STATE OF ALASKA

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OIL-AND-GAS RESOURCES OF ALASKA

1985

INFORMATION CIRCULAR 31

Department of Natural Resources
Division of Geological and
Geophysical Surveys

CONSTITUTION OF THE
STATE OF ALASKA
Article VIII, Section 1

It is the policy of the State to encourage the settlement of its land and the development of its resources by making them available for maximum use consistent with the public interest.

Information about Alaska's natural resources is available from the Office of the Commissioner, Department of Natural Resources, 400 Willoughby Center (5th floor), Pouch M, Juneau, Alaska 99811 (phone 907-465-2400).

Alaska Department of
NATURAL
RESOURCES

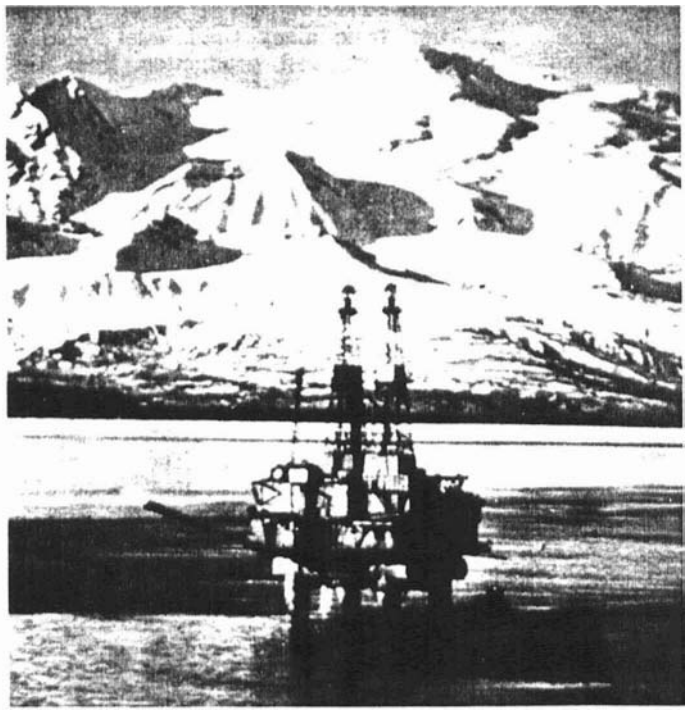
OIL-AND-GAS RESOURCES OF ALASKA

History of Oil-and-gas Exploration and Development

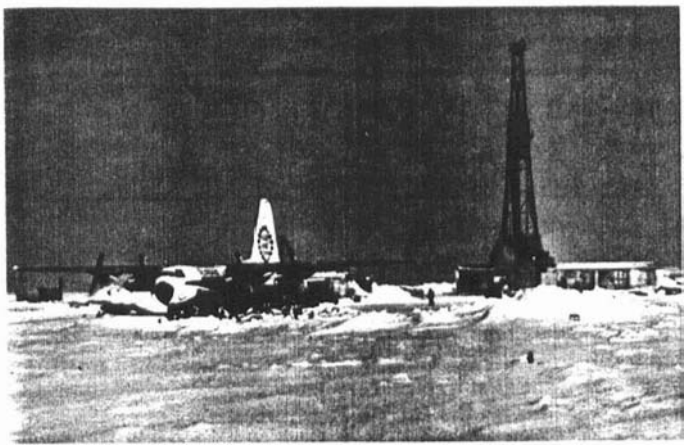
Oil seeps in Alaska were first reported by Russian traders over 130 years ago. The first exploratory wildcat well was drilled on the Iniskin Peninsula on the west side of lower Cook Inlet in 1898, and in 1902, the first commercial hydrocarbon discovery was drilled at Katalla, Gulf of Alaska. The Katalla field produced oil until 1931, when the topping plant burned. This plant had supplied refined petroleum products to the Kennicott Copper Mine at McCarthy.

The first major oil field in Alaska was discovered in 1951 on the Kenai Peninsula, when the Richfield Oil Company initially drilled the Swanson River field. Other commercial oil-and-gas discoveries in the area soon delineated the Kenai Peninsula as a major petroleum-producing province.

The Atlantic Richfield Company discovered the supergiant field, Prudhoe Bay, in 1968. At the time of discovery, this field had producible reserves of approximately 9.6 billion barrels of oil and 26 trillion cubic feet of gas. In 1977, after nearly 4 years of



Oil-and-gas-producing platform in Cook Inlet, Alaska. Photograph courtesy of the U.S. Department of Interior Minerals Management Service, 1980.



The Prudhoe Bay discovery well was drilled by the Atlantic Richfield Company in 1967-68. C-130 Hercules planes were used to fly in the drill rig, camp, and all drilling supplies. Photograph by C.G. Mull, March 1968.

construction—and at a cost of $7.7 billion—the Trans-Alaska Pipeline System was completed. Since then, oil has moved through the pipeline from Prudhoe Bay to Valdez, where it is loaded onto tankers for shipment to refineries along the west coast.

Current Prospects

Approximately 85 percent of the State of Alaska's current revenue is derived from royalties and taxes paid on state-owned oil-and-gas leases. Production from many Cook Inlet fields is declining, and production from the Prudhoe Bay field is expected to substantially decline in the 1990s.

Indications from current North Slope oil-and-gas exploration are encouraging. Recently discovered accumulations in the following areas are estimated to total 2.5 billion barrels of recoverable oil.

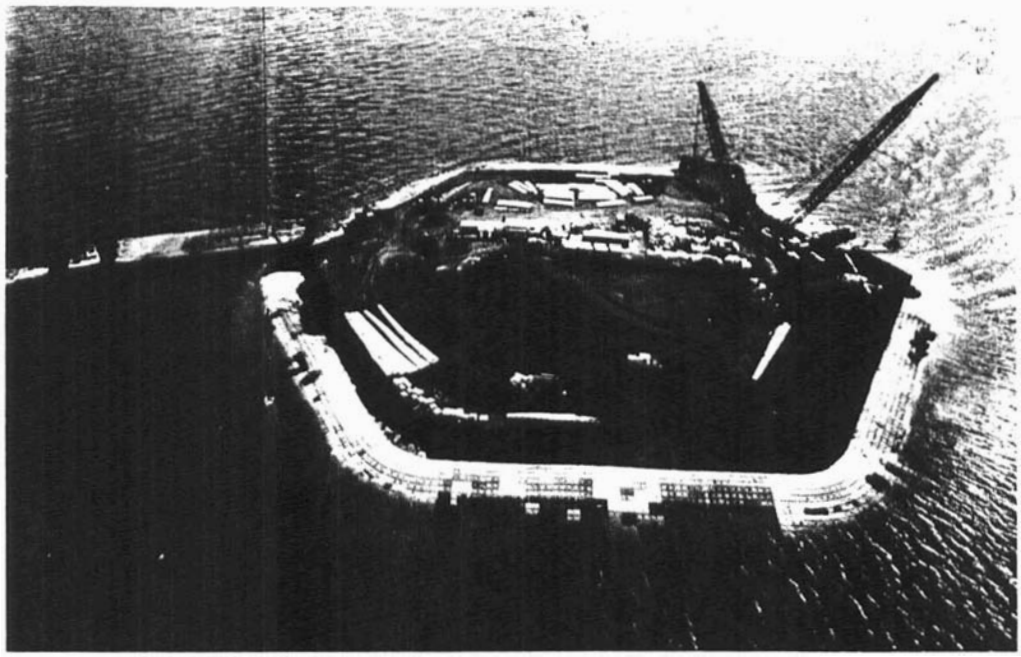
- Kuparuk field: Approximately 1.2 billion barrels of recoverable oil; currently producing over 190,000 barrels per day.
- Duck Island - Sag Delta area: 1.1 billion barrels of in-place oil with up to 350 million barrels recoverable, not including an unknown quantity of free and associated gas. Production is from Endicott Group rocks that are not productive in the Kuparuk and Prudhoe Bay fields.

Aerial view of the Alyeska Pipeline Terminal, Valdez, Alaska. Photograph courtesy of Alyeska Pipeline Service Company, 1984.

- Point Thompson area: Estimates of 350 million barrels of recoverable condensate (very high gravity, high-quality oil) and 6 trillion cubic feet of recoverable gas.
- Lisburne Pool: 3 billion barrels of in-place oil that underlie the producing Sadlerochit reservoir (Prudhoe Bay field); possibly 500 million barrels recoverable.
- Milne Point area: 60 million barrels of recoverable oil.
- Gwydyr Bay area: 30 million barrels of recoverable oil.

Other discoveries are in the early stages of delineation:

- West Sak - Ugnu area: These shallow sands contain large reserves of heavy oil. Fifteen to 25 billion barrels of oil may be in place in the West Sak sands, with as much as 3 to 5 billion barrels ultimately recoverable. Although preliminary hot-water-injection projects are being conducted, commercial production is uncertain. Commercial development of heavy oil in the shallow Ugnu sands (6 to 11 billion barrels in place) is currently beyond the technological capability of industry.
- Seal Island: The discovery well produced up to 5,000 barrels of 40° gravity oil and 10 million cubic feet of gas per day. Delineation wells are currently being drilled.



Construction of North Star Island was completed in 1985. Concrete blocks replace the traditionally used gravel-filled bags that protect other gravel islands from erosion by pack ice and wind-driven summer waves. Other man-made gravel islands have been effectively used for oil-and-gas drilling operations. Photograph courtesy of AIC-Martin, 1985.

- Colville Delta: In 1985 Texaco announced a discovery well that produced from 414 to 1,076 barrels of oil per day. No estimate of in-place reserves has been made.

According to the National Petroleum Council (1981), estimates for undiscovered, conditional, in-place oil resources in Alaska range from 2.5 to 14.6 billion barrels onshore and 4.6 to 24.2 billion barrels offshore (95-percent and 5-percent probability levels, respectively).

Between September 1984 and August 1985, exploratory drilling proceeded at a moderate to fast pace. Of nine new wells drilled on state leases, Texaco announced one discovery at Colville Delta No. 1. Nineteen wildcat wells were drilled on federal leases in the St. George Basin, Norton Sound, Navarin Basin, lower Cook Inlet - Shelikof Strait, and Beaufort Sea areas, but none encountered commercial-grade hydrocarbon deposits. Additionally, one dry hole was drilled onshore on a federal lease in the National Petroleum Reserve Alaska.

Six federal outer continental shelf wells are operating in the state. Additional permitted locations will be drilled during the fall of 1985 or during the 1985-86 winter drilling season.

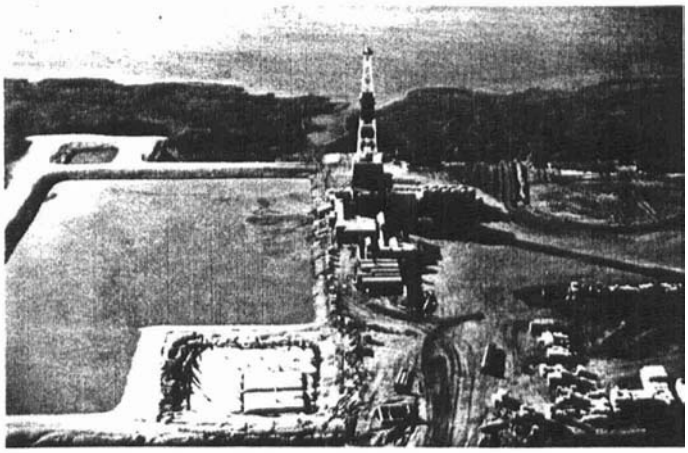
Development activity is extensive in both the Prudhoe Bay and Kuparuk fields. Delineation and development drilling are especially active on the Seal Island and Milne Point accumulations. During the past year, the private sector proceeded with development of the Endicott reservoir at Duck Island and successfully used the first Concrete Island Drilling System (CIDS).

Resource Estimates

The map of Alaska (p. 9) identifies the state's hydrocarbon resources based on estimates by the U.S. Geological Survey and National Petroleum Council. These estimates were made in 1981 and were subsequently modified from Ehm (1983) for this document. Resource estimates released in July 1984 by the U.S. Department of Interior Minerals Management Service (Cooke, 1985) are also shown on the map. The Alaska Department of Natural Resources Division of Geological and Geophysical Surveys recently published Special Report 32 (Ehm, 1983), which shows major oil-and-gas basins in Alaska.

Oil-and-gas Leasing Program

The Alaska Department of Natural Resources is responsible for managing Alaska's oil-and-gas resources. Annually a 5-year schedule for the leasing of state land for oil-and-gas exploration is submitted to the Legislature. The major purpose of this schedule is to facilitate the orderly assessment and development of Alaska's petroleum resources. All Alaskans, including local citizens and governments, environmental groups, the oil-and-gas industry, and the business sector benefit from a fixed and predict-



Gravel pad, containment pit, and drill rig on the North Slope near Prudhoe Bay. Photograph by S.E. Rawlinson, 1978.

able leasing program because an established leasing schedule permits the public to comment on areas that may be leased, allows business and labor to plan employment or business opportunities, permits the petroleum industry to allocate a portion of its resources to petroleum exploration and development, and gives local, state, and federal governments adequate time for presale evaluation, assessment, and mitigation of impacts. The 5-year lease-sale schedule may be obtained from the Alaska Department of Natural Resources Division of Oil and Gas (1985).

Exploration Activity in the Arctic National Wildlife Refuge

Oil-industry interest is currently focused on the Arctic National Wildlife Refuge (ANWR) in anticipation of a Congressional decision about leasing within the refuge. The Congressional decision, which is to be made in 1986 or 1987, will partly be based on estimates by federal and state geologists of probable oil resources within the refuge.

The Department of Natural Resources Division of Geological and Geophysical Surveys is conducting a petroleum-resource analysis of ANWR. During the summer of 1985, in cooperation with the Bureau of Land Management, Survey geologists conducted extensive field studies in the refuge. The information collected during this field program will be used to interpret confidential seismic and well data, including 1984 and 1985 ANWR seismic and offshore data within the 6-mile limit.

Geologists from the Alaska Division of Geological and Geophysical Surveys collect field data in the Arctic National Wildlife Refuge, North Slope, Alaska. Photograph courtesy of C.G. Mull, 1985.

References Cited

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Cooke, L.W., 1985, Estimates of undiscovered, economically recoverable oil and gas resources for the outer continental shelf as of July 1984: U.S. Department of the Interior Minerals Management Service Outer Continental Shelf Report MMS 85-0012, 45 p.

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National Petroleum Council, 1981, U.S. Arctic oil and gas: Washington, D.C., 130 p.

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U.S. DEPARTMENT OF INTERIOR
U.S. GEOLOGICAL SURVEY RESOURCE ASSESSMENT AREAS

No.	Area
1	Arctic National Wildlife Refuge
2	National Petroleum Reserve-Alaska
3	Beaufort Sea
4	Chukchi Sea
5	Hope
6	Navarin
7	Norton
8	St. George-Umnak Plateau
9	North Aleutian
10	Bering Sea (other)
11	Shumagin
12	Kodiak Shelf
13	Gulf of Alaska
14	Cook Inlet-Shelikof Strait
15	Copper River-Interior
16	Yukon-Kandik
17	North Slope (other)

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL AND GAS
Oil-and-gas lease-sale schedule, August 27, 1985

No.	Area	Date
32	Kenai Peninsula	Aug 1981
33	Upper Cook Inlet	May 1981
34	Prudhoe Bay Uplands	Sept 1982
35	Cook Inlet (general location)	Dec 1981
36	Flaxman Island area	May 1982
37	Middle Tanana basin and Copper River basin	Aug 1982
37A	Chatok River Exempt	Aug 1982
39	Beaufort Sea	May 1983
40	Upper Cook Inlet	Sept 1983
41	Bristol Bay Uplands	Sept 1984
43	Beaufort Sea	May 1984
43A	Colville Delta-Prudhoe Bay Uplands Exempt	May 1984
45	Hope Basin	May 1989
45A	North Slope (location not available)	Sept 1985
46	Holitna Basin	Sept 1987
46A	Cook Inlet (location not available)	Feb 1985
47	Kuparuk Uplands	Sept 1985
48	Kuparuk Uplands	Feb 1986
48A	Mikkelsen	Feb 1986
49	Cook Inlet (general location)	May 1986
50	Camden Bay	May 1987
51	Prudhoe Bay Uplands	Jan 1987
52	Beaufort Sea	Sept 1986
52A	Nechelik	Sept 1986
53	Icy Cape	Sept 1987
54	Kuparuk Uplands	Jan 1988
55	Demarcation Point	May 1988
56	Alaska Peninsula	Sept 1988
57	North Slope Foothills	Jan 1989
58	Offshore Icy Cape	Sept 1989
59	Cook Inlet	Jan 1990
60	Point Franklin	May 1990
61	White Hills	Sept 1990

U.S. DEPARTMENT OF INTERIOR
Oil-and-gas lease-sale schedule issued 1985

BUREAU OF LAND MANAGEMENT

Iditarod-George	Sept 1986
Goodnews Bay	On hold
Kvichak	On hold
National Petroleum Reserve-Alaska (tentative)	Sept 1986
Anvik-Bonsila	Sept 1987
Steese-White Mountain	Sept 1986
Central Yukon	Sept 1987
Venetie	Sept 1988

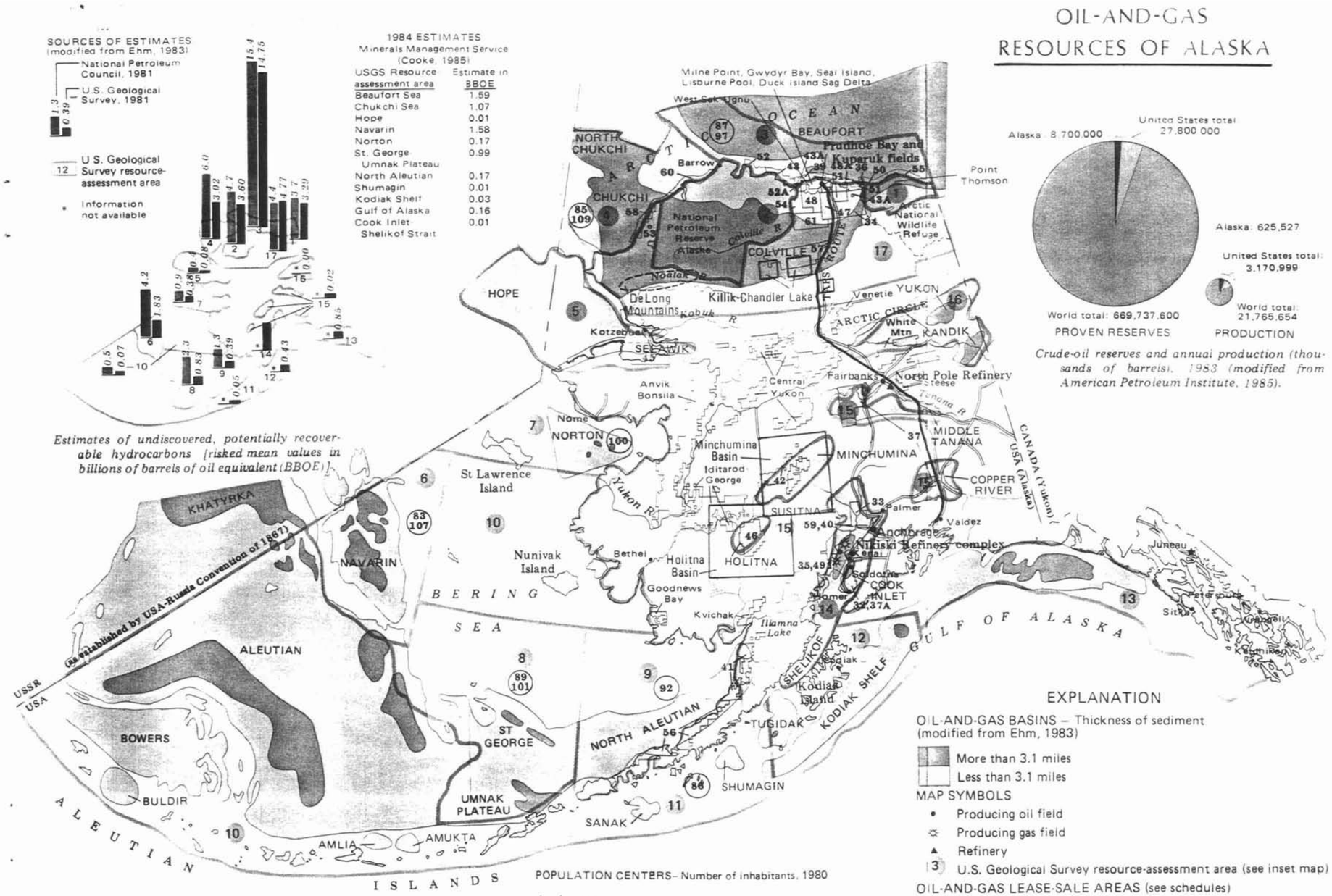
MINERALS MANAGEMENT SERVICE
(general location, April 1985)

83	Navarin Basin	Apr 1984
85	Barrow Arch	No date
86	Shumagin	Dec 1987
87	Diapir Field	Aug 1984
89	St. George Basin	No date
92	N. Aleutian Basin	Jan 1986
97	Diapir Field	Dec 1986
100	Norton Basin	Mar 1986
101	St. George Basin	July 1988
107	Navarin Basin	Sept 1986
109	Barrow Arch/Chukchi	May 1985
-	Barrow Arch/Chukchi	May 1990

Estimates of undiscovered, potentially recoverable hydrocarbons [risked mean values in billions of barrels of oil equivalent (BBOE)].

1984 ESTIMATES
Minerals Management Service
(Cooke, 1985)

USGS Resource assessment area	Estimate in BBOE
Beaufort Sea	1.59
Chukchi Sea	1.07
Hope	0.01
Navarin	1.58
Norton	0.17
St. George Umnak Plateau	0.99
North Aleutian	0.17
Shumagin	0.01
Kodiak Shelf	0.03
Gulf of Alaska	0.16
Cook Inlet Shelikof Strait	0.01



POPULATION CENTERS– Number of inhabitants, 1980

Anchorage	●	174,431
Fairbanks	•	22,645
Juneau	★	19,528 (state capital)
	•	2,000-8,000

SELECTED TRANSPORTATION-UTILITY CORRIDORS

Scale 1:12,000,000

100 0 100 200 300 400 mi

100 0 100 200 300 400 500 km

Compilation of map data by Division of Geological and Geophysical Surveys

OIL-AND-GAS RESOURCES OF ALASKA

Crude-oil reserves and annual production (thousands of barrels), 1983 (modified from American Petroleum Institute, 1985).

EXPLANATION

OIL-AND-GAS BASINS – Thickness of sediment (modified from Ehrm, 1983)

More than 3.1 miles
Less than 3.1 miles

MAP SYMBOLS

- Producing oil field
- Producing gas field
- Refinery
- 3 U.S. Geological Survey resource-assessment area (see inset map)

OIL-AND-GAS LEASE-SALE AREAS (see schedules)

State of Alaska
- 45 Department of Natural Resources

U.S. Department of Interior
- Bureau of Land Management
- (88) Minerals Management Service (general location)

DGGS OIL-AND-GAS INVENTORY PROJECTS
- Current
- Proposed