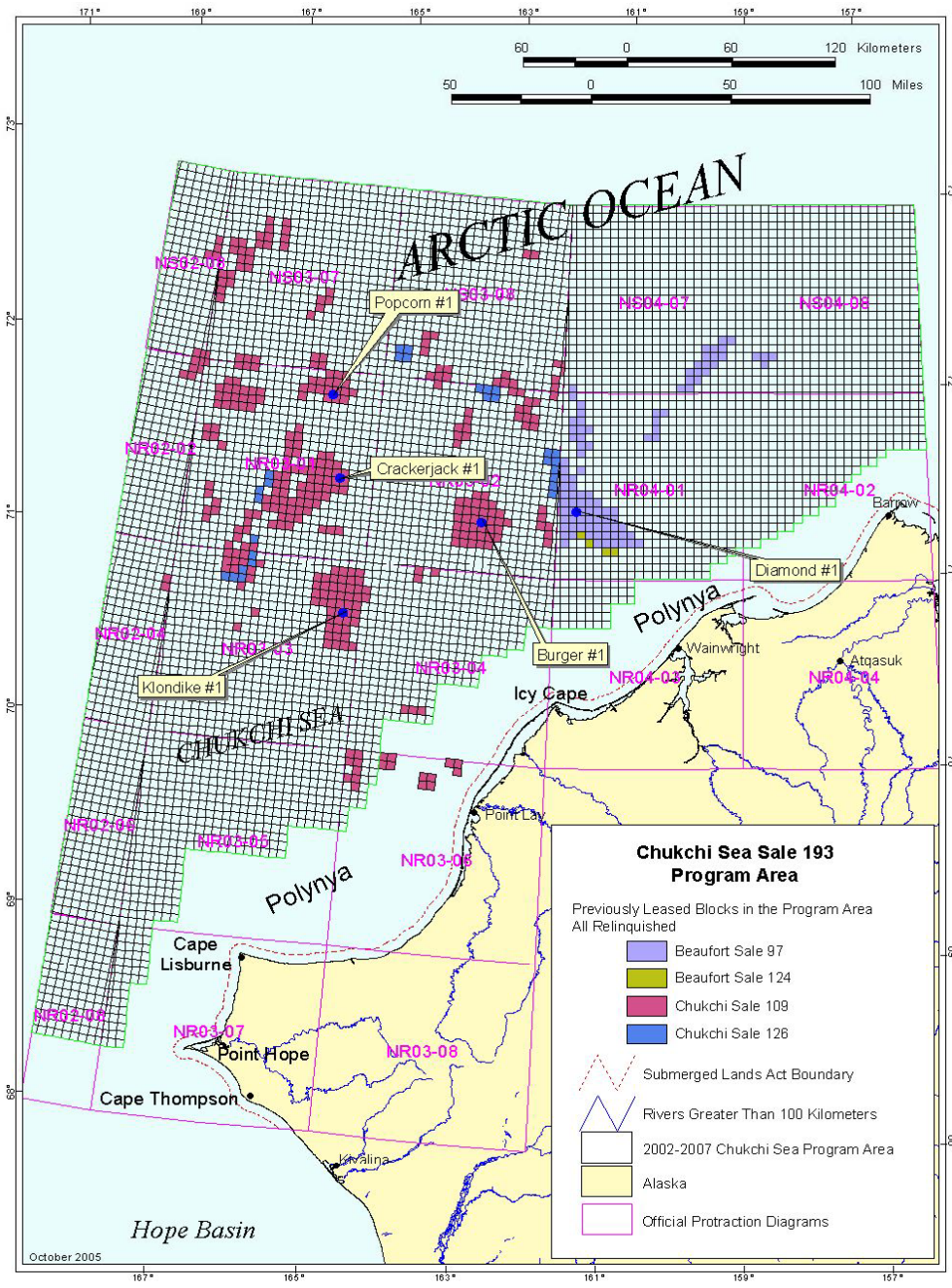
Beaufort Sea Sale 202 April 18, 2007

Blocks Receiving Bids Sale 202 - By Company

- BP Exploration (Alaska) Inc.
- ConocoPhillips Alaska, Inc.
- Eni Petroleum US LLC
- Keith C Forsgren
- Shell Gulf of Mexico Inc.
- Total E&P USA, Inc.

- Existing Leases
- Blocks Deferred from Sale Area
- Zone A
- Zone B
- Submerged Lands Act Boundary
- Sale Area Boundary





Chukchi Sea

Map is for illustration only, showing past leases; no current leases; it does not reflect Sale 193 decisions

Alaska Oil and Gas Estimates

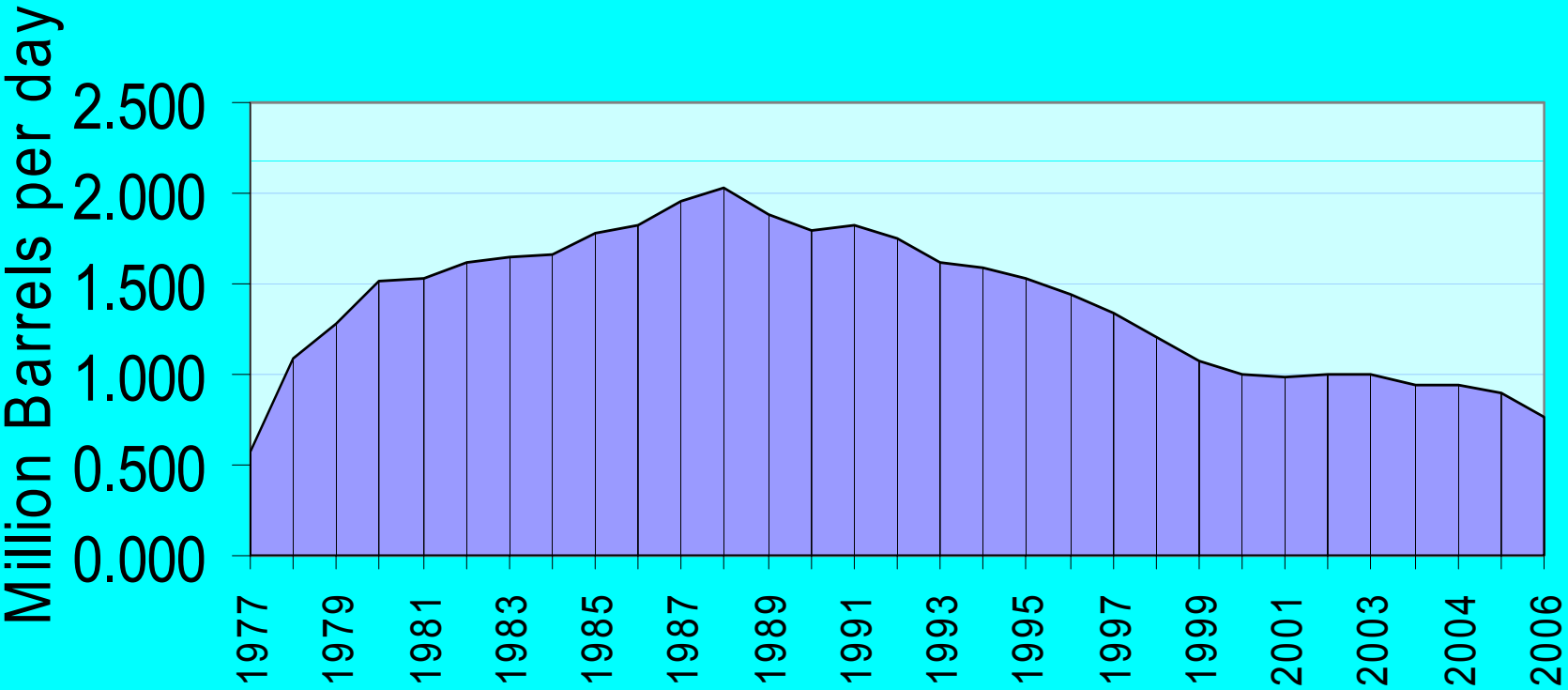
Undiscovered Technically Recoverable

OCS Planning Area

Oil and Gas Estimates

	<u>95%</u>	<u>Mean</u>	<u>5%</u>
Beaufort Sea			
Oil (bbo)	0.4	8.2	23.2
Gas (tcf)	0.7	27.7	72.2
Chukchi Sea			
Oil (bbo)	2.3	15.4	40.1
Gas (tcf)	10.3	76.8	209.5
North Aleutian Basin (Bering Sea-Bristol Bay)			
Oil (bbo)	0.02	0.75	2.5
Gas (tcf)	0.4	8.6	22.3
Cook Inlet			
Oil (bbo)	0.06	1.0	2.9
Gas (tcf)	0.03	1.2	3.5

Trans-Alaska Pipeline Daily Throughput 1977-2006



2006: 759,081 barrels of oil per day

What are oil and gas activities?

- **Exploration**
 - field work
 - seismic surveys
 - drilling
- **Development**
 - platforms/rigs construction
 - drilling
 - infrastructure (including housing, roads, airstrips, storage, waste disposal facilities)
 - transportation (ships and pipelines).
- **Decommissioning**
- **In the event of climate change, all of these are likely to be affected.**

Alaska Exploration

- Seismic surveys
 - 2006 & 2007 summer
Chukchi/Beaufort
 - Ice hinders surveys
- Exploration drilling
 - Shell – Sivulliq, Beaufort Sea
 - “open water”
 - Floating vessels
 - Past: ice or gravel islands
 - winter
 - Floaters
 - Ice management



Alaska Offshore Development/Production

Past

Northstar (BF) producing
(State/federal)

Buried pipeline

Nearshore in State waters
barrier/gravel islands
extended reach drilling

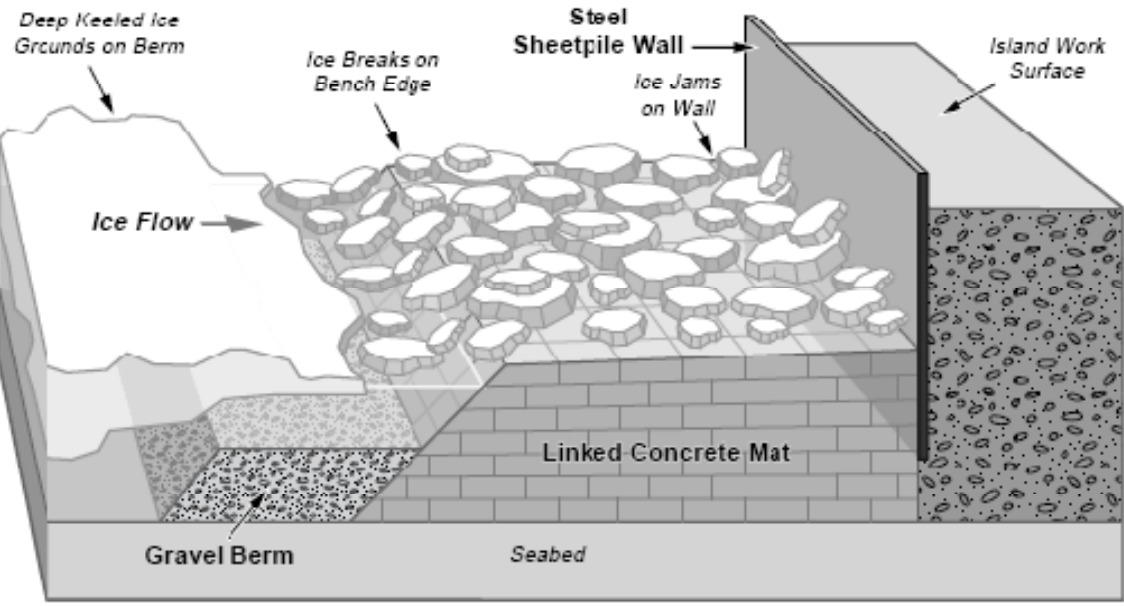


Near Future

Liberty (BF) – Development
Plan - ultra extended reach

State – nearshore islands

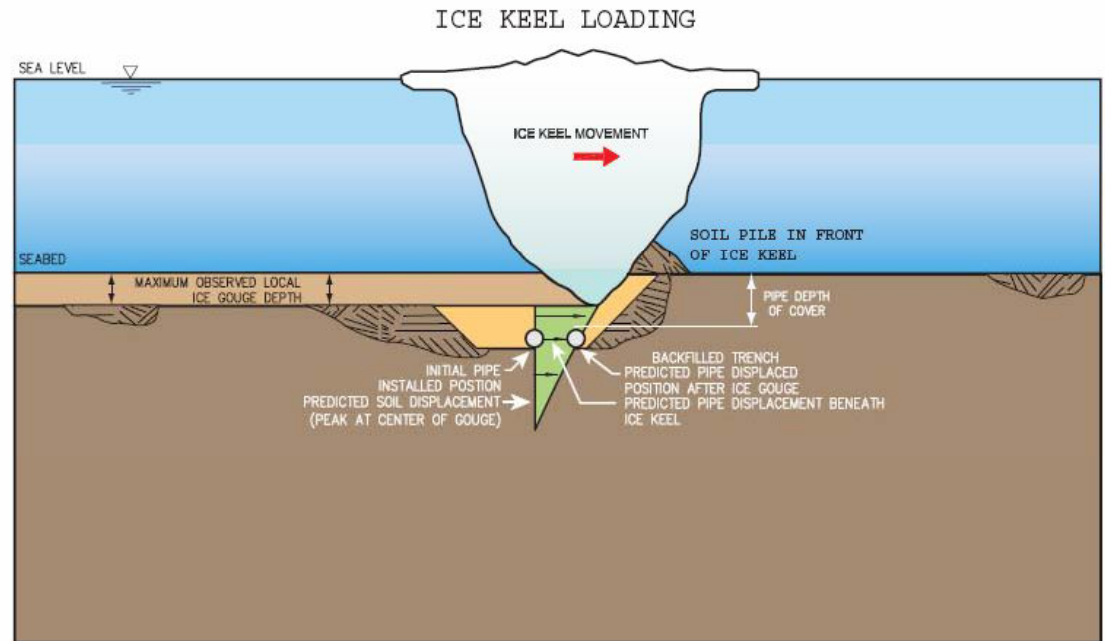




ICE PROTECTION — Northstar's production island is protected from the moving ice by a special design. Diagram above shows how the design causes ice to ground on the gravel berm and then break up. Storm action has caused some changes in the shape of the berm, which is being monitored by BP.

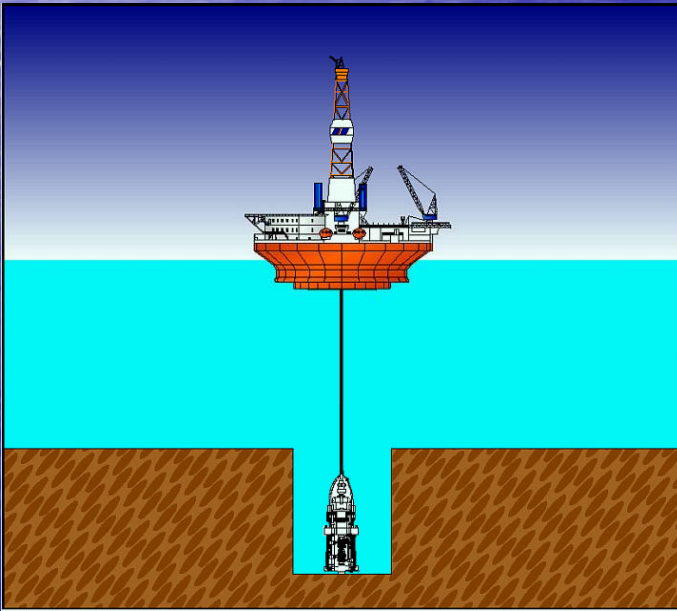
Northstar Island design for ice

Buried pipeline for ice protection



Technology Changes

- Platforms
- Pollution Prevention
- Safety Systems
- Human Factors
- Pipelines



Norway's Barents Sea



Conceptual Field Layout

