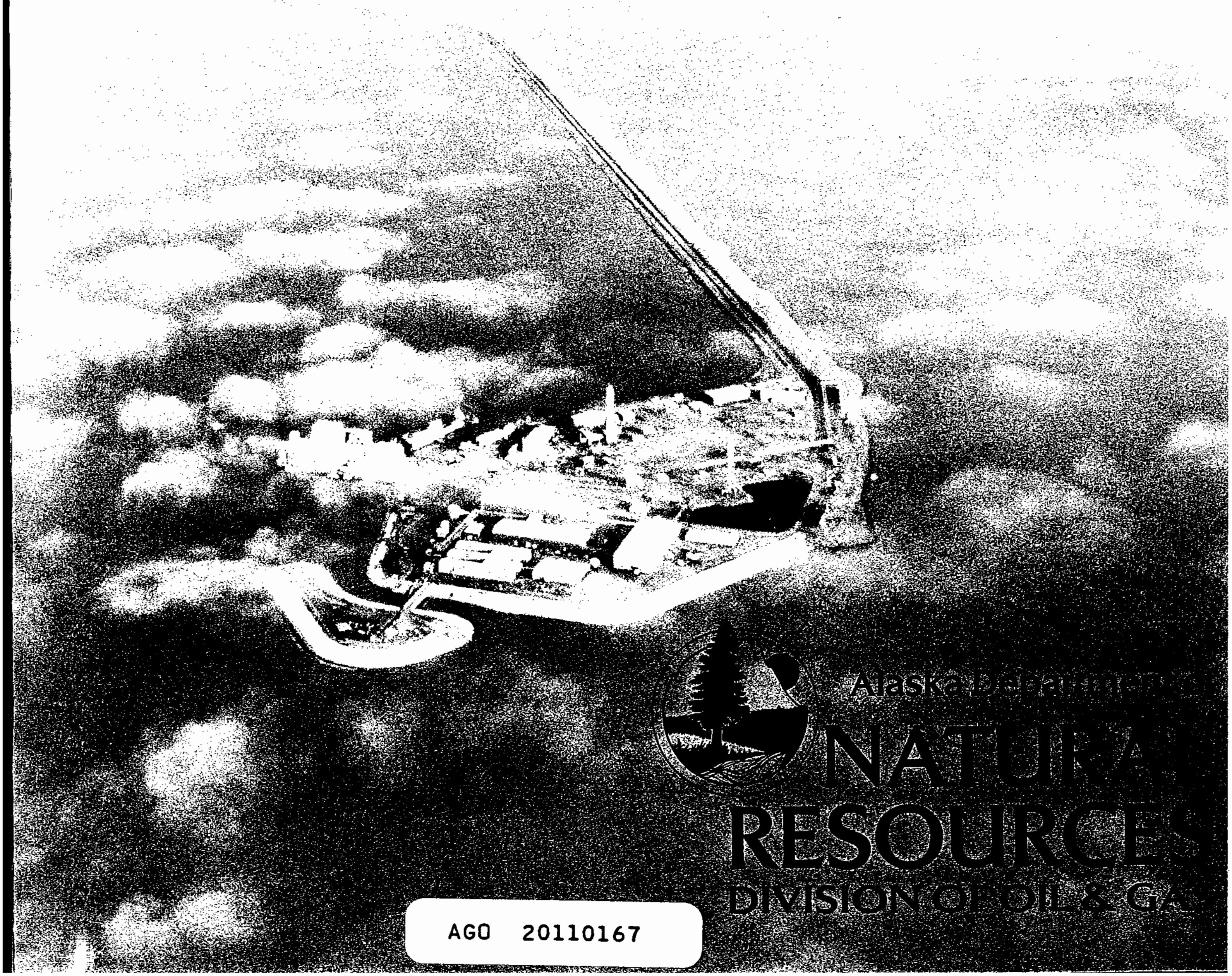
HISTORICAL AND PROJECTED OIL AND GAS CONSUMPTION

JANUARY 1988



STATE OF ALASKA

HISTORICAL AND PROJECTED OIL AND GAS CONSUMPTION

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EXECUTIVE SUMMARY

This report compares estimates of the quantity of Alaskan oil and gas reserves with estimates of how much oil (refined products) and gas Alaska will consume in the 15 year period between 1988 and 2002. A revised supply and demand report is issued each year to comply with AS 38.05.183(d), which states:

"(d) Oil or gas taken in kind by the state as its royalty share may not be sold or otherwise disposed of for export from the state until the commissioner determines that the royalty-in-kind oil or gas is surplus to the present and projected intrastate domestic and industrial needs. The commissioner shall make public, in writing, the specific findings and reasons on which his determination is based and shall, within 10 days of the convening of a regular session of the legislature, submit a report showing the immediate and long-range domestic and industrial needs of the state for oil and gas and an analysis of how these needs are to be met." [1](

Chapter 1 describes the state's royalty oil program and reviews pending federal legislation which might affect prices of state royalty oil.

Chapter 2 lists high, mid and low estimates of oil and gas reserves, and their respective royalty shares. Whereas high estimates are somewhat probabilistic and assume increasing oil prices, mid and low estimates are derived from proven and probable reserves and assume relatively stable oil prices. The lower figures, therefore, are prudent values for long range policy considerations. The mid-range oil estimate is 8.1 billion barrels of oil, yielding a 1.0 billion barrel state royalty share. Of this royalty share, 98.8% is attributable to reserves on the North Slope. The mid range estimate of gas is 35.2 trillion cubic feet. The state's share of this gas is 4.2 trillion cubic feet. Again, 92.7% of the gas is attributed to North Slope reserves.

Production estimates of reserves are also presented for the 15 year period. North Slope oil production will peak at about 2.0 million barrels per day in 1988 and 1989, and then is expected to begin to decline. Production is expected to have declined to about 473 thousand barrels per day by the year 2002.

Chapter 3 presents historical data on production and consumption of Alaska oil and gas. Between 1977 and 1987, oil fuel consumption grew by an average of 9.5% per year from 0.7 to 1.9 billion gallons while, in the same period, gas consumption grew an average of 7.5% per year from 205 to 422 billion cubic feet.

Chapter 4 presents forecasts of expected in-state oil and gas consumption from 1988 to 2002. Alaska is expected to consume about 24 billion gallons of fuels (572 million barrels) and 3.9 trillion cubic feet of gas during that period. Consumption growth rates are forecast to be considerably lower than they have been until now; it is estimated that during the period 1988 to 2002, annual growth in consumption will be 1% for both oil and gas.

1 See Appendix D for discussion of statutory definitions.

Chapter 5 presents estimates of state reserves and future production compared with estimates of future consumption. The comparison shows that Alaska's total supply of oil and gas will be greater than in-state consumption for the next 15 years.

The supply and demand projections used in this report are estimates which are applicable only if their underlying assumptions approximate future events. The demand side of the equation is probabilistic because in-state consumption will be influenced by economic and population growth which in turn will be influenced in a large part by world energy and natural resource prices. For example, development of a new southcentral hydroelectric project (other than Bradley Lake) or a coal-fired electric generation project could dramatically affect the in-state demand for natural gas, particularly after the late 1990s. Future expansion of the natural gas, ammonia-urea or petrochemical export market would similarly affect in-state natural gas availability, as well as prices.

The supply side of the equation also is probabilistic. The mid-range estimates of oil and gas reserves, 8.1 billion barrels and 35.2 trillion cubic feet, respectively, are likely outcomes, though the timing for the development of a natural gas transportation system from the North Slope remains very uncertain and development of certain proven oil and gas fields outside of the existing Prudhoe Bay - Kuparuk infrastructure area does not appear economically feasible at today's oil prices. Estimates of undiscovered resources are highly speculative and of little value for this type of plan or projection. Even if these undiscovered resources exist (which they may not), there is no guarantee that they will be discovered or developed in time (or if ever) to assure long-run continuity. For the most part, oil and gas firms will search for and develop reserves in response to world market conditions, not because of surplus or deficit conditions in Alaska's relatively small intrastate market.

In summary, reasonable assumptions about Alaska's existing oil and gas reserves and future consumption indicate that not only are current reserves more than adequate to meet the demands of Alaskans for the next 15 years, but that significant quantities are surplus to requirements, and therefore are available for export from the state.

CHAPTER 1
ROYALTY OIL PROGRAM

When a landowner sells the right to explore for and develop oil and gas, it usually reserves to itself a percentage of the oil and gas ultimately produced if exploration is successful. That percentage is known as a royalty interest or royalty share. The State of Alaska holds a royalty interest in the lands it has leased for oil and gas exploration and development, and receives royalty payments and "in kind" royalty oil from oil and gas production in Cook Inlet and on the North Slope. The latter royalty production and income is from Prudhoe Bay Unit, Duck Island Unit and Kuparuk River Unit production.

Under Alaska Statutes and the terms of state oil and gas leases, the state can take its royalty share of oil and gas either "in kind" or "in value." When the state takes its share of production in kind, the Commissioner of Natural Resources, acting on behalf of the state, disposes of the oil or gas through negotiated contracts or competitive sales. When royalty shares are taken in value (i.e., money), individual lessees market the state's share of production along with their equity production and pay the state according to the value of the product.

Presently, North Slope royalty oil is taken both in value and in kind. Four in-state refiners, Chevron, Tesoro Alaska Petroleum, Petro Star/Chevron, and MAPCO Petroleum, Inc., hold long term negotiated contracts with the state for the purchase of royalty oil. Tables 2.2A and 2.2B depict estimated North Slope and Cook Inlet production to 2013 as well as the state's existing royalty oil contract obligations over that period. In addition to the four in-state refineries, the department has a long-term contract with Golden Valley Electric Association in Fairbanks.

The state began taking all Cook Inlet royalty oil in value on October 1, 1985. The department's decision to nominate Cook Inlet royalty oil for in value taking was based on the state's desire to have Cook Inlet royalty oil available for export. Following the federal administration's October 28, 1985 announcement of its intent to conditionally permit the export of Cook Inlet crude oil, the department issued the Cook Inlet Royalty Oil Export Sale Comment Document (Comment Document) on November 25, 1985.

The Comment Document outlined the department's tentative schedule and terms for a one-year sale of approximately 3,600 barrels per day (bpd) of royalty oil produced from the west side of Cook Inlet. Following the U.S. Commerce Department's publication of the final regulations permitting export and a review of public comments received on the department's Comment Document, the department issued the Solicitation for Offers to Purchase West Side Cook Inlet Royalty Oil of July 15, 1986. That solicitation led to a contract award to the Chinese Petroleum Corporation (Taiwan). The Chinese Petroleum Corporation began receiving oil on July 9, 1987 under a one-year contract that terminates on July 8, 1988. This contract cannot be automatically renewed, and the solicitation process must be repeated if additional export sales are contemplated.

The Department of Natural Resources plans to issue a Cook Inlet Solicitation for Offers on January 11, 1988. The contract under this solicitation would be for one year with approximately the same volumes delivered as under the current contract. Under the proposed schedule, oil deliveries would commence in December 1988. During the interim period (July to December 1988) the state would receive in value payments for the royalty oil.

As of this date, there are two pending legislative developments at the federal level that would, if enacted, influence the potential value of Alaskan oil and, by inference, the value of royalty oil.

The recently signed "Free Trade" bill with Canada would allow the export of up to 50,000 bpd of Alaska North Slope (ANS) crude to Canada, presumably Vancouver. The proposed trade would probably reduce shipments of crude or refined products from Alberta to British Columbia, and possibly increase Canadian shipments to the Midwest or East Coast refineries.

Canada is currently a major exporter of crude oil to the U.S. with daily exports averaging more than 550,000 barrels of crude oil. The U.S. currently exports small quantities of crude and refined products (less than 100,000 bpd) to Canada.

The potential gain to Alaska results from reduced transportation charges associated with such trade. If one assumes that the traded barrels would normally be destined for U.S. Gulf Coast refineries, transportation savings are expected to exceed $3.00 per barrel of traded oil. This savings would be reflected in higher wellhead prices, and hence higher royalties. These potential gains may be reduced by a requirement that the oil be shipped in U.S. tankers.

H.R. 3. entitled: "Trade and International Economic Policy Act of 1987" also addresses the export of Alaskan crude to Canada. Title III of the Act would permit the export of up to 50,000 bpd. The legislation clearly contemplates a swapping arrangement whereby an equivalent quantity of crude is exchanged at some inland location.

This Act also amends section 7(d) of the Export Administration Act of 1979 to prohibit the construction and operation of export refineries for the shipment of Alaska North Slope (ANS) refined products to "noncontiguous countries." Export refineries are defined in Section 331 as any domestic refinery exporting more than 33% of its annual output.

This legislation, by removing a potential in-state source of demand for ANS would have the effect of reducing potential royalty income to the state. H.R. 3. has passed both the House and Senate and is in the House/Senate Joint Conference Committee.

CHAPTER 2
RESERVE ESTIMATES AND ROYALTY SHARE

This chapter discusses estimates of oil and gas reserves in the state and the state's royalty share of these reserves. The reserve estimates have been developed for low, mid and high cases. The specific royalty terms of individual oil and gas lease contracts were used to calculate the state's royalty share of the respective reserves. The low estimates assume stable to falling oil and gas prices and/or less satisfactory than predicted reservoir performance. The high estimates assume rising oil and gas prices and/or better than currently expected reservoir performance. The mid case estimates assume relatively stable oil and gas prices and as-expected reservoir performance.

The estimated reserves and royalty share for oil and gas are shown in Table 2.1. The estimates have been developed separately for Cook Inlet and the North Slope, as different information sources were used for each category. In addition to listing reserves by area, this year's report also lists reserves as "proven and developed" or "proven but undeveloped or shut-in." These categories were used so that the reader can discern which volumes of oil and gas are readily marketable versus those where additional investment in facilities and transportation systems are needed and where there will be a corresponding time delay in bringing the reserves on line.

Cook Inlet

Considerable historical and subsurface information is available about the oil and gas reserves and potential in the Cook Inlet area, and major (i.e., large) new oil discoveries are not considered likely at this time. The reserves are assumed to remain constant for low, mid and high estimates. Cook Inlet reserves account for about 1.8% of the low, 1.2% of the mid, and 0.8% of the high estimates of statewide total oil and gas reserves.

North Slope

Oil and gas reserve estimates shown in Table 2.1 are for currently leased state lands. Current North Slope oil production is from the Sadlerochit reservoir and the Lisburne reservoir both in the Prudhoe Bay Unit, the Kuparuk River reservoir in the Kuparuk River Unit, and the Endicott reservoir in the Duck Island Unit. Production from the Kuparuk River reservoir of the Milne Point Unit was shut in during January 1987. Additional enhanced oil recovery operations at Prudhoe Bay Unit, over and above those already planned, recovery of additional gas condensate and natural gas liquids from the Sadlerochit and Lisburne gas caps and enhanced oil recovery from the Kuparuk and Lisburne reservoirs represent an oil resource (versus oil reserves) of about two billion additional barrels of liquids which may, or may not, be economically recoverable sometime in the future. The economics of enhanced oil recovery operations are extremely sensitive to incremental capital costs and expected wellhead crude oil prices. Recovery of liquids from the Sadlerochit and Lisburne gas caps (and absent major gas sales, simultaneous reinjection of the dry gas back into the reservoirs) would require additional investment by the respective gas cap owners. However, installation at Prudhoe Bay in 1986 of a new large central gas facility designed to recover natural gas liquids (to be used for EOR purposes with the remainder being sold) from the produced gas stream represents a major step in establishing the infrastructure that will be needed to proceed with any future large-scale gas sales or expanded gas cycling projects. The possibility for conversion of any of the above mentioned resources to the proven reserves category and the timing of that conversion must be viewed with extreme caution at this time. However, because billions of barrels of oil will remain in the ground at Prudhoe Bay and Kuparuk River Units after completion of primary and secondary recovery operations, sufficient economic incentives to develop economic means of enhanced oil recovery will continue to exist well into the future.

Various leaseholders on the North Slope continue to experiment with techniques to economically produce the vast amounts of "heavy" oil held in the shallow Tertiary and Cretaceous age sands primarily located west of Prudhoe Bay. Technology and equipment already exist to produce these types of deposits in more temperate, less costly operating climates. However, permafrost considerations, surface-related construction and operating constraints, and the projected wellhead price of the produced oil to date have combined to stymie any commercial development of these relatively shallow (but very large) resources. Pilot production projects have been completed and laboratory research continues in an effort to improve project performance and economics.

Tables 2.2A and 2.2B list production forecasts for some of the fields listed in Table 2.1. Figure 2.1 graphically portrays these estimates. As illustrated, North Slope production is expected to increase slightly in 1988, then begin to decline in 1990.

Currently, no natural gas is exported from the North Slope. Both the Alaska Natural Gas Transportation System (ANGTS) and the Trans-Alaska Gasline System (TAGS) have been proposed as a means of moving North Slope gas to market. To date, neither project has secured financing or a guaranteed market. The continued volatility and uncertainty in prices for oil and gas, the relatively abundant current worldwide supplies of natural gas, and the sheer magnitude of the proposed pipeline projects combine to make the prospective purchasers of the gas, the financial institutions, and the projects' sponsors all very cautious at this time. Efforts to secure markets for the gas are continuing. However, start up of the ANGTS or TAGS project cannot be expected until financing for the project is arranged, and financing likely will not be finalized until firm long-term markets for the gas are guaranteed.

Several noteworthy oil and gas related events occurred in 1987. Production at the Milne Point Unit was suspended after only 13 months of operation. Conoco, the unit operator, stated that oil prices were not high enough to justify continued day-to-day operations. The facilities have been left in place so that production can be resumed. On the brighter side, production commenced from the Endicott field (Duck Island Unit) in the Beaufort Sea. Rates are expected to average 100,000 bpd through 1991, and then begin to decline. Sales of natural gas liquids (NGLs) from the Lisburne and Sadlerochit reservoirs also commenced in 1987. The NGLs are blended with the produced crude oil and transported through TAPS.

The current 1.5 million bpd crude oil production rate (an additional 0.1 million bpd of gas condensate and liquids are also produced) at Prudhoe Bay is expected to begin to decline in late 1989. The actual date of the decline will be influenced by the level of infill development drilling, scheduling of well workovers, water and rich gas injection rates, and the capabilities of the installed and to-be-installed gas handling facilities.

It is possible that the current production rate could be maintained through 1989 and even 1990, given a specific set of reservoir management and investment decisions are adopted by the operators and given that the reservoir then performs as expected. The production forecast presented in this report assumes that the production rate at Prudhoe Bay will begin to decline in late 1989.

Undiscovered Resources

Estimates of undiscovered oil and gas resources in Alaska were discussed in the 1986 report. Since these estimates are not used in the forecasts prepared for this report, no further discussion of undiscovered resources will be presented at this time.

ESTIMATED REMAINING RECOVERABLE RESERVES AND ROYALTY SHARE

TABLE 2.1

	OIL (Millions of Barrels)						GAS (Billion Cubic Feet)					
	Recoverable Reserves			Royalty Share			Recoverable Reserves			Royalty Share		
COOK INLET [1]												
Proven and Developed												
Beaver Creek		1			0			176			0	
Beluga River		—			—			746 [2]			56	
Cannery Loop		—			—			300 [2]			12	
Granite Point		22			3			12			2	
Ivan River, Lewis River, Pretty Creek and Stump Lake		—			—			500 [2]			63	
Kenai		—			—			650 [2]			13	
McArthur River		49			6			633 [2]			79	
Middle Ground Shoal		11			1			5			1	
North Cook Inlet		—			—			770 [2]			9(	
Sterling		—			—			20			(1	
Swanson River		10			0			250			6	
Trading Bay		2			(1			31			[3]	
Proven but Undeveloped or Shut In												
Birch Hill		—			—			11			0	
Falls Creek		—			—			13			2	
Nicolai Creek		—			—			3			(1	
North Fork		—			—			12			(1	
West Foreland		—			—			20			0	
West Fork		—			—			6			(1	
SUBTOTAL		95			10			4,158			323	
NORTH SLOPE [2]	LOW	MID	HIGH	LOW	MID	HIGH	LOW	MID	HIGH	LOW	MID	HIGH
Proven and Developed												
East Barrow [1]	—	—	—	—	—	—	9	9	9	—	—	—
Endicott	270	370	445	38	52	62	600	800	1,200	84	112	168
Kuparuk River Unit	600	900	1,100	75	113	138	450	600	750	56	75	94
Lisburne reservoir	280	380	580	35	48	73	800	900	1,000	100	113	125
Milne Point Area	0	60	95	0	11	17	—	—	—	—	—	—
Prudhoe Bay Unit	4,100	4,800	6,000	513	600	750	29,000	29,000	29,000	3,625	3,625	3,625
South Barrow [1]	—	—	—	—	—	—	8	8	8	—	—	—
Proven but Undeveloped or Shut In												
Beaufort Sea	0	0	300	0	0	60	—	—	—	—	—	—
Gwydyr Bay Area	0	0	10	0	0	1	—	—	—	—	—	—
Point Thomson Area and Flaxman Island Area [3]	0	0	350	0	0	44	0	0	5,000	0	0	625
Shallow Cretaceous Sands	0	1,500	3,000	0	188	375	—	—	—	—	—	—
SUBTOTAL	5,250	8,010	11,880	660	1,010	1,519	30,867	31,317	36,967	3,865	3,925	4,637
STATE TOTAL	5,345	8,105	11,975	671	1,020	1,530	35,025	35,475	41,125	4,188	4,248	4,960

[1] As of 1/87, adjusted to 1/1/88, except where noted as [2]. Alaska Oil and Gas Conservation Commission, "Estimat Oil Reserves in Alaska" and "Estimate of Gas Reserves in Alaska."
[2] As of 1/1/88. Estimates by W. Van Dyke.
[3] Oil and gas condensate.
S/D88;T2_1;12/16/87

PRODUCTION FORCAST AND AVAILABLE ROYALTY OIL (Thousand Barrels/Day)

TABLE 2.2A

YEAR:	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
PRODUCTION FORCAST														
North Slope														
Prudhoe Bay	1,550	1,550	1,550	1,348	1,173	1,021	888	773	672	585	509	443	385	335
Kuparuk	280	260	260	260	250	240	205	175	150	125	105	90	75	65
Lisburne	50	50	50	70	70	70	70	70	70	70	70	65	58	52
Endicott	6	100	100	100	100	85	75	70	65	60	55	50	45	40
Milne Point	0	17 [1]	17	14	12	10	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	135	135	135	120	108	103
Prudhoe Bay NGL	50	55	55	54	47	41	36	31	27	23	20	18	15	13
Cook Inlet														
Granite Point	7.9	7.1	6.4	5.8										
McArthur River	20.5	19.3	18.1	17.0										
Trading Bay	2.6	2.4	2.2	2.0										
Middle Ground Shoal	8.0	7.3	6.7	6.1										
NGL	0.6	0.6	0.0	0.0										
SUBTOTAL-NORTH SLOPE	1,936	2,032	2,032	1,846	1,652	1,467	1,274	1,119	1,119	998	894	786	686	608
SUBTOTAL-COOK INLET	40	37	33	31										
TOTAL	1,976	2,069	2,065	1,877	1,652	1,467	1,274	1,119	1,119	998	894	786	686	608
AVAILABLE ROYALTY OIL AND NGL														
North Slope														
Prudhoe Bay [2]	194	194	194	169	147	128	111	97	84	73	64	55	48	42
Kuparuk [2]	35	33	33	33	31	30	26	22	19	16	13	11	9	8
Lisburne [2]	6	6	6	9	9	9	9	9	9	9	9	8	7	7
Endicott [3]	1	14	14	14	14	12	11	10	9	8	8	7	6	6
Milne Point [4]	0	3	3	3	2	2	0	0	0	0	0	0	0	0
Other [5]	0	0	0	0	0	0	0	0	27	27	27	24	22	21
Prudhoe Bay NGL	6	7	7	7	6	5	5	4	3	3	3	2	2	2
Cook Inlet														
Granite Point	1.0	0.9	0.8	0.7										
McArthur River	2.6	2.4	2.3	2.1										
Trading Bay	0.3	0.3	0.3	0.3										
Middle Ground Shoal	1.0	0.9	0.8	0.8										
NGL [5]	)0.1	)0.1	0.0	0.0										
SUBTOTAL-NORTH SLOPE	242	256	256	233	209	185	160	141	151	136	123	108	95	84
SUBTOTAL-COOK INLET	5	5	4	4										
TOTAL	247	261	261	237	209	185	160	141	151	136	123	108	95	84
ROYALTY OIL SALES (In-Kind)														
Mapco	35	35	35	35	35	35	35	35	35	35	35	35	35	35
GVEA [7]	5	5	5	5	4	4	3	3						
Tesoro (Old) [8]	49	49	49	43	37	33	28	25						
(New) [9]	28	28	28	24	21	18	16	14						
Chevron [10]	19	19	19	17	15	13	11	10						
Petrostar [11]	7	7	7	6	5	4	3	3	3					
Cook Inlet (Proposed)	4	4	3 [12]											
TOTAL	147	147	147	130	117	106	97	89	38	35	35	35	35	35
ROYALTY OIL IN VALUE	100	114	114	107	91	79	64	52	113	101	88	73	60	49

YEAR:	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	SUM (Mbbl)
PRODUCTION FORCAST														
North Slope														
Prudhoe Bay	291	254	221	192	167	145	126	110	96	83	72	63	55	5,349,805
Kuparuk	55	45	40	35	30	25	20	15	15	10	10	10	10	1,043,900
Lisburne	47	42	38	34	31	28	25	20	15	10	0	0	0	428,875
Endicott	20	10	0	0	0	0	0	0	0	0	0	0	0	358,065
Milne Point	0	0	0	0	0	0	0	0	0	0	0	0	0	19,345
Other	98	112	105	100	95	88	67	56	44	42	40	38	35	604,440
Prudhoe Bay NGL	12	10	9	8	7	6	5	4	4	3	3	2	2	204,400
Cook Inlet														
Granite Point														9,914
McArthur River														27,362
Trading Bay														3,396
Middle Ground Shoal														10,259
NGL														460
SUBTOTAL-NORTH SLOPE	523	473	413	369	330	292	243	205	174	148	125	113	102	8,015,035
SUBTOTAL-COOK INLET														51,392
TOTAL	523	473	413	369	330	292	243	205	174	148	125	113	102	8,066,427
AVAILABLE ROYALTY OIL AND NGL														
North Slope														
Prudhoe Bay [2]	36	32	28	24	21	18	16	14	12	10	9	8	7	668,726
Kuparuk [2]	7	6	5	4	4	3	3	2	2	1	1	1	1	130,488
Lisburne [2]	6	5	5	4	4	4	3	3	2	1	0	0	0	53,609
Endicott [3]	3	1	0	0	0	0	0	0	0	0	0	0	0	50,129
Milne Point [4]	0	0	0	0	0	0	0	0	0	0	0	0	0	4,599
Other [5]	20	22	21	20	19	18	13	11	9	8	8	8	7	120,888
Prudhoe Bay NGL	2	1	1	1	1	1	1	1	1	0	0	0	0	25,550
Cook Inlet														
Granite Point														1,239
McArthur River														3,420
Trading Bay														424
Middle Ground Shoal														1,282
NGL [5]														0
SUBTOTAL-NORTH SLOPE	73	68	60	54	48	43	35	30	25	22	19	17	15	1,053,989
SUBTOTAL-COOK INLET														6,366
TOTAL	73	68	60	54	48	43	35	30	25	22	19	17	15	1,060,355
ROYALTY OIL SALES (In-Kind)														
Mapco	35	35	35											217,175
GVEA [7]														12,438
Tesoro (Old) [8]														114,417
(New) [9]														64,673
Chevron [10]														44,772
Petrostar [11]														16,425
Cook Inlet (Proposed)														3,723
TOTAL	35	35	35											473,623
ROYALTY OIL IN VALUE	38	33	25	54	48	43	35	30	25	22	19	17	15	586,732

Note: numbers may not sum to totals due to rounding errors.
[1] Production during only last six months of 1988.
[2] 12.5% of production.
[3] 14.0% of production (weighted average).
[4] 18.0% of production (weighted average).
[5] 20.0% of production.
[6] 6.25% of production
[7] 2.667% of Prudhoe Bay production.
[8] 24.533% of Prudhoe Bay production.
[9] 13.867% of Prudhoe Bay production.
[10] 9.6% of Prudhoe Bay production.
[11] The Petro Star/Chevron contract is for 6,500 BPD of Royalty oil from the Kuparuk River Unit. Petro Star/Chevron initially would purchase 6,000 BPD. The contract will expire September 30, 1996.
[12] 1989 sale is proposed.
S/D88;T2_2;11/25/87

ESTIMATED PRODUCTION AND SALES OF NORTH SLOPE ROYALTY OIL [1]

(THOUSAND BARRELS PER DAY)

TABLE 2.2B

YEAR	ESTIMATED TOTAL PRODUCTION [2]								ESTIMATED ROYALTY PRODUCTION								ESTIMATED SALES OF ROYALTY OIL						ROYALTY IN VALUE
	PRUDHOE	KUPARUK	LISBURNE	ENDICOTT	MILNE PT.	PRUDHOE NGL	TOTAL		PRUDHOE	KUPARUK	LISBURNE	ENDICOTT	MILNE PT.	PRUDHOE NGL	TOTAL		MAPCO	GVEA [4]	TESORO (OLD) [5]	TESORO (NEW) [6]	CHEVRON [7]	PETROSTAR [8]	
1987	1,550	280	50	6	—	50	1,936		194	35	6	—	—	6	241		35	5	49	28	19	8	97
1988	1,550	260	50	100	17 [3]	55	2,032		194	33	6	14	3	7	256		35	5	49	28	19	8	112
1989	1,550	260	50	100	20	55	2,035		194	33	6	14	4	7	257		35	5	49	28	19	8	113
1990	1,348	260	70	100	17	54	1,849		169	33	9	14	3	7	234		35	5	43	24	17	8	102
1991	1,173	250	70	100	14	47	1,654		147	31	9	14	3	6	209		35	4	37	21	15	7	89
1992	1,021	240	70	85	12	41	1,469		128	30	9	12	2	5	186		35	4	33	18	13	7	76
1993	888	205	70	75	10	36	1,284		111	26	9	11	2	5	162		35	3	28	16	11	6	63
1994	773	175	70	70	—	31	1,119		97	22	9	10	—	4	141		35	3	25	14	10	5	50
1995	672	150	70	65	—	27	984		84	19	9	9	—	3	124		35	—	—	—	—	4	85
1996	585	125	70	60	—	23	863		73	16	9	8	—	3	109		35	—	—	—	—	4	70
1997	509	105	70	55	—	20	759		64	13	9	8	—	3	96		35	—	—	—	—	—	61
1998	443	90	65	50	—	18	666		55	11	8	7	—	2	84		35	—	—	—	—	—	49
1999	385	75	58	45	—	15	578		48	9	7	6	—	2	73		35	—	—	—	—	—	38
2000	335	65	52	40	—	13	505		42	8	7	6	—	2	64		35	—	—	—	—	—	29
2001	291	55	47	20	—	12	425		36	7	6	3	—	2	53		35	—	—	—	—	—	18
2002	254	45	42	10	—	10	361		32	6	5	1	—	1	45		35	—	—	—	—	—	10
2003	221	40	38	—	—	9	308		28	5	5	—	—	1	39		35	—	—	—	—	—	4
2004	192	35	34	—	—	8	269		24	4	4	—	—	1	34		—	—	—	—	—	—	34
2005	167	30	31	—	—	7	235		21	4	4	—	—	1	29		—	—	—	—	—	—	29
2006	145	25	28	—	—	6	204		18	3	4	—	—	1	26		—	—	—	—	—	—	26
2007	126	20	25	—	—	5	176		16	3	3	—	—	1	22		—	—	—	—	—	—	22
2008	110	15	20	—	—	4	149		14	2	3	—	—	1	19		—	—	—	—	—	—	19
2009	96	15	15	—	—	4	130		12	2	2	—	—	1	16		—	—	—	—	—	—	16
2010	83	10	10	—	—	3	106		10	1	1	—	—	—	13		—	—	—	—	—	—	13
2011	72	10	—	—	—	3	85		9	1	—	—	—	—	10		—	—	—	—	—	—	10
2012	63	10	—	—	—	2	75		8	—	—	—	—	—	8		—	—	—	—	—	—	8
2013	55	10	—	—	—	2	67		7	—	—	—	—	—	7		—	—	—	—	—	—	7

[1] INCLUDES ONLY FIELDS IN, OR PLANNED FOR, PRODUCTION IN THE NEAR FUTURE.
[2] DNR ESTIMATE OF FIELD PERFORMANCE, NOVEMBER, 1987.
[3] PRODUCTION DURING ONLY LAST SIX MONTHS OF 1988.
[4] GVEA'S TEN-YEAR CONTRACT COMMENCED JULY 1, 1985. QUANTITY IS 2.667% OF DAILY PRUDHOE ROYALTY OIL. THE CONTRACT EXPIRES JUNE 30, 1996.
[5] TESORO'S CONTRACT IS CURRENTLY AT ITS MAXIMUM QUANTITY OF 24.533% OF DAILY PRUDHOE ROYALTY OIL. THE CONTRACT EXPIRES JANUARY 1995.
[6] ON OCTOBER 1, 1985 TESORO COMMENCED DELIVERIES UNDER 12/9/83 PRUDHOE CONTRACT WHICH HAS A MAXIMUM QUANTITY OF 13.86% OF DAILY PRUDHOE ROYALTY OIL AND EXPIRES JANUARY 1, 1995. TESORO DENOMINATED THE ENTIRE VOLUME UNDER THIS CONTRACT EFFECTIVE AUGUST 20, 1986, BUT HAS THE OPTION OF RENOMINATING ON SIX MONTHS NOTICE.
[7] CHEVRON'S CONTRACT CALLS FOR A MAXIMUM QUANTITY OF 9.6% OF DAILY PRUDHOE ROYALTY OIL. THE CONTRACT EXPIRES JANUARY 1, 1995.
[8] THE PETRO STAR/CHEVRON CONTRACT IS FOR 6,500 BPD OF ROYALTY OIL FROM THE KUPARUK RIVER UNIT. THE CONTRACT EXPIRES SEPTEMBER 30, 1996.

S/D88;T2_2B;11/23/87

OIL PRODUCTION FORECAST
(Thousand Barrels/Day)

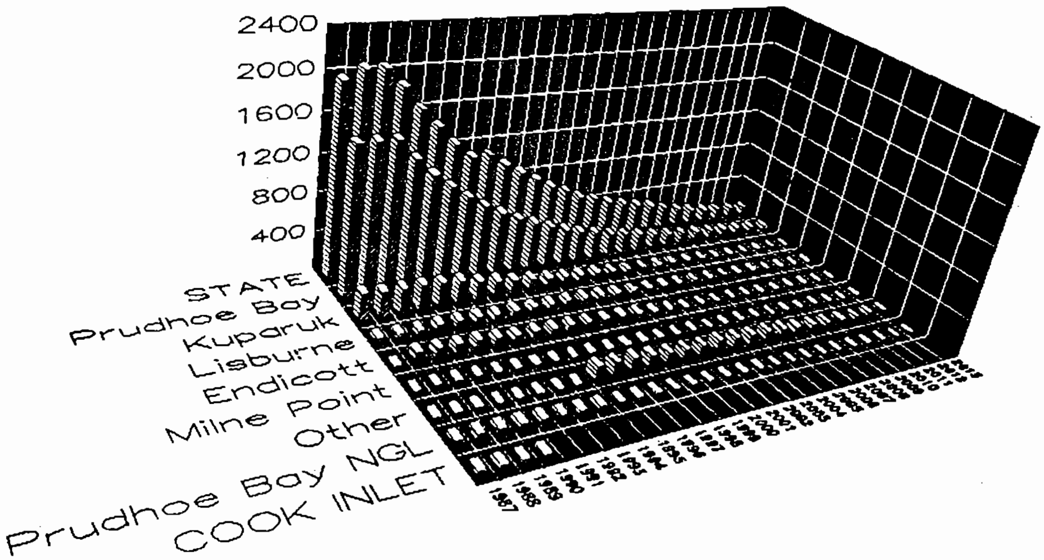

FIG. 2.1

CHAPTER 3
HISTORICAL OIL AND GAS PRODUCTION AND CONSUMPTION

Oil Production

Virtually all Alaskan oil has been and currently is produced from Cook Inlet and the North Slope. Production data for these regions and the state are presented in Table 3.1 and Figure 3.1. Cook Inlet fields began production in the 1960s and peaked by 1970, the first year of the data series. The region has produced a total of 1 billion barrels of crude oil, but for the last ten years production has fallen an average of 11.5% per year, from 56 million barrels per year in 1977 to 16 million barrels per year in 1987, and all of the Cook Inlet fields are now past peak production, with some near depletion.

Prudhoe Bay began commercial production when the Trans-Alaska Pipeline System (TAPS) opened in 1977. Since then the region has produced 6 billion barrels of crude oil. Regional production is expected to peak either in 1988 or 1989 at 730 million barrels per year.

Oil Consumption

All the oil consumed in Alaska is consumed as refined fuels. Part of this fuel is refined in-state and the rest is imported. Though no data source satisfactorily reports how much fuel is produced in state nor how much is imported, Department of Revenue (DOR) reports of fuel sales for 1977 to 1987, which are summarized in Table 3.2 and Figure 3.2., indicate how much fuel is consumed. Though data quality from the beginning of data collection in 1977 to about 1984 are unconfirmed, data from 1985 to 1987 are considered good. Throughout the ten year reporting period the data suggest orderly average growth of 9.4% in total consumption, from 750 million gallons per year to 1,850 million gallons per year, and in consumption of all categories except gasoline, which appears to have remained constant.

Gas Production

As with oil production, virtually all of Alaska's natural gas is produced from Cook Inlet and the North Slope. The only exception is production from two small gas fields near Barrow. Table 3.3 and Figure 3.3 show the development of state and regional gas production from 1971 to 1987. Cook Inlet produces both casinghead and dry gas from a mix of oil fields, gas fields and oil fields with gas caps. Production from this region began in the 1960s and peaked between 1982 and 1984. Cumulative production through 1987 is 3.3 trillion cubic feet, net of injection, including 194 billion cubic feet produced in 1987.

North Slope gas is, for the most part, casinghead gas produced in association with the oil. Gas has been produced as part of field development since the 1960s. Since then about 835 billion cubic feet, net of injection, have been produced, of which 175 billion cubic feet were produced in 1987. There is currently no market for the gas, other than as fuel for field and pipeline operations; consequently, much of the gas is reinjected back into the reservoir.

Gas Consumption

The dissimilar gas disposition patterns of Cook Inlet and North Slope natural gas are tabulated in Table 3.4 and Figure 3.4. Though Cook Inlet fields in 1987 used 18 billion cubic feet for field operations, the region's major feature is its pipeline connections to a market which this past year consumed 176 billion cubic feet, net of injection, which is 91% of net production. The major users were: LNG, 25% of net production; ammonia/urea production, 21%; electricity generation, 21%; and gas utilities, 13%.

The North Slope region, on the other hand, produces a very large amount of gas but, as mentioned above, there is no major market for it, other than as fuel for production facilities. Most of the 1987 net North Slope production, 189 billion cubic feet, were consumed in field operations. Of the remainder, 14 billion cubic feet were sold to TAPS. It is interesting to note that, in 1987, field operations alone on the North Slope consumed more gas than total commercial use in Cook Inlet.

HISTORICAL OIL PRODUCTION
(Million Barrels/Year)

TABLE 3.1

YEAR:	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
STATE [2]	83.614	78.785	73.561	73.139	72.244	71.980	67.009	171.352	447.805	511.335	591.646	587.336	618.910	625.527	630.401	666.233	681.372	709.087
RAILBELT (Cook Inlet)[2]	82.415	77.628	72.638	72.196	70.074	69.111	62.404	56.094	50.126	42.923	36.252	31.072	27.405	24.763	21.986	16.946	17.630	16.486
NON-RAILBELT (North Slope)[2]	1.199	1.157	0.922	0.944	2.170	2.870	4.604	115.258	397.679	468.412	555.394	556.264	591.506	600.764	608.415	649.287	663.741	692.601
ITEM:																		
TAPS throughput, PS#1 [3]								112.315	397.149	467.939	554.934	556.067	591.142	600.859	608.836	649.887	665.435	706.252

[1] Estimated from part-yearly reports.
[2] Alaska Oil and Gas Conservation Commission, "Alaska Production Summary by Field and Pool", monthly report. Does not include NGL.
[3] 1977-81: Alaska Oil and Gas Conservation Commission, "Statistical Report."
1982-87: Alyeska Pipeline Service Co., personal communication.
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HISTORICAL OIL PRODUCTION
(Million Barrels/Year)

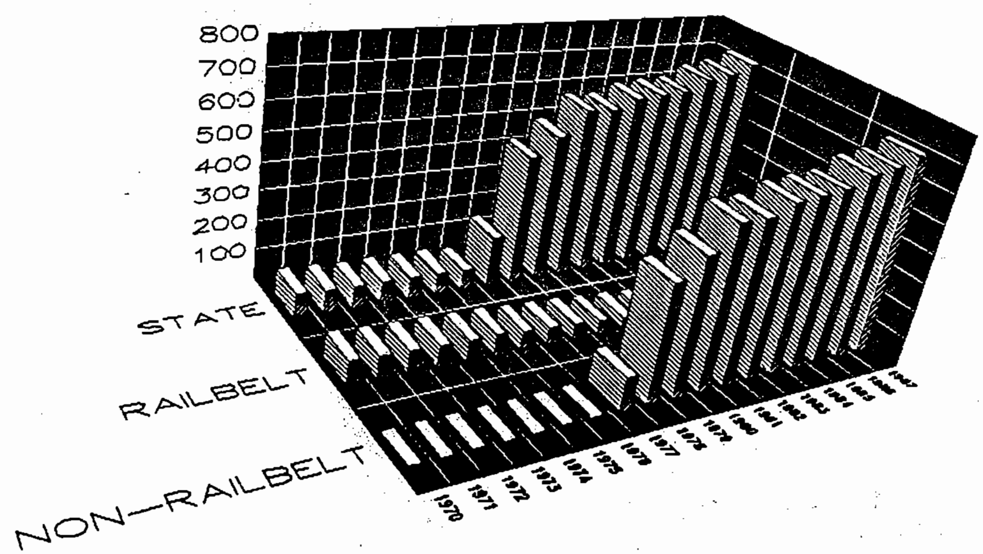

FIG. 3.1

HISTORICAL OIL CONSUMPTION - SALES AND SHIPMENTS

TABLE 3.2

YEAR:	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
FUEL SALES [2] (Million Gallons/Year)											
Aviation Gas	16.770	15.830	16.925	16.912	18.754	16.596	15.244	17.399	17.997	17.815	17.494
Exempt	1.521	0.685	0.552	0.558	0.574	0.589	0.498	0.574	0.515	0.858	0.383
Taxable	15.249	15.145	16.373	16.354	18.180	16.007	14.746	16.825	17.482	16.957	17.111
Aviation Jet	330.744	363.607	415.164	416.184	400.177	432.366	517.575	611.314	518.092	592.620	620.331
Exempt	227.581	250.601	288.974	286.110	247.619	99.957	242.815	311.820	223.635	280.654	313.848
Taxable	103.163	113.006	126.190	130.074	152.558	332.409	274.760	299.494	294.457	311.966	306.483
Marine Gas	11.766	7.714	8.296	7.598	7.602	7.878	8.568	8.955	14.664	10.464	12.437
Exempt	5.707	0.554	0.292	0.025	0.085	0.032	0.052	0.120	0.251	0.291	0.195
Taxable	6.059	7.160	8.004	7.573	7.517	7.846	8.516	8.835	14.413	10.173	12.242
Marine Diesel	38.613	51.985	59.492	67.711	72.282	99.443	147.569	124.416	98.675	105.218	219.170
Exempt	6.396	10.116	6.325	5.370	5.153	30.443	75.395	50.874	9.724	10.097	126.595
Taxable	32.217	41.869	53.167	62.341	67.129	69.000	72.174	73.542	88.951	95.121	92.575
Other Gas	186.213	187.359	181.329	177.353	186.446	210.644	197.968	223.178	235.081	234.482	217.146
Exempt	5.094	8.290	7.527	8.162	9.084	12.809	10.887	11.028	15.353	21.558	15.553
Taxable	181.119	179.069	173.802	169.191	177.362	197.835	187.081	212.150	219.728	212.924	201.593
Other Diesel	165.752	184.876	269.377	302.647	326.440	411.125	420.279	436.308	643.430	897.970	765.641
Exempt	46.160	54.050	120.960	120.939	117.074	187.856	178.494	190.891	369.279	559.413	523.237
Taxable	119.592	130.826	148.417	181.708	209.366	223.269	241.785	245.113	274.151	338.557	242.404
TOTAL FUEL SALES	749.858	811.371	950.583	988.405	1,011.701	1,178.052	1,307.203	1,421.570	1,527.939	1,858.569	1,852.219
SHIPMENTS [3] (MMbbl/Year)											
Liftings at Valdez	96.669	394.080	464.394	548.895	547.026	583.370	592.319	596.588	643.512	603.028	696.930

[1] Estimated from part-yearly reports.
[2] Alaska Department of Revenue, "Report of Motor Fuel Sold or Distributed in Alaska."
[3] 1977-81: Alaska Oil and Gas Conservation Commission, "Statistical Report."
1982-87: Alyeska Pipeline Service Co., personal communication.
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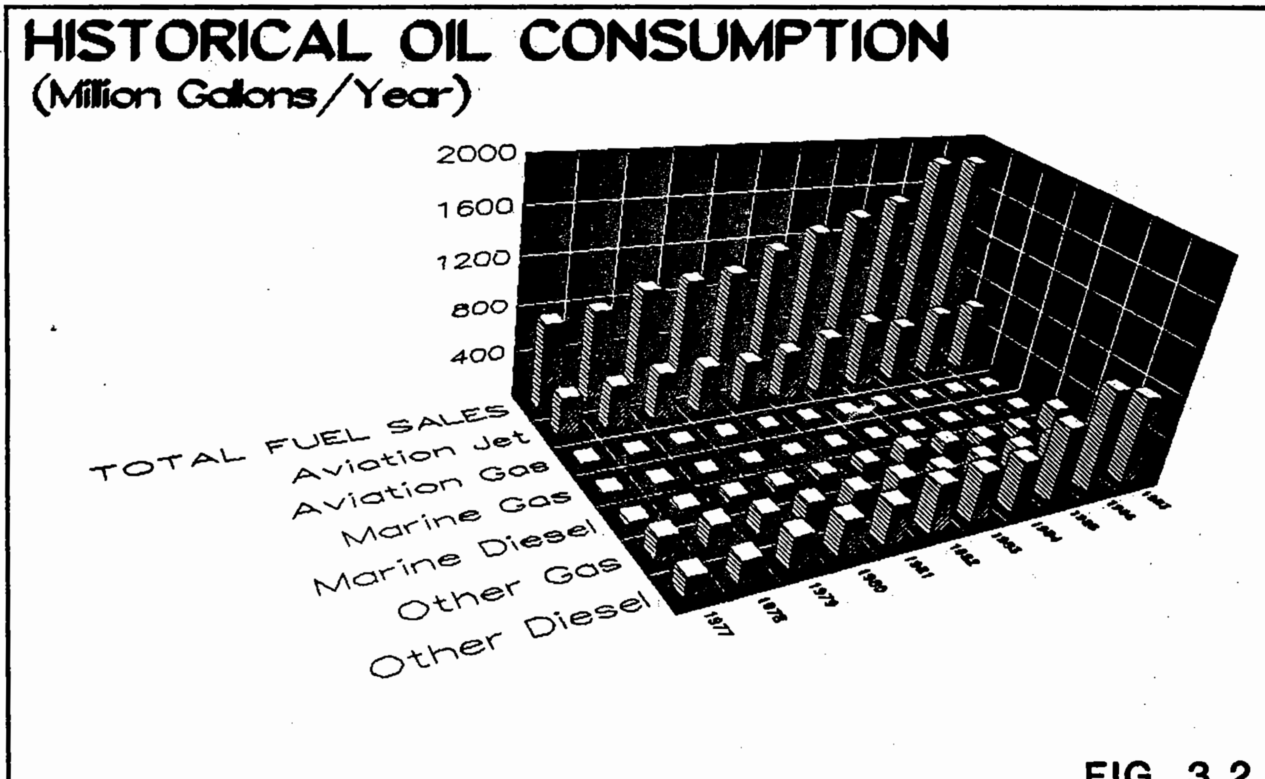

FIG. 3.2

HISTORICAL GAS PRODUCTION (Billion Cubic Feet/Year) TABLE 3.3

YEAR:	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
STATE [2]																	
Production	227.94	222.79	225.24	232.97	256.399	271.162	375.832	602.687	738.485	898.155	948.554	1,090.655	1,171.121	1,212.705	1,350.884	1,381.930	1,633.528
Injection [3]	73.88	76.13	87.78	49.04	83.007	97.077	171.188	375.405	503.003	661.947	695.515	817.863	886.364	909.617	1,021.459	1,067.147	1,211.717
Net Production	154.06	146.66	137.46	183.93	173.392	174.085	204.644	227.282	235.482	236.208	253.039	272.792	284.757	303.088	329.425	314.783	421.811
RAILBELT (Cook Inlet) [2]																	
Production	227.94	222.79	225.24	230.18	252.554	265.253	279.961	293.800	305.075	299.942	299.051	309.119	306.343	306.956	306.937	285.186	274.809
Injection [3]	73.88	76.13	87.78	49.04	83.007	97.077	103.108	103.551	112.868	115.437	100.410	102.248	94.385	93.687	89.025	92.136	81.081
Net Production	154.06	146.66	137.46	181.14	169.547	168.176	176.853	190.249	192.207	184.505	198.641	206.871	211.958	213.269	217.912	193.050	193.728
NON-RAILBELT (North Slope)																	
Production	---	---	---	2.79	3.845	5.909	95.871	308.887	433.410	598.214	649.504	781.536	864.778	905.749	1,043.911	1,096.734	1,358.719
Injection	---	---	---	0.00	0.000	0.000	68.080	271.854	390.136	546.509	595.106	715.615	791.979	815.929	932.434	975.011	1,130.636
Net Production	---	---	---	2.79	3.845	5.909	27.791	37.033	43.274	51.705	54.398	65.921	72.799	89.820	111.477	121.723	228.083

[1] Estimated from part-yearly reports of cited sources.
[2] 1971-73: Stanford Research Institute, "Natural Gas Demand and Supply to the Year 2000 in the Cook Inlet Basin of South Central Alaska," Nov. 1977.
1974-87: Alaska Oil and Gas Conservation Commission, "Report of Gas Disposition," monthly reports.
[3] Does not include gas rented from Beaver Creek and Kenai fields for injection into Swanson River field.
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HISTORICAL GAS PRODUCTION (NET)

(Billion Cubic Feet/Year)

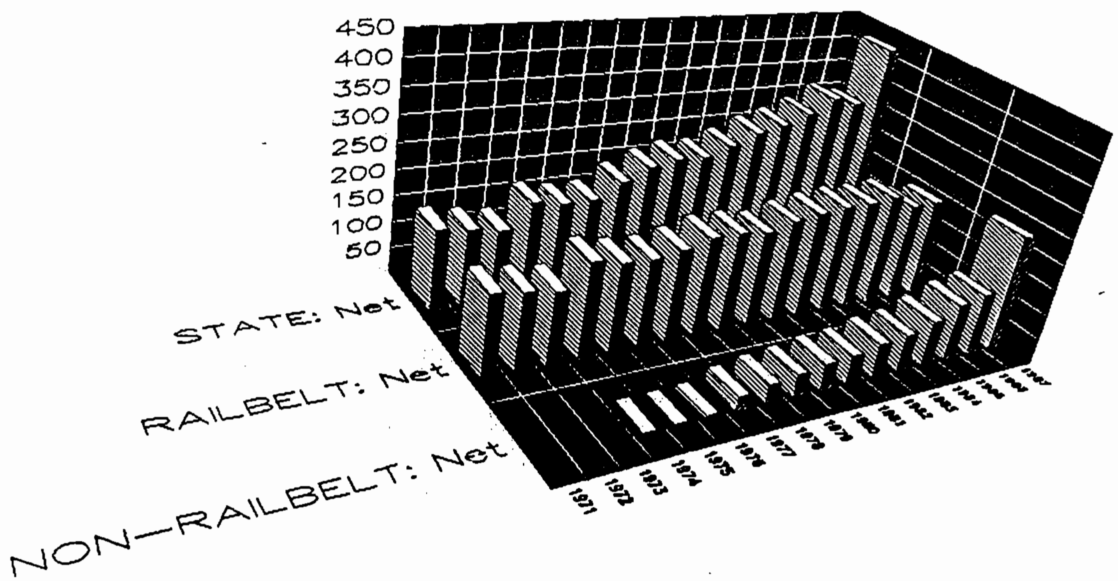

FIG. 3.3

HISTORICAL GAS CONSUMPTION (Billion Cubic Feet/Year) TABLE 3.4

YEAR:	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[1]
STATE [2]																	
Total consumption	166.97	160.28	151.84	183.13	173.393	174.085	204.644	227.281	235.481	236.209	253.039	272.790	284.757	303.089	329.425	314.783	421.810
Field Operations	45.25	36.56	20.90	52.48	31.639	28.322	48.859	55.180	57.865	62.001	62.166	72.876	77.590	95.249	110.025	120.130	207.038
Vented and Flared	33.18	20.98	6.93	9.05	10.557	6.674	15.729	6.183	4.551	4.846	5.660	6.983	5.084	9.075	6.330	8.897	19.634
Used on Leases	10.96	14.86	12.42	41.40	17.963	18.424	29.966	35.055	38.123	43.575	44.592	52.724	58.893	68.481	84.654	85.183	118.285
Shrinkage	1.11	0.72	1.55	2.01	3.119	3.224	3.145	3.426	2.847	2.438	2.434	2.602	2.726	2.657	1.773	1.468	1.136
Other	0.00	0.00	0.00	0.02	0.000	0.000	0.019	10.516	12.344	11.142	9.480	10.567	10.887	15.036	17.268	24.582	67.983
Sold [3]	121.72	123.72	130.94	130.65	141.754	145.763	155.785	172.101	177.616	174.208	190.873	199.914	207.167	207.840	219.400	194.653	214.772
Power generation	14.69	15.38	16.70	17.45	25.461	27.613	28.590	29.937	33.376	33.755	33.947	36.222	36.651	37.000	41.337	44.767	40.225
Public [4][5]	8.14	8.91	10.63	11.76	19.619	22.189	23.590	24.811	28.390	28.992	29.386	31.392	32.055	32.662	36.807	40.236	35.607
Military [4]	6.55	6.47	6.07	5.68	5.842	5.424	5.000	5.126	4.986	4.763	4.561	4.830	4.596	4.338	4.530	4.531	4.618
Gas Utilities	10.24	13.10	14.76	15.13	12.092	12.551	12.683	13.745	14.362	15.921	16.213	19.564	19.518	20.911	24.872	23.721	25.485
Residential [4][5]	5.44	6.03	6.52	6.72	5.548	5.916	6.010	6.827	7.228	8.173	8.385	10.520	10.609	11.507	12.898	12.421	13.534
Commercial [4]	4.80	7.07	8.24	8.41	6.544	6.635	6.673	6.918	7.134	7.748	7.828	9.044	8.909	9.404	11.974	11.300	11.951
LNG [6]	63.24	59.87	60.99	61.87	64.777	63.509	66.912	60.874	64.111	54.844	68.823	64.438	67.729	65.892	65.177	61.906	47.589
Amonia-Urea [7]	19.49	20.58	20.64	22.10	23.888	24.257	28.620	48.879	51.657	54.699	53.836	55.220	50.338	50.083	50.688	35.733	40.350
Producers [8]	—	13.40	12.59	10.41	12.477	11.588	6.703	10.523	6.958	5.190	5.601	11.383	12.698	18.362	21.532	14.785	14.839
Refiners [9]	---	0.56	1.94	2.47	3.268	1.785	0.199	0.237	0.285	0.380	0.316	0.486	0.502	0.938	1.306	1.133	1.148
TAPS [10]	0.00	0.00	0.00	0.00	0.000	0.000	1.754	6.949	8.648	10.686	11.106	11.952	13.277	12.856	14.381	15.166	14.221
Unaccounted for [11]	14.06	0.83	3.32	0.89	(0.209)	4.460	10.324	1.467	(1.229)	(0.632)	1.031	0.649	6.454	1.798	0.107	(2.558)	30.915
RAILBELT																	
Total Consumption	166.97	160.28	151.84	180.34	169.547	168.177	176.853	190.249	192.207	184.505	198.641	206.870	211.958	215.220	217.948	192.971	193.727
Field Operations	45.25	36.56	20.90	49.83	28.830	24.467	24.416	25.949	24.101	22.304	20.559	20.957	19.380	22.468	18.637	18.408	17.861
Vented and Flared	33.18	20.98	6.93	7.98	9.496	5.421	4.848	3.870	2.710	3.045	3.175	3.494	2.560	3.260	2.893	3.095	2.581
Used on Leases	10.96	14.86	12.42	39.85	16.215	15.822	16.404	16.228	14.564	14.608	14.950	14.861	14.056	14.597	13.971	13.845	14.144
Shrinkage	1.11	0.72	1.55	2.01	3.119	3.224	3.145	3.426	2.847	2.438	2.434	2.602	2.726	2.657	1.773	1.468	1.136
Other	0.00	0.00	0.00	0.00	0.000	0.000	0.019	2.425	3.980	2.213	0.000	0.000	0.038	1.954	0.000	0.000	0.000
Sold [3]	121.72	123.72	130.94	130.51	140.717	143.710	152.437	164.300	168.106	162.201	178.082	185.913	192.578	192.752	199.311	174.563	175.866
Power generation	14.69	15.38	16.70	17.45	25.461	27.613	28.590	29.718	33.141	33.520	33.632	35.818	36.169	36.520	40.851	44.208	39.689
Public [4]	8.14	8.91	10.63	11.76	19.619	22.189	23.590	24.592	28.155	28.757	29.071	30.988	31.573	32.182	36.321	39.677	35.071
Military [4]	6.55	6.47	6.07	5.68	5.842	5.424	5.000	5.126	4.986	4.763	4.561	4.830	4.596	4.338	4.530	4.531	4.618
Gas Utilities	10.24	13.10	14.76	15.13	12.092	12.551	12.683	13.454	14.045	15.521	15.778	19.025	19.111	20.903	24.419	23.235	24.908
Residential [4]	5.44	6.03	6.52	6.72	5.548	5.916	6.010	6.536	6.911	7.773	7.950	9.981	10.202	10.999	12.445	11.935	12.957
Commercial [4]	4.80	7.07	8.24	8.41	6.544	6.635	6.673	6.918	7.134	7.748	7.828	9.044	8.909	9.904	11.974	11.300	11.951
LNG [6]	63.24	59.87	60.99	61.87	64.777	63.509	66.912	60.874	64.111	54.844	68.823	64.438	67.729	65.882	65.177	61.906	47.589
Amonia-Urea [7]	19.49	20.58	20.64	22.10	23.888	24.257	28.620	48.879	51.657	54.699	53.836	55.220	50.338	50.083	50.688	35.733	40.350
Producers [8]	—	13.40	12.59	10.41	12.477	11.588	6.703	10.523	6.958	5.190	5.601	11.383	12.698	18.362	21.532	14.785	14.839
Unaccounted for [11]	14.06	1.39	5.26	3.36	2.022	4.192	8.929	0.852	(1.806)	(1.573)	0.412	0.029	6.533	1.002	(3.356)	(5.304)	8.491
NON-RAILBELT																	
Total Consumption				2.786	3.845	5.910	27.791	37.033	43.275	51.704	54.398	65.921	72.799	89.820	111.477	121.723	228.082
Field Operations [3]	—	—	—	2.65	2.808	3.856	24.444	29.231	33.763	39.697	41.607	51.921	58.210	74.732	91.388	101.722	189.177
Vented and Flared	—	—	—	1.08	1.061	1.254	10.882	2.313	1.840	1.801	2.485	3.490	2.524	5.814	3.437	5.802	17.053
Used on Leases	—	—	—	1.56	1.747	2.602	13.562	18.826	23.559	28.967	29.642	37.864	44.837	53.884	70.683	71.338	104.140
Shrinkage	—	—	—	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other	—	—	—	0.02	0.000	0.000	0.000	8.092	8.364	8.929	9.480	10.567	10.849	15.034	17.268	24.582	67.984
Sold [3]	—	—	—	0.14	1.037	2.054	3.347	7.802	9.512	12.007	12.791	14.000	14.589	15.088	20.089	20.001	38.905
Power generation [5]	—	—	—	—	—	—	—	0.219	0.235	0.235	0.315	0.404	0.482	0.480	0.486	0.559	0.536
Gas Utilities [5]	—	—	—	—	—	—	—	0.291	0.317	0.400	0.435	0.539	0.407	0.508	0.453	0.486	0.577
Refiners [9]	—	0.56	1.94	2.47	3.268	1.785	0.199	0.237	0.285	0.380	0.316	0.486	0.502	0.938	1.306	1.133	1.148
TAPS [10]	0.00	0.00	0.00	0.00	0.000	0.000	1.754	6.949	8.648	10.686	11.106	11.952	13.277	12.856	14.381	15.166	14.221
Unaccounted for [11]					(2.231)	0.269	1.394	0.616	0.579	0.941	0.619	0.619	(0.079)	0.306	3.463	2.657	22.423

[1] Estimated from part-yearly reports of cited sources.
[2] Does not include NON-RAILBELT items marked ---.
[3] Alaska Oil and Gas Conservation Commission, "Report of Gas Disposition," monthly reports.
[4] Sum of sales from Beluga gas field in: Alaska Oil and Gas Conservation Commission, "Report of Gas Disposition" and
1971-82: Annual reports from Alaska Pipeline Co., ENSTAR and Kenai Utility Service Co. to Alaska Public Utilities Commission
1983-87: Enstar Natural Gas Co., personal communication.
[5] Barrow Utilities and Electric Cooperative Inc., personal communication.
[6] 1971-74: Stanford Research Institute, "Natural Gas Demand and Supply to the Year 2000 in the Cook Inlet Basin of South Central Alaska," Nov. 1977.
1975-79: Sum of 1) production from Kenai and Beaver Creek gas fields in: Alaska Oil and Gas Conservation Commission, "Report of Gas Disposition," and
2) sales from North Cook Inlet gas field in: Alaska Oil and Gas Conservation Commission, "Kenai Gas Sales."
1980-87: Royalty reports from producers to Division of Oil and Gas.
[7] 1971-74: Stanford Research Institute, "Natural Gas Demand and Supply to the Year 2000 in the Cook Inlet Basin of South Central Alaska," Nov. 1977.
1975-79: Sum of 1) sales from Kenai and Beaver Creek gas fields to Collier Chemical in: Alaska Oil and Gas Conservation Commission, "Kenai Gas Sales," and
2) sales from McArthur River gas field in: Alaska Oil and Gas Conservation Commission, "Monthly Report of Gas Disposition."
1980-87: Royalty reports from producers to Division of Oil and Gas.
[8] Royalty reports from Union to Division of Oil and Gas, item Rental Gas.
[9] Royalty reports from Union to Division of Oil and Gas, items Alaska Pipeline-Nikiski, Chevron Rental Gas and Metering.
[10] Royalty reports from ARCO to Division of Oil and Gas.
[11] Calculated difference between "Sold" and sum of listed "Sold" items.
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HISTORICAL GAS CONSUMPTION
(Billion Cubic Feet/Year)

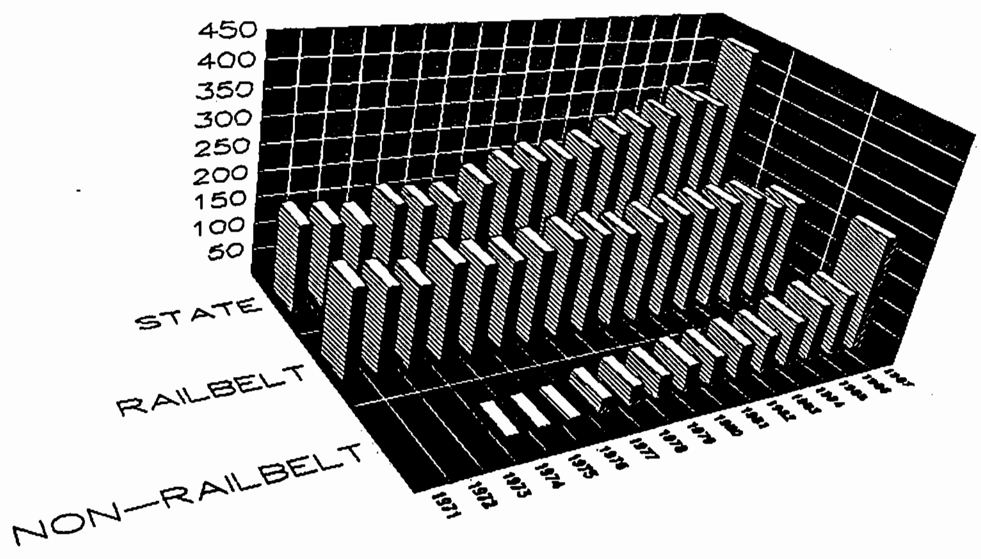

FIG. 3.4

CHAPTER 4
CONSUMPTION FORECAST

The following projection was prepared by the Institute of Social and Economic Research (ISER) in December 1986 for last year's edition of this report. The projection has not been recast because most of its assumptions and the long-term forecasts are reasonable and little affected by population and economic changes during 1987. The methods and assumptions used to generate the forecasts are included in Appendix B of the January 1986 report.

The projection has been updated by extending it by one year and by revising where needed all data in the text.

Summary

Consumption of oil and gas in most major categories is forecast to increase at a modest rate in future years.

Total consumption of liquid petroleum will increase from 1,487 million gallons in 1988 (about 36 million barrels of crude oil equivalent) to 1,727 million gallons in 2002 (40 million barrels), as presented in Table 4.1 and Fig 4.1. This represents a 1 percent annual growth rate. Space heating use of petroleum will be flat. Vehicle transportation use will increase 1 percent annually. The use of fuel oil for electricity generation reflects the recent and planned introduction of several hydroelectric facilities which replace fuel oil generation. However, in the long run, fuel oil consumption increases, and the 15-year growth rate is projected to be 2 percent annually. Industrial use of petroleum liquids will remain constant.

Consumption of natural gas will grow from 249 billion cubic feet in 1988 to 272 illion cubic feet in 2002 (annual growth of 1 percent) as shown in Table 4.2 and Fig 4.2. Industry will continue to consume the majority of natural gas. The consumption of natural gas for industrial uses will grow from 184 billion cubic feet in 1988 to 204 billion cubic feet in 2002 (1 percent annual growth). Over the next 15 years, use of gas for space heating will increase very little from 26 billion cubic feet in 1988 to 28\billion cubic feet in 2002. Use of gas for electricity generation will remain constant at 40 billion cubic feet annually.

Transportation Liquid Fuels

Transportation fuel consumption will grow moderately in future years, increasing from 1,191 million gallons in 1988 to 1,415 million gallons in 2002 (Table 4.1). Jet fuel consumption will grow most rapidly (2 percent annually) while diesel fuel consumption will grow slowly, and gasoline use will fall slowly.

Total consumption projected over the 15-year period from 1988 to 2002 is 21,759 million gallons. This is equivalent to about 518 million barrels of crude oil.

Space Heating

Outside the railbelt, most space heating is accomplished by burning fuel oil, the region's dominant fuel. Fuel oil consumption for this use is approximately constant--157 million gallons in 1988 and 167 million gallons in 2002. Natural gas use will grow slowly from 26 billion cubic feet in 1988 to 28 billion cubic feet in 2002 (Table\4.2). Barrow, on the North Slope, is the only location outside of the railbelt presently served by natural gas.

Utility Electricity Generation

Fuel oil use for utility electricity generation will grow at an average annual rate of 2 percent. This is due to demand growth in areas where power generation from natural gas and hydroelectric plants is not available.

Natural gas use for utility electricity generation will decline in the near term from its current level of 40 billion cubic feet, when the Bradley Lake hydroelectric project backs out some gas use starting in the 1990s. Subsequently, its use will grow and regain the current level by 2001.

Industrial Fuel Use

The major industrial use of fuel oil (not including transportation) is in the petroleum industry. Pipeline fuel for the Alyeska pipeline is the largest element of this use. In addition, a significant amount of fuel is used for electricity generation. Both of these uses are projected at constant levels.

Increased use of natural gas in future years will be related to petroleum production. This increase will be concentrated on the North Slope where more intensive recovery methods will necessitate the use of larger amounts of energy. The other large use of natural gas, the production of ammonia-urea, will continue to require a constant amount of natural gas.

PROJECTED DEMAND FOR OIL (Million Gallons/Year)

TABLE 4.1

YEAR:	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	TOTAL, 1988-2002	ANNUAL GROWTH
STATE																	
Vehicle Transportation	1,191	1,208	1,216	1,227	1,239	1,255	1,269	1,281	1,296	1,313	1,334	1,354	1,377	1,400	1,415	19,375	1%
Jet Fuel	563	576	587	599	611	626	639	652	666	682	699	716	734	753	769	9,872	2%
Civilian Domestic	302	313	321	330	339	351	362	372	384	396	410	424	440	456	469	5,669	3%
Military and International	261	264	266	269	272	274	277	280	283	286	288	291	294	297	300	4,203	1%
Gasoline	250	250	248	247	245	245	244	243	242	241	242	242	242	243	243	3,668	0%
Aviation	18	18	18	18	18	18	18	18	18	18	18	19	19	19	19	277	0%
Highway	222	222	220	219	218	217	216	215	214	214	214	214	214	214	215	3,249	0%
Marine	9	9	9	9	9	9	9	9	9	9	10	10	10	10	10	142	0%
Diesel	378	381	381	382	382	385	386	386	388	390	393	396	400	404	406	5,838	0%
Highway	272	273	272	272	271	272	272	272	272	273	274	276	277	279	280	4,108	0%
Marine	107	108	109	110	111	112	113	114	116	117	119	121	123	125	126	1,730	1%
Space Heat	156	159	159	159	159	161	161	162	162	163	164	164	165	166	167	2,428	0%
Utility Generation	35	37	38	40	41	42	43	44	45	46	47	48	49	50	51	655	2%
Industry	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	1,574	0%
Pipeline Fuel	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	1,260	0%
Electricity Generation	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	314	0%
TOTAL	1,487	1,510	1,518	1,531	1,544	1,564	1,578	1,591	1,608	1,627	1,650	1,671	1,696	1,720	1,738	24,032	1%
RAILBELT																	
Vehicle Transportation	888	889	895	901	909	919	929	940	951	965	981	999	1,017	1,038	1,049	14,268	1%
Jet Fuel	474	479	486	494	504	514	524	535	546	559	573	588	604	620	632	8,133	2%
Civilian Domestic	252	258	264	270	278	286	295	303	312	323	334	346	359	373	384	4,637	3%
Military and International	222	221	223	224	226	227	230	232	234	237	239	242	244	247	249	3,497	1%
Gasoline	188	186	184	182	181	180	179	178	178	177	178	178	178	179	180	2,708	0%
Aviation	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	226	0%
Highway	167	165	163	162	160	160	159	158	157	157	157	157	157	158	159	2,397	0%
Marine	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	85	0%
Diesel	226	225	224	224	224	225	226	226	227	228	230	233	235	238	239	3,429	0%
Highway	150	149	148	147	147	147	147	147	147	147	148	149	150	151	151	2,225	0%
Marine	76	76	76	77	77	78	79	79	80	81	82	84	85	87	88	1,204	1%
Space Heat	59	58	57	57	57	57	57	57	57	57	58	58	59	59	59	866	0%
Utility Generation	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	150	0%
Industry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
TOTAL	957	958	962	967	975	985	996	1,006	1,018	1,032	1,049	1,067	1,086	1,107	1,118	15,284	1%
NON-RAILBELT																	
Vehicle Transportation	206	215	218	221	224	229	231	233	236	239	243	246	250	253	256	3,499	1%
Jet Fuel	89	98	101	105	108	112	114	117	120	123	126	128	131	133	136	1,739	3%
Civilian Domestic	50	55	57	60	62	65	67	69	71	74	76	78	81	83	86	1,032	4%
Military and International	39	43	44	45	46	47	47	48	49	49	50	50	50	50	51	706	2%
Gasoline	62	64	64	64	64	65	65	64	64	64	64	64	64	64	64	960	0%
Aviation	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	50	1%
Highway	55	57	57	57	57	58	57	57	57	57	57	57	56	56	56	852	0%
Marine	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	57	0%
Diesel	152	157	157	158	158	160	160	160	161	162	163	164	165	166	167	2,409	1%
Highway	121	124	124	124	124	125	125	125	126	126	127	127	128	128	128	1,883	0%
Marine	31	32	33	33	34	34	35	35	36	36	37	37	37	38	38	526	1%
Space Heat	96	101	101	102	103	104	105	105	105	106	106	106	107	107	108	1,562	1%
Utility Generation	25	28	29	30	31	32	33	34	35	36	37	38	38	39	40	505	3%
Southeast	7	8	8	9	10	11	11	12	12	13	13	14	14	15	15	172	5%
Rest of State	18	20	20	21	21	22	22	22	23	23	24	24	24	25	25	333	2%
Industry	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	1,574	0%
TOTAL	336	348	351	356	359	366	369	372	376	380	385	388	393	397	509	5,685	1%

S/D88;T4_1;12/07/87

PROJECTED DEMAND FOR GAS (Billion Cubic Feet/Year) Table 4.2

YEAR:	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	TOTAL, 1988-2002	ANNUAL GROWTH
STATE																	
Vehicle Transportation [1]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%
Space Heat	25.8	26.1	26.3	26.5	26.8	26.9	26.9	26.9	27.0	27.1	27.2	27.3	27.3	27.4	27.5	403.0	0%
Utility Generation	39.3	39.4	39.5	39.7	35.5	35.9	36.2	36.6	37.0	37.5	38.1	38.8	39.5	40.3	40.3	573.6	0%
Industry	184.3	188.4	192.8	197.3	202.1	202.1	202.1	202.1	202.1	202.1	202.1	202.1	202.1	202.1	203.6	2,987.5	1%
Ammonia-Urea Production	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	750.0	0%
Military Power Generation	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	66.0	0%
Petroleum Production	129.9	134.0	138.4	142.9	147.7	147.7	147.7	147.7	147.7	147.7	147.7	147.7	147.7	147.7	149.3	2,171.5	1%
Pipeline Fuel	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	220.5	0%
Miscellaneous	115.2	119.3	123.7	128.2	133.0	133.0	133.0	133.0	133.0	133.0	133.0	133.0	133.0	133.0	134.6	1,951.1	1%
TOTAL	249.4	253.9	258.6	263.5	264.4	264.9	265.3	265.6	266.1	266.7	267.4	268.2	269.0	269.8	271.5	3,964.2	1%
RAILBELT																	
Vehicle Transportation [1]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%
Space Heat	25.4	25.6	25.9	26.1	26.4	26.5	26.5	26.5	26.5	26.6	26.7	26.8	26.8	26.9	27.0	396.2	0%
Utility Generation	38.8	38.9	39.0	39.1	35.0	35.3	35.7	36.0	36.4	36.9	37.5	38.2	38.9	39.6	39.7	564.9	0%
Industry	86.9	86.9	86.9	86.9	86.9	86.9	86.9	86.9	86.9	86.9	86.9	86.9	86.9	86.9	86.9	1,303.5	0%
Ammonia-Urea Production	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	750.0	0%
Military Power Generation	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	66.0	0%
Petroleum Production	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	487.5	0%
Pipeline Fuel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%
Miscellaneous	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	487.5	0%
TOTAL	151.1	151.4	151.8	152.1	148.2	148.7	149.0	149.4	149.8	150.4	151.1	151.9	152.6	153.4	153.6	2,264.5	0%
NON-RAILBELT																	
Vehicle Transportation [1]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0%
Space Heat	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	6.9	2%
Utility Generation	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	8.8	2%
Industry	97.4	101.5	105.9	110.4	115.2	115.2	115.2	115.2	115.2	115.2	115.2	115.2	115.2	115.2	116.8	1,684.1	1%
Pipeline Fuel	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	220.5	0%
Other Petroleum	82.7	86.8	91.2	95.7	100.5	100.5	100.5	100.5	100.5	100.5	100.5	100.5	100.5	100.5	102.2	1,463.6	2%
TOTAL	98.3	102.5	106.8	111.4	116.2	116.2	116.2	116.2	116.3	116.3	116.3	116.3	116.4	116.4	118.0	1,699.7	1%

[1] Includes industrial, military and government use. Excludes pipeline fuel.
S/D88;T4_2;12/07/87

PROJECTED DEMAND FOR OIL
(Million Gallons/Year)

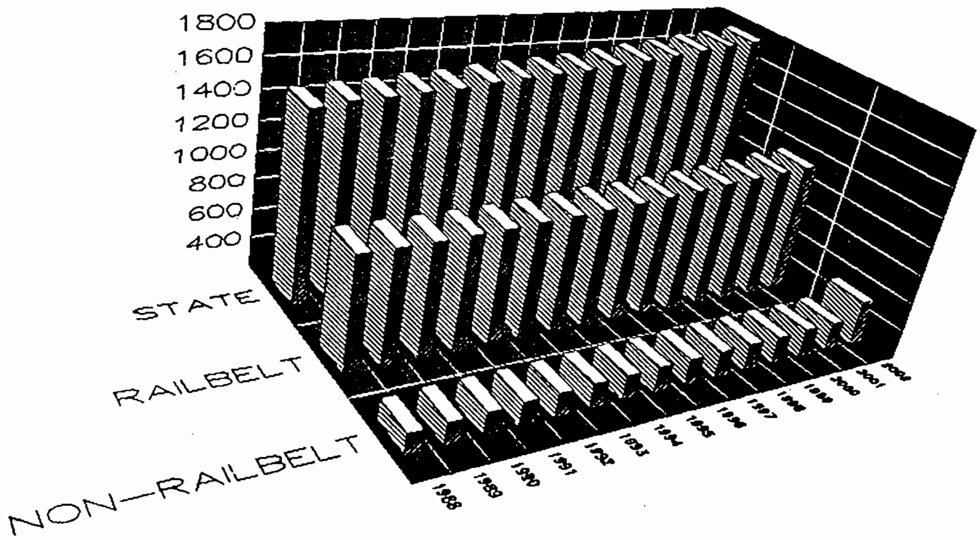

FIG. 4.1

PROJECTED DEMAND FOR GAS
(Billion Cubic Feet/Year)

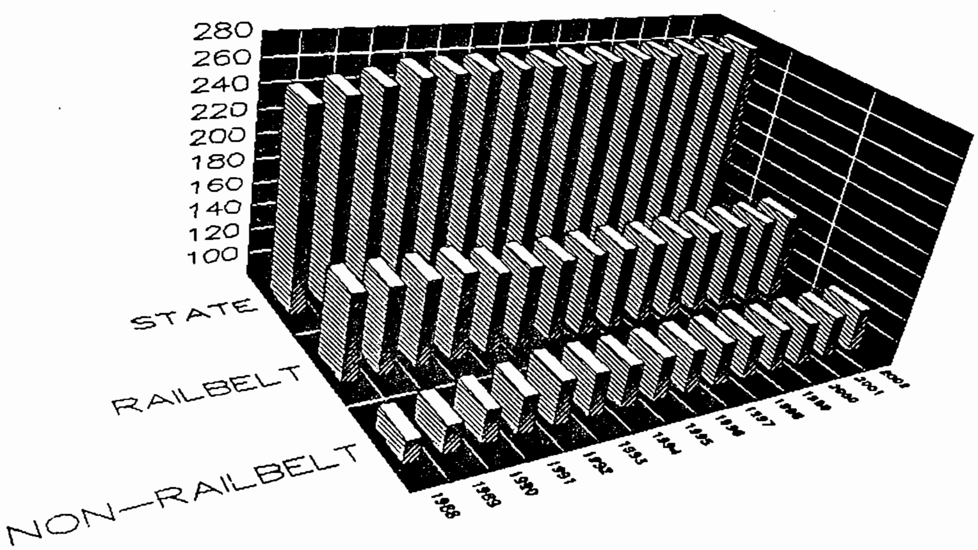

FIG. 4.2

CHAPTER 5
ANALYSIS OF SURPLUS

The analysis of surplus which follows was compiled in December 1986 to supplement the consumption projections in Chapter 4 (numeric data has been revised, however). The surplus of state oil and gas which this analysis predicts is probably low because in the analysis the factors which operate to reduce consumption have proved to be understated. Table 5.2 notes that only two variables, reserve estimates and export of LNG, have much influence on calculations of surplus, and Tables 2.1 and 3.2 show no dramatic change in either variable.

Population and economic factors, on the other hand, though they have small influence on the calculations, have probably declined more than the analysis anticipated. Population was estimated by ISER to decline from 536,000 in 1985 to 523,000 in 1990. Alaska Department of Labor (DOL), however, predicted a "low" decline from 539,000 in 1985 to a low of 534,000 in 1988, then recovery to 539,000 in 1990. DOL is revising this prediction, and the new figures will probably be lower. Economic decline was incorporated in the analysis of surplus, but the decline was likely greater and lasted longer than the analysis accounted for, with the probable result that less gas and transportation fuel will be consumed.

Summary

Under reasonable assumptions about available reserves and in-state consumption, the current inventories of both oil and gas are more than adequate for the next 15 years.

Liquid Petroleum

Table 5.1 shows that the cumulative 15-year Alaska demand for refined petroleum products is approximately 572 million barrels. This is equal to approximately 56 percent of the reserves of royalty crude oil and 7 percent of total crude oil reserves in the state.

A direct barrel-for-barrel comparison between demand for refined products and availability of crude oil is unrealistic since a barrel of crude oil does not yield a barrel of specific refined products. Outputs and efficiencies differ between refineries, and a given refinery can alter its product output. If it is assumed that on a statewide basis the refineries convert two-thirds of their crude oil feedstock into refined products used in Alaska, then the total volume of royalty oil available over the next 15 years more or less equals the projected consumption levels of refined products over that same time period. Because North Slope oil production is expected to begin to decline in 1990 and decline each year thereafter, the annual volume of available royalty oil will fall below the projected refined products consumption level in about 1997 when using unrealistic barrel-for-barrel comparison. Using a conversion factor for crude oil to refined products of two-thirds results in the availability of royalty oil on an annual basis falling below the consumption level of refined products in the mid-1990s.

Historically, in-state refiners have purchased both state royalty oil and oil sold by the individual lessees (Standard, Exxon, ARCO, Texaco, etc.). Price terms, contract length, and transportation considerations are a few of the factors that enter into that decision process. It is not unrealistic to assume that in-state refiners will, at least on a limited basis, continue to purchase non-royalty oil as refinery feedstock. However, it is unrealistic to assume that state royalty oil will or should provide the only source of feedstock for in-state refiners over the next 15 years. At present, approximately 3,600 bpd of Cook Inlet royalty oil is taken in kind and exported. No North Slope royalty oil is taken in kind and exported.

Based on current projections, sufficient feedstocks will be available regardless of the supply sources chosen by the in-state refiners. No attempt has been made to compare the total volume of petroleum products produced at Alaska refineries with the total volume of petroleum products consumed in the state. Currently the capacity of Alaska refineries exceeds Alaskan consumption. But, owing to technical constraints, the product mix which the refineries can produce does not match the product mix demanded. The resulting cross-hauling of crude oil out of Alaska and refined products (motor oils, specialty lubricants, etc.) into the state is a common feature of petroleum markets, and does not represent an inefficient distribution of refining capacity or mismatch of supply and demand.

Natural Gas

Table 5.1 indicates that the cumulative 15-year Alaska demand for natural gas is 3.964 trillion cubic feet of gas. This is about 1 percent more than the state royalty share of gas in the combined current inventory at Cook Inlet and on the North Slope.

Since natural gas is traditionally transported by pipeline, particular markets for gas which are linked by pipeline to supplies are relevant for the determination of excess supply. Table 5.1 shows that there is a net surplus in both the Cook Inlet and North Slope markets. The Alaskan royalty share of Cook Inlet gas alone, however, would be insufficient to meet projected Cook Inlet requirements over the next 15 years. At present, no royalty gas is taken in-kind and sold for export. Again, it is unrealistic to assume that all in-state consumption of natural gas should be satisfied by state royalty gas.

Projections Beyond Current Inventory

We assume reserves represent a 15-year inventory of petroleum in the ground based upon historical reserve-to-production ratios. Because a very sizable investment is required to develop a petroleum reservoir, reserves will be "proven up" at a rate to maintain sufficient inventory consistent with the growth in demand. Excessive development, like excessive inventories, results in unnecessary carrying costs to reservoir equity owners and will be avoided if possible. This is the basis for the 15-year time horizon for demand used in this analysis. As time passes, the growth in demand will stimulate the search for reserves to replace those produced, and market forces will work to keep supply and demand in balance.

Sensitivity of Results

The net surpluses of oil and gas calculated in this chapter are largely insensitive to a reasonable range of changes in the assumptions underlying the projections. These are discussed in turn and shown in Table 5.2.

Economic Growth

Faster population growth will accelerate the use of liquid fuels relative to the use of natural gas because a larger portion of liquid fuel use is population sensitive. Even so, the net surplus of petroleum liquids would be reduced only marginally by growth of population based on a rapid economic growth scenario (see Appendix B of the 1986 report).

Export of Gas

To the extent natural gas is exported, it is unavailable for the local market. Cumulative exports over the next 15 years from current operations are projected to be about 945 billion cubic feet. If a new export facility were to be constructed in Cook Inlet, it is anticipated that exploration for natural gas in Cook Inlet would accelerate (it is currently at a near standstill) and additional reserves would likely be discovered, once again creating a demand/supply balance.

Natural Gas Availability in Fairbanks

If, by some means, natural gas became available in Fairbanks, space heating in Fairbanks might be converted to gas. This could increase annual natural gas consumption as fuel oil use was backed out. Fuel oil use could fall by 8 million gallons annually.

Natural gas consumption for space heating might eventually capture 75 percent of the market. If gas became available in 1993 and captured this share of the market by 1997, gas consumption for space heat could increase 30 billion cubic feet, and fuel oil consumption could fall by 175 million gallons over the projection period.

The net surplus of gas would fall only marginally as a result of these changes, and the net surplus of liquid fuels would increase

only marginally.

SURPLUS OIL AND GAS TABLE 5.1

	OIL (Million Barrels)		GAS (Billion Cubic Feet)	
	Total	State Royalty	Total	State Royalty
STATE				
Estimated reserves, as of 01/88 [1]	8,105	1,020	35,475	4,248
Estimated cumulative consumption, 1/88-12/02	572	572	3,964	3,964
NET SURPLUS (DEFICIT)	7,533	448	31,511	284
COOK INLET				
Estimated reserves, as of 01/88 [1]	95	10	4,158	323
Estimated cumulative consumption, 1/88-12/02	364	364	2,265	2,265
NET SURPLUS (DEFICIT)	(269)	(354)	1,893	(1,942)
NORTH SLOPE				
Estimated reserves, as of 01/88 [1]	8,010	1,010	31,317	3,925
Estimated cumulative consumption, 1/88-12/02	135	135	1,700	1,700
NET SURPLUS (DEFICIT)	7,875	875	29,617	2,225

[1] From Table 2.1: North Slope as of 1/87; Cook Inlet as of 1/87, adjusted to 1/88
S/D88;T5_1;1/06/88

SENSITIVITY ANALYSIS OF OIL AND GAS SURPLUS TABLE 5.2

	Reduction in Net Surplus	
	Oil	Gas
Low reserve estimate	24%	1%
Rapid population growth	1%	0%
Export of LNG	—	9%
Natural Gas available in Fairbanks	)0%	0%

S/D88;T5_2;12/08/87

APPENDIX A
OIL AND GAS FIELD DATA

BELUGA RIVER
LOCATION Cook Inlet, onshore, west side
BEGAN PRODUCTION 1/68
OPERATOR ARCO
PURCHASER Chugach Electric, ENSTAR

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	---	---	1,967,000
CUMULATIVE PRODUCTION [2]	---	---	252,811,000
RESERVES [2]	---	---	604,396,000
PERCENT OF FIELD DEPLETED [2]	---	---	30%

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.

COMMENTS
- Chugach Electric uses this gas onsite for generation of electricity which is delivered to the Anchorage market.
- Enstar has recently purchased Beluga River gas under contract from Shell and transports the gas by pipeline from the field through the Mat-Su Valley to Anchorage.
- Due to the existence of several Federal leases in the field, the state's effective royalty share is 7.555%.

CANNERY LOOP
LOCATION Cook Inlet, onshore, east side
BEGAN PRODUCTION Field development underway
OPERATOR Union

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	---	---	---
CUMULATIVE PRODUCTION [2]	---	---	---
RESERVES [2]	---	---	300,000,000
PERCENT OF FIELD DEPLETED [2]	---	---	---

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.

COMMENTS
- Production to commence in 1988.

DUCK ISLAND/SAG DELTA (ENDICOTT RESERVOIR)
LOCATION North Slope, onshore/offshore
BEGAN PRODUCTION 1987
OPERATOR BP

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	---	---	---
CUMULATIVE PRODUCTION [2]	---	---	---
RESERVES [2]	370,000,000	---	800,000,000
PERCENT OF FIELD DEPLETED [2]	---	---	---

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.

FALLS CREEK
LOCATION Cook Inlet, onshore, east side
BEGAN PRODUCTION Shut-in 1961
OPERATOR Chevron

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	---	---	---
CUMULATIVE PRODUCTION [2]	---	---	18,983
RESERVES [2]	---	---	13,000,000
PERCENT OF FIELD DEPLETED [2]	---	---	(1%

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.

GRANITE POINT
LOCATION Cook Inlet, offshore, west side
BEGAN PRODUCTION 12/67
OPERATOR Mobil
PURCHASER Tesoro, ARCO [1], AMOCO Platform [1], Union [1]

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	244,000	214,000	---
CUMULATIVE PRODUCTION [2]	106,976,000	92,429,000	---
RESERVES [2]	19,875,000	12,429,000	---
PERCENT OF FIELD DEPLETED [2]	85%	88%	---

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.

[1] Small amount of casinghead gas sold to AMOCO for use on platform.

GWIDER BAY UNIT AREA

			OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
LOCATION	North Slope, onshore/offshore				
BEGAN PRODUCTION	Field delineation underway				
OPERATOR	Conoco	MONTHLY PRODUCTION [1]	—	—	—
		CUMULATIVE PRODUCTION [2]	—	—	—
		RESERVES [2]	—	—	—
		PERCENT OF FIELD DEPLETED [2]	—	—	—

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.

HEMI SPRINGS UNIT AREA

			OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
LOCATION	North Slope, onshore				
BEGAN PRODUCTION	Unit agreement approved in 1984.				
OPERATOR	ARCO	MONTHLY PRODUCTION [1]	—	—	—
		CUMULATIVE PRODUCTION [2]	—	—	—
		RESERVES [2]	—	—	—
		PERCENT OF FIELD DEPLETED [2]	—	—	—

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.

IVAN RIVER

			OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
LOCATION	Cook Inlet, onshore, west side				
BEGAN PRODUCTION	Shut-in 1966, suspended				
OPERATOR	Chevron	MONTHLY PRODUCTION [1]	—	—	—
		CUMULATIVE PRODUCTION [2]	—	—	—
		RESERVES [2]	—	—	[1]
		PERCENT OF FIELD DEPLETED [2]	—	—	—

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.
[3] Ivan River, Lewis River, Pretty Creek and Stump Lake reserves are combin under Lewis River reserves.

KAVIK

			OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
LOCATION	North Slope, onshore				
BEGAN PRODUCTION	Suspended				
OPERATOR	ARCO	MONTHLY PRODUCTION [1]	—	—	—
		CUMULATIVE PRODUCTION [2]	—	—	—
		RESERVES [2]	—	—	—
		PERCENT OF FIELD DEPLETED [2]	—	—	—

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.

KENAI

			OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
LOCATION	Cook Inlet, onshore, east side				
BEGAN PRODUCTION	1/62				
OPERATOR	Union				
PURCHASER	Alaska Pipeline	MONTHLY PRODUCTION [1]	—	—	7,475,000
	Chevron	CUMULATIVE PRODUCTION [2]	11,877 [3]	—	1,830,841,000
	City of Kenai	RESERVES [2]	—	—	451,295,000
	Marathon LNG	PERCENT OF FIELD DEPLETED [2]	—	—	80%
	Rental gas (Swanson River oil field)	[1] 1/1/87 thru 7/31/87.			
	Union	[2] Estimated as of 1/1/88.			
	Union-Chevron exchange	[3] Natural gas liquids.			

COMMENTS
- Effective royalty rates are: Kenai, 2.06875%; Kenai Deep, 0.0%. The state does not receive the full 12.5% royalty sha because of the predominance of Federal leases in the unit and the conveyance of land to Cook Inlet Region INc.

KUPARUK

LOCATION North Slope, onshore
BEGAN PRODUCTION 12/81
OPERATOR ARCO, BP, Chevron, Exxon, Mobil, Phillips, Union
PURCHASER All owners

	OIL (Bbl)	CsngHd GAS -Gross (Mcf)	CsngHd GAS -Net (Mcf)
MONTHLY PRODUCTION [1]	8,794,000 [3]	10,629,000	2,695,000
CUMULATIVE PRODUCTION [2]	399,740,000 [3]	472,217,000	298,147,000
RESERVES [2]	900,000,000	---	600,000,000
PERCENT OF FIELD DEPLETED [2]	31%	---	33%

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.
[3] Includes NGL.

LEWIS RIVER

LOCATION Cook Inlet, onshore, west side
BEGAN PRODUCTION 1984
OPERATOR Cities Service

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	---	---	5,000
CUMULATIVE PRODUCTION [2]	---	---	3,736,000
RESERVES [2]	---	---	500,000,000 [3]
PERCENT OF FIELD DEPLETED [2]	---	---	<1%

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.
[3] Ivan River, Lewis River, Pretty Creek and Stump Lake reserves are combine under Lewis River reserves.

COMMENTS
- Short term gas sales to Enstar began in 1984.

LISBURNE RESERVOIR

LOCATION North Slope, onshore/offshore
BEGAN PRODUCTION 1986
OPERATOR ARCO

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	1,341,000	4,831	---
CUMULATIVE PRODUCTION [2]	21,408,000	69,421,000	---
RESERVES [2]	380,000,000	900,000,000	---
PERCENT OF FIELD DEPLETED [2]	5%	7%	---

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.

MCARTHUR RIVER

LOCATION Cook Inlet offshore, west side
BEGAN PRODUCTION 12/69
OPERATOR Union, Marathon, ARCO
PURCHASER Tesoro

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	647,000 [3]	300,000	1,083,000
CUMULATIVE PRODUCTION [2]	530,701,000 [3]	194,177,000	133,063,000
RESERVES [2]	41,234,000	[4]	612,000,000
PERCENT OF FIELD DEPLETED [2]	93%	---	35%

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.
[3] Includes NGL.
[4] Included with DRY GAS reserves.

COMMENTS
- Major gas sales to commence in 1988 from the new Steelhead platform.

MIDDLE GROUND SHOAL

LOCATION Cook Inlet, offshore, east side
BEGAN PRODUCTION 9/67
OPERATOR AMOCO, Shell

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	246,000	109,000	29,000
CUMULATIVE PRODUCTION [2]	153,259,000	76,785,000	2,213,000
RESERVES [2]	8,046,000	5,337,000	[3]
PERCENT OF FIELD DEPLETED [2]	95%	94%	---

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.
[3] Included with Casinghead reserves.

MILNE POINT
LOCATION North Slope, onshore
BEGAN PRODUCTION Production commenced in 1985.
OPERATOR Conoco

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	6,000	(25,000)	---
CUMULATIVE PRODUCTION [2]	5,481,000	1,915	---
RESERVES [2]	60,000,000	---	---
PERCENT OF FIELD DEPLETED [2]	8%	---	---

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.

COMMENTS
- Production temporarily suspended in 1987.
- Estimated effective royalty rate: 18%

NICOLAI CREEK
LOCATION Cook Inlet, onshore-offshore, west side
BEGAN PRODUCTION 10/68, now shut-in
OPERATOR Texaco
PURCHASER AMOCO

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	---	---	---
CUMULATIVE PRODUCTION [2]	---	---	1,062,055
RESERVES [2]	---	---	3,000,000
PERCENT OF FIELD DEPLETED [2]	---	---	26%

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.

COMMENTS
- Gas from this small field, when produced, is used only by platform and shore production facilities.

NORTH COOK INLET
LOCATION Cook Inlet, offshore, mid-channel
BEGAN PRODUCTION 3/69
OPERATOR Phillips
PURCHASER Phillips
Alaska Pipeline

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	---	---	3,369,000
CUMULATIVE PRODUCTION [2]	---	---	817,863,000
RESERVES [2]	---	---	682,574,000
PERCENT OF FIELD DEPLETED [2]	---	---	55%

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.

COMMENTS
- Gas from this field is primarily delivered to the Phillips LNG plant and subsequently sold in Japan.

NORTH FORK
LOCATION Cook Inlet, onshore, east side
BEGAN PRODUCTION Shut-in 1965
OPERATOR Chevron

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	---	---	---
CUMULATIVE PRODUCTION [2]	---	---	104,595
RESERVES [2]	---	---	12,000,000
PERCENT OF FIELD DEPLETED [2]	---	---	1%

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.

POINT THOMSON UNIT AND FLAXMAN ISLAND
LOCATION North Slope, onshore/offshore
BEGAN PRODUCTION Shut-in
OPERATOR EXXON

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	---	---	---
CUMULATIVE PRODUCTION [2]	---	---	---
RESERVES [2]	[3]	[3]	---
PERCENT OF FIELD DEPLETED [2]	---	---	---

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.
[3] Oil and gas condensate.

COMMENTS
- Unit Area expansion approved in 1984. Market analysis underway to determine development potential of gas condensate and natural gas liquids production and sales from the unit.

PRETTY CREEK UNIT AREA

LOCATION Cook Inlet, onshore, west side
BEGAN PRODUCTION 1986
OPERATOR Union

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	---	---	62,000
CUMULATIVE PRODUCTION [2]	---	---	744,000
RESERVES [2]	---	---	[1]
PERCENT OF FIELD DEPLETED [2]	---	---	---

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.
[1] Ivan River, Lewis River, Pretty Creek and Stump Lake reserves are combine

PRUDHOE BAY - SADLEROCHIT RESERVOIR

LOCATION North Slope, onshore
BEGAN PRODUCTION 10/69
OPERATOR ARCO, Sohio
PURCHASER Mapco-GVEA
Tesoro
Chevron

	OIL (Bbl)	CsngHd GAS Gross (Mcf)	CsngHd GAS Net (Mcf)
MONTHLY PRODUCTION [1]	48,657,000 [3]	93,311,000	18,507,000
CUMULATIVE PRODUCTION [2]	5,503,806,000 [3]	7,573,154,000	1,736,236,000
RESERVES [2]	4,800,000,000	---	29,000,000,000
PERCENT OF FIELD DEPLETED [2]	53%	---	6%

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.
[3] Includes NGL.

STERLING

LOCATION Cook Inlet, onshore, east side
BEGAN PRODUCTION 5/62; currently shut in.
OPERATOR Union
PURCHASER Sport Lake Greenhouse

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	---	---	217
CUMULATIVE PRODUCTION [2]	---	---	2,089,000
RESERVES [2]	---	---	22,997,000
PERCENT OF FIELD DEPLETED [2]	---	---	8%

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.

COMMENTS

-Since Federal and Cook Inlet Region Inc. leases are included, the state's royalty share is approximately 1.6%.

STUMP LAKE UNIT AREA

LOCATION Cook Inlet, onshore, west side
BEGAN PRODUCTION Suspended
OPERATOR Chevron

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	---	---	---
CUMULATIVE PRODUCTION [2]	---	---	---
RESERVES [2]	---	---	[3]
PERCENT OF FIELD DEPLETED [2]	---	---	---

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.
[1] Ivan River, Lewis River, Pretty Creek and Stump Lake reserves are combine under Lewis River reserves.

TRADING BAY

LOCATION Cook Inlet, offshore, west side
BEGAN PRODUCTION 12/67
OPERATOR Union
PURCHASER Tesoro

	OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
MONTHLY PRODUCTION [1]	81,000 [3]	81,000	40,000
CUMULATIVE PRODUCTION [2]	89,462,000 [3]	60,849,000	3,243,000
RESERVES [2]	1,026,000	31,000,000	[4]
PERCENT OF FIELD DEPLETED [2]	99%	67%	---

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.
[3] Includes NGL.
[4] Included under Casinghead reserves.

WEST FORK

LOCATION	Cook Inlet, onshore, east side				
BEGAN PRODUCTION	Shut-in gas field.		OIL (Bbl)	CsngHd GAS (Mcf)	DRY GAS (Mcf)
OPERATOR					
		MONTHLY PRODUCTION [1]	---	---	0
		CUMULATIVE PRODUCTION [2]	---	---	1,542,000
		RESERVES [2]	---	---	6,000,000
		PERCENT OF FIELD DEPLETED [2]	---	---	20%

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.

WEST SAK RESERVOIR

				GAS (Mcf)	
LOCATION	North Slope, onshore		OIL (Bbl)		
BEGAN PRODUCTION					
OPERATOR	ARCO, Conoco			Casinghead	Dry Gas
		MONTHLY PRODUCTION [1]	---	---	---
		CUMULATIVE PRODUCTION [2]	3,365	4,980	---
		RESERVES [2]	---	---	---
		PERCENT OF FIELD DEPLETED [2]	---	---	---

[1] 1/1/87 thru 7/31/87.
[2] Estimated as of 1/1/88.

COMMENTS
- Reservoir delineation and engineering/geological studies continuing.

S/D87;APXA_1;1/7/88

APPENDIX A1

UNIT OWNERSHIP

LEASE NO.		PA FACTOR (%)	OWNERS % OF PA --->		
BELUGA RIVER			ARCO	Chevron	Shell
FED		11.5885	3.8624	3.8624	3.8624
FED		27.7204	9.2392	9.2392	9.2392
FEE		0.1290	0.0430	0.0430	0.0430
FEE		0.1219	0.0406	0.0406	0.0406
ST	17592	8.0024	2.6672	2.6672	2.6672
ST	17599	5.0210	1.6735	1.6735	1.6735
ST	17658	12.7251	4.2413	4.2413	4.2413
ST	21126	0.7855	0.2618	0.2618	0.2618
ST	21127	9.4019	3.1337	3.1337	3.1337
ST	21128	14.5560	4.8515	4.8515	4.8515
ST	21129	0.5803	0.1934	0.1934	0.1934
ST	58815	0.0162	0.0054	0.0054	0.0054
ST	58820	1.5889	0.5296	0.5296	0.5296
ST	58831	7.7629	2.5874	2.5874	2.5874
ST	63055	Frac %			

CANNERY LOOP-BELUGA			UNION	PAC.LT.	MARATHON	CIRI	CALL	BURGLIN	CHEVRON	ARCO
CIRI	60568	17.8404	6.6902	0.0669	4.4601					
CIRI		2.6799					2.1439	0.5360		
CIRI		11.2846	2.8212	2.8212		5.6423				
CIRI		0.0231	0.0115	0.0115						
CIRI		0.1438	0.0719	0.0719						
CIRI		0.0388	2.5291	2.5291	1.6861					
CON		3.3391	0.8348	0.8348		1.6695				
CON		0.2026	0.0506	0.0506		0.1013				
CON		0.4542	0.1136	0.1136		0.2271				
FED		1.6207	0.8104		81.0355					
FED		0.0286	2.5291	2.5291	1.6861					
FEE		2.3197	1.1598	1.1598						
FEE		1.8075	0.9038	0.9038						
FEE		6.0878	2.2829	2.2829	1.5200					
FEE		1.5903	0.7952	0.7952						
FEE		0.0557	0.0279	0.0279						
FEE		0.2024	0.1012	0.1012						
FEE		0.0631	0.0315	0.0315						
FEE		0.0557	0.0279	0.0279						
FEE		0.0178	0.0089	0.0089						
FEE		0.0230	0.0115	0.0115						
FEE		0.0180	0.0090	0.0090						
FEE		0.0177	0.0088	0.0088						
FEE		0.0150	0.0075	0.0075						
FEE		0.0290	0.0145	0.0145						
FEE		0.0063	0.0031	0.0031						
FEE		0.0066	0.0033	0.0033						
FEE		0.0105	0.0052	0.0052						
FEE		0.0306	0.0153	0.0153						
FEE		0.0120	0.0060	0.0060						
FEE		0.0558	0.0279	0.0279						
FEE		0.0230	0.0115	0.0115						
FEE		0.0177	0.0088	0.0088						
FEE		0.0248	0.0124	0.0124						
FEE		0.0461	0.0230	0.0230						
FEE		0.0201	0.0101	0.0101						
FEE		0.0133	0.0066	0.0066						
FEE		2.9823	1.1184	1.1184	0.7456					
FEE		0.8450	0.4225	0.4225						
FEE		3.9051	1.9526	1.9526						
FEE		0.1321	0.0661	0.0661						
FEE		0.2658	0.1329	0.1329						
FEE		0.6148	0.3074	0.3074						

	LEASE NO.	PA FACTOR (%)	OWNERS % OF PA --->							
FEE		0.0583	0.0292	0.0292						
FEE		1.7986	0.8993	0.8993						
FEE		0.0093	0.0047	0.0047						
FEE		0.0159	0.0080	0.0080						
FEE		0.0173	0.0087	0.0087						
FEE		0.0621	0.0310	0.0310						
FEE		0.1718	0.0859	0.0859						
FEE		0.1228	0.0614	0.0614						
FEE		0.0111	0.0055	0.0055						
FEE		0.4076	0.2038	0.2038						
ST	2397	5.5133	2.7566		2.7566					
ST	324602	16.7670	8.3835	8.3835	4.1918					
ST	324604	0.1564					0.1251	0.0313		
ST	359153	6.7618	2.2539		2.2539	2.2539				
ST	364395	2.0137	0.6712		0.6712	0.6712				
ST	365454	0.4660	0.1553		0.1553	0.1553				
UNC		0.0000								
UNC		0.0000							0.0000	0.0000
UNC		0.0000								
UNC		0.0000								
UNC		0.0000								
UNC		0.0000								
CANNERY LOOP-TYONEK 'D'			UNION	PAC.LT.	MARATHON	CIRI				
CIRI		2.8582	1.0718	1.0718	0.7145					
CIRI		0.3419	0.1709	0.1709						
CIRI	60568	37.3083	13.9906	13.9906	9.3271					
CIRI		1.1450	0.2863	0.2863		0.0057				
FEE		1.4077	0.7039	0.7039						
FEE		0.5835	0.2917	0.2917						
FEE		5.5131	2.7566	2.7566						
FEE		4.2959	2.1480	2.1480						
FEE		6.7650	2.5369	2.5369	1.6913					
ST	2397	4.1698	2.0849		2.0849					
ST	324602	23.0247	11.5123	0.0576	5.7562					
ST	359153	11.4796	3.8265		3.8265	3.8265				
ST	365454	1.1074	0.3691		0.3691	0.3691				
UNC		0.0000								
UNC		0.0000								
CANNERY LOOP-TYONEK			UNION	PAC.LT.	MARATHON	CIRI				
CIRI	60568	32.3424	12.1284	12.1284	8.0856					
CIRI		1.3536	0.3384	0.3384		0.6768				
CIRI		5.5167	2.0687	2.0687	1.3792					
CIRI		0.4041	0.2021	0.2021						
FEE		1.3945	0.6973	0.6973						
FEE		1.0940	0.5470	0.5470						
FEE		3.4437	1.2914	1.2914	0.8609					
FEE		1.6641	0.8321	0.8321						
FEE		0.6898	0.3449	0.3449						
ST	2397	7.3449	3.6725		3.6725					
ST	324602	29.8726	14.9363	0.0747	7.4682					
ST	359153	13.5706	4.5235		4.5235	4.5235				
ST	365454	1.3092	0.4364		0.4364	0.4364				
UNC		0.0000								
UNC		0.0000								
DUCK ISLAND			AMOCO	EXXON	UNION	STANDARD	CIRI	DOYON	NANA	
ST	34633	26.7609				26.7609				
ST	34634	0.0675				0.0675				
ST	34636	5.2911				5.2911				
ST	47502	22.3357	5.5839	11.1679	5.5839					
ST	47503	19.6233	4.9058	9.8117	4.9058					
ST	47504	0.0036		0.0036						
ST	47505	0.0140		0.0140						
ST	47506	0.0084	0.0042		0.0042					
ST	312828	25.8252				24.6631	0.6456	0.1291	0.3874	
ST	312834	0.0703	0.0234	0.0234	0.0234					
FALLS CREEK			CHEVRON	ARCO						
FED		1.6200	0.8100	0.8100						

	LEASE NO.	PA FACTOR (%)	OWNERS % OF PA --->	
FEE		0.7400	0.3700	0.3700
FED		0.3700	0.1850	0.1850
FED		4.5900	2.2950	2.2950
FED		3.1100	1.5550	1.5550
ST	590	89.5700	44.7850	44.7850

IVAN RIVER			CHEVRON	ARCO	PAC.LT.	CONOCO
ST	17600	7.2700	3.6350	3.6350		
ST	32930	52.3700	26.1850	6.5463	19.6387	
ST	33637	9.4600	4.7300	1.1825	3.5475	
ST	33727	6.0600	3.0300	3.0300		
ST	302284	20.9400	20.9400			
ST	302282	3.9000				3.9000

KAVIK			ARCO	AMOCO
ST	65405	10.9640	5.4820	5.4820
ST	65406	43.7480	21.8740	21.8740
ST	65407	22.6440	11.3220	11.3220
ST	65412	22.6440	11.3220	11.3220

KUPARUK			ARCO	BPAE	SAPC	UNION	CHEVRON	MOBIL	EXXON
ST	25512	2.0167	1.0084	0.7563	0.2521				
ST	25513	1.8881	0.9441	0.7080	0.2360				
ST	25519	1.4931	0.7466	0.5599	0.1866				
ST	25520	1.6504	0.8252	0.6189	0.2063				
ST	25521	1.8568	0.9284	0.6963	0.2321				
ST	25522	0.4727	0.2364	0.1773	0.0591				
ST	25523	1.4205	0.7103	0.5327	0.1776				
ST	25524	0.0034	0.0017	0.0013	0.0004				
ST	25531	0.7768	0.2589	0.1942	0.0647	0.2589			
ST	25547	1.7394	0.5798	0.4349	0.1450	0.5798			
ST	25548	0.8471	0.2824	0.2118	0.0706	0.2824			
ST	25558	0.2228	0.0743	0.0557	0.0186	0.0743			
ST	25569	1.6004	0.5335	0.4001	0.1334	0.5335			
ST	25570	2.4757	0.8252	0.6189	0.2063	0.8252			
ST	25571	0.9866	0.3289	0.2467	0.0822	0.3289			
ST	25585	0.1232	0.0411	0.0308	0.0103	0.0411			
ST	25586	1.3809	0.4603	0.3452	0.1151	0.4603			
ST	25587	1.6177	0.5392	0.4044	0.1348	0.5392			
ST	25588	0.7497	0.2499	0.1874	0.0625	0.2499			
ST	25589	0.7333	0.2444	0.1833	0.0611	0.2444			
ST	25590	0.4711	0.1570	0.1178	0.0393	0.1570			
ST	25603	0.0053	0.0018	0.0013	0.0004	0.0018			
ST	25604	0.0113	0.0038	0.0028	0.0009	0.0038			
ST	25605	0.0087	0.0029	0.0022	0.0007	0.0029			
ST	25627	0.0080	0.0040	0.0030	0.0010				
ST	25628	0.6831	0.3416	0.2562	0.0854				
ST	25629	1.3845	0.6923	0.5192	0.1731				
ST	25630	1.5285	0.7643	0.5732	0.1911				
ST	25631	1.6166	0.8083	0.6062	0.2021				
ST	25632	1.4206	0.7103	0.5327	0.1776				
ST	25633	1.8478	0.9239	0.6929	0.2310				
ST	25634	1.7903	0.8952	0.6714	0.2238				
ST	25635	1.5919	0.7960	0.5970	0.1990				
ST	25636	0.3903	0.1952	0.1464	0.0488				
ST	25637	0.0150	0.0075	0.0056	0.0019				
ST	25638	0.2556	0.2556						
ST	25639	1.5563	1.5563						
ST	25640	3.2639	1.6320	1.2240	0.4080				
ST	25641	3.7079	1.8540	1.3905	0.4635				
ST	25642	2.9725	1.4863	1.1147	0.3716				
ST	25643	1.6088	0.8044	0.6033	0.2011				
ST	25644	3.0745	1.5373	1.1529	0.3843				
ST	25645	4.3910	2.1955	1.6466	0.5489				
ST	25646	4.6415	2.3208	1.7406	0.5802				
ST	25647	4.1270	4.1270						
ST	25648	2.4180	2.4180						

	LEASE NO.	PA FACTOR (%)	OWNERS % OF PA ---)					
ST	25649	1.2015	1.2015					
ST	25650	1.7216	1.7216					
ST	25651	3.7875	3.7875					
ST	25652	2.0863	1.0432	0.7824	0.2608			
ST	25653	3.2856	1.6428	1.2321	0.4107			
ST	25654	2.5659	1.2830	0.9622	0.3207			
ST	25655	3.0744	1.5372	1.1529	0.3843			
ST	25656	1.9739	0.9870	0.7402	0.2467			
ST	25657	2.5700	1.2850	0.9638	0.3213			
ST	25658	2.1376	1.0688	0.8016	0.2672			
ST	25659	1.1593	0.5797	0.4347	0.1449			
ST	25660	0.6737	0.6737					
ST	25661	0.4496	0.4496					
ST	25664	0.0135	0.0135					
ST	25665	0.3493	0.1747	0.1310	0.0437			
ST	25666	0.8540	0.4270	0.3203	0.1068			
ST	25667	1.0375	0.5188	0.3891	0.1297			
ST	25668	0.0038	0.0019	0.0014	0.0005			
ST	28242	0.4360	0.2180					0.2180
ST	28243	0.5140	0.1695	0.0875			0.2570	
ST	47449	0.2180				0.1090	0.1090	
ST	355023	0.7867	0.7867					
ST	355030	0.0011	0.0011					
ST	355924	0.2539	0.2539					

LEWIS RIVER - PA #1			CIT PAC
ST	58798	61.1110	61.1110
ST	58801	22.2220	22.2220
ST	58802	16.6670	16.6670
LEWIS RIVER - PA #2			**CIT PAC**
ST	58798	76.1905	76.1905
ST	58801	14.2857	14.2857
ST	58802	9.5238	9.5238

LISBURNE			ARCO	EXXON	STANDARD
ST	28277	0.0170			0.0170
ST	28280	0.0380			0.0380
ST	28285	0.0300			0.0300
ST	28299	0.1870	0.0935	0.0935	
ST	28300	1.7170	0.8585	0.8585	
ST	28301	2.4440	1.2220	1.2220	
ST	28302	5.4180	2.7090	2.7090	
ST	28303	2.2490	1.1245	1.1245	
ST	28304	0.5380	0.2690	0.2690	
ST	28305	0.1450			0.1450
ST	28306	0.9190	0.4595	0.4595	
ST	28307	3.5270	1.7635	1.7635	
ST	28308	0.2460	0.1230	0.1230	
ST	28309	0.0890			0.0890
ST	28320	6.7190			6.7190
ST	28321	8.5540	4.2770	4.2770	
ST	28322	10.0680	5.0340	5.0340	
ST	28323	11.0800	5.5400	5.5400	
ST	28324	4.3250	2.1625	2.1625	
ST	28325	3.7180	1.8590	1.8590	
ST	28326	1.9940	0.9970	0.9970	
ST	28327	0.0400	0.0200	0.0200	
ST	28328	0.0260	0.0130	0.0130	
ST	28337	0.6590			0.6590
ST	28338	0.8960			0.8960
ST	28339	1.0830			1.0830
ST	28339	3.1550			3.1550
ST	28340	0.2000			0.2000
ST	28340	0.0300			0.0300
ST	28342	0.5690			0.5690
ST	28343	1.1160			1.1160
ST	28343	2.4130			2.4130
ST	28344	0.0250	0.0125	0.0125	

	LEASE NO.	PA FACTOR (%)	OWNERS % OF PA --->						
ST	28345	0.1170	0.0585	0.0585					
ST	34628	3.3300	1.6650	1.6650					
ST	34629	3.5260	1.7630	1.7630					
ST	34630	1.3770			1.3770				
ST	34631	8.6100	4.3050	4.3050					
ST	34632	7.3420	3.6710	3.6710					
ST	34634	0.6490			0.6490				
ST	34635	0.8150			0.8150				
MILNE POINT			CONOCO	CIT.SERV.	CHEVRON				
ST	25509	9.2108			9.2108				
ST	25516	2.9090			2.9090				
ST	25518	4.4649			4.4649				
ST	47433	8.7220	7.5009	1.2211					
ST	47434	29.7131	26.0732	3.6398					
ST	47437	34.2418	29.4479	4.7938					
ST	47438	9.1819	7.8964	1.2855					
ST	315848	1.5566			1.5566				
NICOLAI CREEK-POOL A			TEXACO	MOBIL					
ST	17585	52.8027	26.4014	26.4014					
ST	17598	47.1973	23.5987	23.5987					
NICOLAI CREEK-POOL B			TEXACO						
ST	63279	100.0000	100.0000						
NORTH COOK INLET			PHILLIPS	CHEVRON					
ST	17533	44.7324	44.7324						
ST	17590	6.5430	4.3620	2.1810					
ST	18740	8.1787	8.1787						
ST	18741	6.5429	6.5429						
ST	37831	34.0030	34.0030						
NORTH FORK			CHEVRON	ARCO	UNOCAL	MARATHON	SUNRAY		
FED		25.0000	6.8439	6.8439	4.3241	1.9762	5.0119		
FED		12.5000	3.4220	3.4220	2.1620	0.9881	2.5059		
ST	733	6.2500	1.7110	1.7110	1.0800	0.4900	1.2530		
ST	2095	56.2500	15.3988	15.3988	9.7292	4.4465	11.2767		
NORTH TRADING BAY			MARATHON	TEXACO	MOBIL				
ST	17597	50.0000		25.0000	25.0000				
ST	18776	28.5700	28.5700						
ST	35431	21.4300	21.4300						
PRETTY-CREEK			CHEVRON	TEXACO	UNION				
FED	USS 2156	0.4494	0.1977	0.0494	0.2022				
ST	58810	23.8985	10.5153	2.6288	10.7543				
ST	58813	20.8696	20.8696						
ST	58814	10.4348	10.4348						
ST	63047	6.0870	2.6783	0.6696	2.7391				
ST	63048	27.8261	12.2435	3.0609	12.5217				
ST	63049	10.4348	4.5913	1.1478	4.6957				
PRUDHOE BAY-GAS			ARCO	EXXON	STANDARD	CHEVRON	MOBIL	BPAE	PHILLIPS
ST	25637	0.0003	0.0002		0.0000			0.0001	
ST	28238	0.0062	0.0031	0.0031					
ST	28239	0.0913	0.0457	0.0457					
ST	28240	0.0496	0.0248	0.0248					
ST	28241	0.0399					0.0200		0.0200
ST	28244	0.0000	0.0000	0.0000					
ST	28245	0.1806	0.0903	0.0903					
ST	28246	0.0003	0.0002	0.0002					
ST	28257	0.1101					0.0551		0.0551
ST	28260	0.0777			0.0777				
ST	28261	0.0005					0.0003		0.0003
ST	28262	0.1111				0.0370	0.0370		0.0370
ST	28262	0.2996				0.2996			
ST	28263	0.0512					0.0256		0.0256

	LEASE NO.	PA FACTOR (%)	OWNERS % OF PA --->						
ST	28263	0.1539				0.0513	0.0513		0.0513
ST	28264	0.0121	0.0060	0.0060					
ST	28265	0.0004	0.0002	0.0002					
ST	28277	0.1112			0.1112				
ST	28278	0.0332			0.0332				
ST	28279	0.0190			0.0190				
ST	28280	1.7632			1.7632				
ST	28281	1.1061			1.1061				
ST	28282	0.4341			0.4341				
ST	28283	0.1013			0.1013				
ST	28284	0.6688			0.6688				
ST	28285	1.8633			1.8633				
ST	28286	0.2432			0.2432				
ST	28287	0.0133			0.0133				
ST	28299	0.0669	0.0334	0.0334					
ST	28300	2.7462	1.3731	1.3731					
ST	28301	5.4071	2.7035	2.7035					
ST	28302	8.5731	4.2865	4.2865					
ST	28303	6.1308	3.0654	3.0654					
ST	28304	2.9898	1.4949	1.4949					
ST	28305	3.1855			3.1855				
ST	28306	5.4649	2.7325	2.7325					
ST	28307	7.4777	3.7388	3.7388					
ST	28308	4.1072	2.0536	2.0536					
ST	28309	2.2069			2.2069				
ST	28310	1.1675			1.1675				
ST	28311	0.3709			0.3709				
ST	28312	0.1008			0.1008				
ST	28313	0.0067	0.0033	0.0033					
ST	28320	0.3217			0.3217				
ST	28321	7.2611	3.6305	3.6305					
ST	28322	4.2486	2.1243	2.1243					
ST	28323	0.4529	0.2265	0.2265					
ST	28324	0.3609	0.1805	0.1805					
ST	28325	3.3037	1.6518	1.6518					
ST	28326	5.0566	2.5283	2.5283					
ST	28327	0.0133	0.0066	0.0066					
ST	28328	0.7490	0.3745	0.3745					
ST	28329	0.7144	0.3572	0.3572					
ST	34628	4.9027	2.4513	2.4513					
ST	34629	2.3763	1.1882	1.1882					
ST	34630	0.0521			0.0521				
ST	34631	4.4211	2.2106	2.2106					
ST	34632	7.9581	3.9790	3.9790					
ST	47446	0.0212				0.0106	0.0106		
ST	47447	0.0012				0.0006	0.0006		
ST	47449	0.0205				0.0102	0.0102		
ST	47450	0.0194				0.0065	0.0065		0.0065
ST	47451	0.0043				0.0014	0.0014		0.0014
ST	47452	0.1575				0.0525	0.0525		0.0525
ST	47453	0.0385				0.0128	0.0128		0.0128
ST	47454	0.0014				0.0005	0.0005		0.0005

PRUDHOE BAY-OIL			ARCO	EXXON	STANDARD	CHEVRON	MOBIL	BPAE	PHILLIPS	SHELL	AMER HESS	GETTY	LL&E	MARA
ST	25637	0.0046	0.0023		0.0006			0.0017						
ST	28238	0.0164	0.0082	0.0082										
ST	28239	0.0614	0.0307	0.0307										
ST	28240	0.0913	0.0457	0.0457										
ST	28241	0.0487					0.0243		0.0243					
ST	28244	0.0000	0.0000	0.0000										
ST	28245	0.1487	0.0743	0.0743										
ST	28246	0.0007	0.0004	0.0004										
ST	28257	1.7767					0.8884		0.8884					
ST	28258	0.4599	0.2300	0.2300										
ST	28259	0.0077	0.0038	0.0038										
ST	28260	1.4816			1.4816									
ST	28261	0.0889					0.0444		0.0444					
ST	28262	0.0772				0.0257	0.0257		0.0257					
ST	28262	0.2969				0.2969								
ST	28263	0.2072				0.0691	0.0691		0.0691					

	LEASE NO.	PA FACTOR (%)	OWNERS % OF PA --->											
ST	28263	0.1338					0.0669		0.0669					
ST	28264	0.1175	0.0587	0.0587										
ST	28265	0.0364	0.0182	0.0182										
ST	28275	0.0133	0.0067	0.0067										
ST	28276	0.0001	0.0000	0.0000										
ST	28277	0.8421			0.8421									
ST	28278	1.0400			1.0400									
ST	28279	1.2989			1.2989									
ST	28280	3.8982			3.8982									
ST	28281	3.3705			3.3705									
ST	28282	3.0430			3.0430									
ST	28283	1.5635			1.5635									
ST	28284	3.3026			3.3026									
ST	28285	3.9964			3.9964									
ST	28286	2.6692			2.6692									
ST	28287	1.2578			1.2578									
ST	28288	0.3601					0.1801		0.1801					
ST	28289	0.1312					0.0656		0.0656					
ST	28290	0.0025					0.0012		0.0012					
ST	28299	0.9308	0.4654	0.4654										
ST	28300	1.0365	0.5183	0.5183										
ST	28302	0.3106	0.1553	0.1553										
ST	28303	1.9447	0.9724	0.9724										
ST	28304	3.2450	1.6225	1.6225										
ST	28305	3.6765			3.6765									
ST	28306	2.9343	1.4672	1.4672										
ST	28307	1.8597	0.9298	0.9298										
ST	28308	3.9394	1.9697	1.9697										
ST	28309	3.8651			3.8651									
ST	28310	3.9334			3.9334									
ST	28311	3.6619			3.6619									
ST	28312	2.8963			2.8963									
ST	28313	1.5539	0.7769	0.7769										
ST	28314	0.4589					0.2294		0.2294					
ST	28315	1.2192			1.2192									
ST	28316	0.0088				0.0088								
ST	28316	0.0565				0.0188	0.0188		0.0188					
ST	28320	0.3567			0.3567									
ST	28321	1.1126	0.5563	0.5563										
ST	28322	1.0996	0.5498	0.5498										
ST	28323	0.7715	0.3857	0.3857										
ST	28324	2.0838	1.0419	1.0419										
ST	28325	2.7774	1.3887	1.3887										
ST	28326	3.1134	1.5567	1.5567										
ST	28327	2.7731	1.3865	1.3865										
ST	28328	4.0900	2.0450	2.0450										
ST	28329	4.1555	2.0778	2.0778										
ST	28330	1.4812			1.4812									
ST	28331	1.5487			1.5487									
ST	28332	1.6241	0.8120	0.8120										
ST	28333	0.0691			0.0691									
ST	28334	0.1304				0.0435	0.0435		0.0435		0.0810	0.0915	0.0398	
ST	28334	0.0180					0.0090		0.0090		0.4070	0.4070		
ST	28335	0.0668			0.0668									
ST	28339	0.0002			0.0002									
ST	28343	0.1342			0.1342									
ST	28345	0.5812	0.2906	0.2906										
ST	28346	0.2983	0.1491	0.1491										
ST	28349	0.0092			0.0092									
ST	34631	0.2491	0.1245	0.1245										
ST	34632	0.1146	0.0573	0.0573										
ST	47446	0.0100				0.0050	0.0050							
ST	47447	0.0050				0.0025	0.0025							
ST	47448	0.0011					0.0007		0.0004		0.0499	0.0499		0.049
ST	47449	0.0064				0.0032	0.0032							
ST	47450	0.0469				0.0156	0.0156		0.0156					
ST	47451	0.1902				0.0634	0.0634		0.0634					
ST	47452	0.2233				0.0744	0.0744		0.0744					
ST	47453	0.1144				0.0381	0.0381		0.0381					
ST	47454	0.0200				0.0067	0.0067		0.0067					
ST	47469	0.0308					0.0154		0.0154					

	LEASE NO.	PA FACTOR (%)	OWNERS % OF PA --->							
ST	47471	0.3001								0.0878
ST	47472	0.8140								
ST	47475	0.1996								0.0499
ST	47476	0.0028	0.0014	0.0014						
SOUTH MIDDLE GROUND SHOAL			AMOCO	TEXACO	CHEVRON					
ST	18744	6.8966	4.3103	1.7241	0.8621					
ST	18746	93.1034	58.1897	23.2759	11.6379					
STERLING UNIT			UNION	MARATHON						
CIRI	02-028063	28.5141	23.8194	23.8194						
CIRI	02-028135	21.6196	15.2911	15.2911						
CIRI	1836	2.6316	1.3158	1.3158						
CIRI	51502	6.7105	3.3553	3.3553						
FED	02-028063	19.1247	23.8194	23.8194						
FED	02-028135	8.9626	15.2911	15.2911						
ST	2497	3.6283	1.8141	1.8141						
ST	320912	2.3612	1.1806	1.1806						
ST	324599	6.4474	3.2237	3.2237						
STUMP LAKE			CIT.SERV.	PAC.LT.	AGEA	AMAREX	ENSTAR	CHEVRON	SHELL	
ST		9.8361	9.8361							
ST	17600	2.4424						1.4654	0.9770	
ST	58789	11.4754	6.8852	4.1311		0.4131	0.0459			
ST	58790	22.6443	13.5866	8.1519		0.8152	0.0906			
ST	58791	18.8525	1.8852	3.3934		0.3393	0.0377	13.1967		
ST	5879[illegible]	3.2787						3.2787		
ST	58794	4.0984						4.0984		
ST	58795	3.6018	0.3602	0.6483		0.0648	0.0072	2.5213		
ST	326059	8.1967			3.7071	0.3707		4.1190		
ST	326060	15.5738			7.0434	0.7043		7.8260		
TRADING BAY/MCARTHUR RIVER			UNION	MARATHON	ARCO	CHEVRON	GETTY			
ST	17579	12.9480			8.0925	1.6185	3.2370			
ST	17594	28.6480	14.3240	14.3240						
ST	17602	3.7000			2.3125	0.4625	0.9250			
ST	18716	2.6730			1.7820	0.8910				
ST	18729	17.8330	8.9165	8.9165						
ST	18730	16.6480	8.3240	8.3240						
ST	18758	2.7750			1.8500	0.9250				
ST	18772	9.2490			9.2490					
ST	18777	4.6010			4.6010					
ST	21068	0.9250			0.9250					
TRADING BAY/MCARTHUR RIVER-MID			UNION	MARATHON						
ST	17594	26.6700	13.3350	13.3350						
ST	18729	34.8100	17.4050	17.4050						
ST	18730	32.5900	16.2950	16.2950						
ST	18772	5.9300			5.9300					
TRADING BAY/MCARTHUR RIVER-WES			UNION	MARATHON						
ST	17594	30.2500	15.1250	15.1250						
ST	18729	29.4100	14.7050	14.7050						
ST	18730	33.6200	16.8100	16.8100						
ST	18772	6.7200			6.7200					
TRADING BAY/MCARTHUR RIVER-GRA			UNOCAL	MARATHON						
ST	17594	38.5542	19.2771	19.2771						
ST	18729	27.7108	13.8554	13.8554						
ST	18730	33.7349	16.8675	16.8675						

APPENDIX B
CRUDE OIL ANALYSES

CRUDE OIL ANALYSES - COOK INLET

	WEST SIDE, DRIFT RIVER	EAST SIDE, NIKISKI
CRUDE		
Gravity, °API @ 60 °F	35.3	34.6
Spec.Grav. @ 60 °F	0.8483	0.8519
Kin.Vis. @ 65 °F	6.94	7.34
@ 90 °F	6.77	7.17
@122 °F	3.39	3.55
Sulfur, wt%	0.09	0.10
Nitrogen wt%	0.13	0.14
Carbon wt%	86.83	87.09
Hydrogen wt%	12.81	12.80
Oxygen wt%	0.09	0.15
Sed. and water, vol%	0.05	0.1
Water, by dist., vol%	Nil	0.05
RVP, psi	7.5	7.85
Pour Pt, °F	0	-5
Flash Pt., PMCC, °F	<0	<0
BADGER DISTILLATION		
C5 AND LIGHTER		
Yield, vol%	0.4	0.7
Composition		
Methane	0.02	Traces
Ethane	11.07	7.75
Propane	61.74	59.81
Iso-Butane	11.72	12.46
Normal Butane	13.00	16.83
Iso-Pentane	1.52	2.03
Normal Pentane	0.93	1.12
IBP - 120 °F		
Yield vol%	1.3	2.0
Gravity, API @ 60 °F	X	X
120 - 374 °F		
Yield vol%	31.4	29.5
Gravity, API @ 60 °F	59.3	57.2
374 - 440 °F		
Yield vol%	6.0	6.5
Gravity, API @ 60 °F	40.9	40.6
440 - 610 °F		
Yield vol%	17.6	15.7
Gravity, API @ 60 °F	35.3	35.5
610 + Resid		
Yield vol%	41.3	43.9
Gravity, API @ 60 °F	18.1	18.2
DISTILATION CURVE, VOL, %		
IBP	86	84
2%	131	120
4%	134	130
6%	140	145
8%	150	165
10%	163	195
12%	192	213
14%	211	219
16%	220	239
18%	240	254
20%	257	272
22%	273	292
24%	292	307
26%	309	324
28%	325	341
30%	340	361
32%	361	390
34%	395	420
36%	420	430
38%	430	440
40%	440	460
42%	455	475
44%	475	490
46%	495	510
48%	510	525
50%	525	540
52%	545	555
54%	601	X
56%	607	X

CRUDE OIL ANALYSES - NORTH SLOPE [1]

	SADLEROCHIT	KUPARUK	WEST SAK [2]
CRUDE			
Gravity, °API	26.4	23	22.4
Kin.Vis. @ 60 °F	42.42	cSt 79.98	95.92
Sulfur wt%	1.06	1.76	1.82
Nitrogen, ppm	2090	1980	—
Carbon residue wt%	4.4	7.37	7.62
H2S, lb/1,000 bbl	0.35	<5	—
Salt, lb/1,000 bbl	32.7	—	—
Ni/V, ppm	11/26	19/57	22/61
RVP, psi	3.55	2.6	2.7
Pour Pt, °F	0	-55	-50
Neut. no. (D974)	1.12	—	0.68
C4 AND LIGHTER			
Yield, vol%	1.17	—	0.63
C5 AND LIGHTER			
Yield, vol%	—	2.12	—
C5 - 150 °F			
Yield, vol%	2.2	1.6	1.9
Sulfur, wt%	<0.001	0.006	0.004
RON clear	71.5	—	—
MON clear	69.8	—	—
RON + 0.5g TEL/gal.	78.4	—	—
150 - 380 °F			
Yield, vol%	15.6	14.5	14.4
Sulfur, wt%	0.013	0.018	0.018
Paraffins, vol%	39.7	38.3	36.4
Napthenes, vol%	43.3	47	48.2
Aromatics, vol%	17.0	14.7	15.4
380 - 650 °F			
Yield, vol%	28.6	26.9	27.5
Gravity, API	33.1	—	31.6
Sulfur, wt%	0.414	0.66	0.700
Pour Pt, °F	-25	-25	-35
Cetane No.	45.8	45.4	42.1
N2, total, ppm	79	—	—
Vis. cSt @ 100 °F	—	3.083	3.34
Aromatics, vol%	33.6	30.0	31.4
650 - 840 °F			
Yield, vol%	16.4	18.9	16.6
Gravity, API	23.8	20.5	21.1
Sulfur, wt%	1.10	1.79	1.81
Aniline Pt, °C	74.7	104.3	—
Pour Pt, °F	70	50	60
Kin.Vis. @ 100 °F	—	34.2	43.99
Carbon Residue, %	0.012	wt% 0.01	—
Total Nitrogen, ppm	950	600	840
Basic Nitrogen	0.03	wt% 0.02	0.023
V/Ni, ppm	—	<1	—
650 + RESIDUAL			
Yield, vol%	52.4	56	55.6
Gravity, API	15	11.7	10.8
Sulfur, wt%	1.63	2.59	2.53
Carbon Residue, %	8.82	wt% 12.61	wt% 13.15
Total Nitrogen, ppm	3600	—	—
Pour Pt, °F	80	40	45
Kin.Vis. @ 210 °F	47.54	97.15	135.3
Kin.Vis. @ 275 °F	15.55	—	—
Pentane insoluble, wt%	—	—	14.97

[1] Aalund, L.R., "Guide to Export Crudes for the '80s," Oil and Gas Journal, Dec.19,1983.

[2] Crude not in production, but pilot program is underway in Kuparuk area to determine feasibility. Assay sample obtained during drill stem test and may not be represen of the entire accumulation.

APPENDIX C
DEFINITIONS OF STATUTORY TERMS

AS 38.05.183 states that oil and gas taken in kind as the state's royalty share of production may not be sold or otherwise disposed of for export from the state until the Commissioner of Natural Resources determines that the royalty-in-kind oil or gas is surplus to the present and projected intrastate domestic and industrial needs for oil and gas.

The statute contains several key terms whose meaning must be resolved before an estimate can be made of oil and gas surplus to the state's needs. These key terms are: 1) "oil and gas," 2) "export," 3) "present," 4) "projected," 5) "domestic," 6) "industrial," 7) "intrastate," and 8) "how these needs are to be met." Each key term affects the size of the estimated demand for oil and gas in Alaska and consequently, the size of the projected surplus or deficit. The meaning of each term is discussed below.

Oil and Gas

Crude oil and natural gas are fluids containing hydrocarbon compounds produced from naturally occurring petroleum deposits. Typical crude oil contains several hundred chemical compounds. The lightest of these are gases at normal temperatures and pressure, described as "natural gas." These light fractions of the crude oil stream include both hydrocarbon and non-hydrocarbon gases, such as water, carbon dioxide, hydrogen sulfide, helium, or nitrogen. The principal hydrocarbons are methane (CH_4), ethane (C_2H_6), propane (C_3H_8), butanes (C_4H_{10}), and pentanes (C_5H_{12}). The gaseous component found most often and in largest volumes is, typically, methane. Heavier fractions of the crude stream are usually liquids. If a given hydrocarbon fraction is gaseous at reservoir temperatures and pressures, but is recoverable by condensation (cooling and pressure reduction), absorption, or other means, it is classified by the American Gas Association (AGA) as a natural gas liquid (NGL).[2] Natural gas liquids include ethane if ethane is recovered from the gas stream as a liquid. A related term is liquefied petroleum gas (LPG), composed of hydrocarbons which liquefy under moderate pressure under normal temperatures. LPG usually refers to propane and butane. A second related term is condensate, which refers to LPG plus heavier NGL component (natural gasoline). The lightest hydrocarbon fraction is methane, which is almost never recovered as a liquid, and which makes up the bulk of pipeline gas. If a natural gas stream contains few hydrocarbons which are commercially recoverable as liquids, it is considered "dry gas" or "lean gas." The distinction between "wet" and "dry" is usually a legal one, which varies from state to state. "Crude oil" usually means the non-gaseous portion of the crude oil stream.

Natural gas may occur in reservoirs which are predominately gas-bearing or in reservoirs in which the gas is in contact with petroleum liquids. Non-associated gas is natural gas from a reservoir where the gas is neither in contact with nor dissolved in

2 Definitions vary with processes.

crude oil. Associated gas occurs in contact with crude oil, but is not dissolved in it. A gas cap on a crude oil reservoir is a typical example of associated gas. Dissolved gas is dissolved in petroleum liquids and is produced along with them. Dissolved and associated gases are usually good sources of NGL while non-associated gases are often "dry."

The distinction between natural gas and its NGL components is important to a study of the supply and demand of royalty oil and gas because natural gas liquids have a multitude of uses when separated from the gas stream. For example, propane is both produced in Alaska and sold in Alaska as bottled gas for residential, commercial, and limited transportation uses, while butane is used for blending in gasoline and military jet fuel and as a refinery fuel. In addition, Marathon Oil uses LPG to enrich crude oil at its Trading Bay facility. It ships the combined fluids to the Drift River terminal for export.[3] Potential uses for NGL also include the enriching ("spiking") of pipeline gas and crop drying. Several years ago the Dow-Shell Petrochemical Group and Exxon studied the feasibility of utilizing the NGL contained in Prudhoe Bay natural gas as the basis for an Alaska petrochemicals industry. Since the State has the option of considering NGL separately from the gas stream, two definitions of natural gas consumption and reserves are possible. One of these would consider natural gas liquids as part of the gas stream. The second definition would treat the markets for LPG and ethane separately from those for gas. This requires a separate estimate of LPG consumption and gas liquids reserves. In this report, demand for LPG and ethane is estimated separately from that for gas; however, no separate estimate is made of gas liquids reserves.

Export

Taken in context, this term appears to mean the direct physical sending of oil and gas out of the state. However, when one considers the fact that much of Alaska's industrial use of oil and gas is processed directly for export markets, the meaning of export versus "intrastate" is not so obvious. For example, it appears that processing of gas into another product, e.g., anhydrous ammonia, would probably be an "industrial" use rather than "export" of gas, even though the ammonia is mostly exported. Liquefication to change the phase of the gas is a less obvious case. The liquefication of natural gas is considered a transportation process in this report. Still more troublesome is the use of gas and oil for transportation related to export. Is the gas and oil consumed in TAPS pipeline pump stations, for example, an "industrial" use in state? Or is it really "export" of that energy, since it is consumed in the exporting process? There is no reason why the State may not be approached in the future to commit royalty oil and gas to quasi-export uses. Indeed, a top dollar offer was made by the ALPETCO (later, Alaska Oil Company) for royalty oil ultimately destined (as petrochemical products) for out-of-state markets. Though the offer was made, payments in full were not made. Also, the state once committed royalty gas to the El Paso gas pipeline proposal for export of Prudhoe Bay gas, which involved liquefication. Neither proposal was clearly for in-state

3 Kramer, L., Williams, B., Erickson, G., In-State Use Study for Propane and Butaane. Prepared for tlasa Department of Natural Resources by Kramer Associates, Juneau, October 1981.

industrial use. In this report, industrial demand is treated with multiple definitions as outlined later in the chapter to show how different definitions of "export" affect the estimate of total consumption in Alaska.

Present

The problem here is that the term "present" may mean "latest year" consumption, "average recent year" consumption, "weather-adjusted" consumption, or "worst case" consumption. In the residential and commercial sector particularly, each definition gives a somewhat different answer because of the variability of weather.

The "worst case" consumption calculation can result in considerably higher gas consumption than the most recent year, if the most recent year happens to have been a relatively warm one. While it is not correct forecasting procedure to make long run forecasts of intrastate residential consumption of natural gas which assume worst case forecasts for every year, it may be prudent in practice to reserve part of the the State's gas and oil supply for bad weather. For forecasting, variability of weather makes the picking of a starting value for consumption somewhat tricky. In this report, Rail Belt consumption is based on average weather years. For the remainder of the state, trended per capita consumption is used, which approximates average weather conditions.

Projected

This is a very difficult concept, since many different projections of consumption would be possible even if it were possible to agree on a single concept defining consumption. Rates of economic development, population growth, and relative energy prices are key features of any consumption forecast, but assumptions concerning any of these variables are necessarily controversial. This report describes a range of possible consumption figures under precisely articulated definitions of consumption and varying paces of economic, population, and fuel price growth. The economic and population forecasts used in this report were done by the University of Alaska Institute of Social and Economic Research in December, 1984. The assumptions used to run their economic model are shown in Appendix B.

Domestic

Domestic consumption appears to mean Alaska residential consumption. As we saw above under the subheading "present", it is not at all obvious which definition of domestic consumption is the most appropriate, even when the identity of the customer is not in dispute. Some multifamily residential use may be described as "commercial", obscuring the definition of the customer and causing forecasting problems for natural gas. The definition of "domestic" considered in this report includes multifamily residential in "residential" or "domestic" use.

Industrial

As described above, "industrial" energy use has a number of potential definitions. Since one intent of giving in-state industrial needs priority over export uses of royalty oil and gas seems to be encourage in-state economic activity,[4] a day-to-day

4 However, see the short discussion if legislative intent beginning on page 9 of Kramer, Williams and Erickson, op.cit. That study raises many of the issues regarding surplus gas and oil discussed in this report.

working definition of this industrial priority is that the royalty reserves be committed to the market which has the largest potential economic impact in Alaska. For forecasting purposes, however, it is difficult to say which markets will prove to be of the most economic benefit to the state. As a compromise, we will adopt four alternative definitions of "industrial" in this study.

The four alternative definitions of industrial use of oil and gas used in this report are outlined below, beginning with the most restrictive and moving to the most liberal.

Definition 1: Industrial use consists of any consumption of natural gas, petroleum, or their products in combustion (except that required to export oil or gas); or the chemical transformation of natural gas, petroleum, or their products into refined products for local markets. This definition explicitly excludes the exported products from refineries, as well as uses which merely change the physical form of the product (gas conditioning or liquefaction) for export, or which move the product to an export market (pipeline fuel, fuel used on lease, shrinkage, injection, vented and flared gas).

Definition 2: Industrial use consists of ;any consumption of natural gas, petroleum, or their products in combustion (except in oil and gas production and transportation); or the chemical transformation of natural gas, petroleum, or their products into refined products. This definition counts feedstocks for petrochemical plants and refineries as industrial consumption. It also counts energy consumed by an LNG facility as industrial consumption. It excludes the feedstocks of LNG plants ;and fuel consumption by conditioning plants, pump stations, fuel used on lease, shrinkage, injection and flared gas.

Definition 3: Industrial use consists of any consumption of natural gas, crude oil, or their products in combustion (except in oil and gas transport and extraction) or their chemical transformation into refined products. This definition permits the feedstocks of refineries to be counted as industrial consumption. It excludes fuels used in pump stations, in conditioning plants, fuel used on lease, and gas shrinkage, injection, or venting.

Definition 4: Industrial use consists of any use of natural gas, crude oil, or their products in combustion, or their transformation into chemically different products. This definition permits feedstocks of refineries to be counted as industrial consumption, as well as energy consumption in conditioning plants and pump stations. It excludes injected gas, which is ultimately recoverable for other uses, and LNG processing, which is considered an export. Definition 4 will be used for the purposes of this report.

None of the four definitions treats industrial use (including transportation) to include gas injected to enhance oil recovery, since in theory this gas remains part of the ultimately recoverable gas reserves of the state. Thus, it is not "consumed."

Intrastate

It is unclear what is meant by intrastate consumption. Some uses, such as combustion of oil and gas products in fixed capital facilities in Alaska, are reasonably easy to categorize as intrastate. There are several uses in transportation which are not obviously within Alaska. These categories include the fuel burned in marine vessels such as cargo vessels, ferries, and fishing boats, and fuel burned in international interstate air travel. There are multiple ways to approach the definition of this consumption. The first is a sales definition: the fuel used in transportation which is sold in Alaska. The second approach is to base consumption on fuel used in Alaska or related to Alaska's economy and population, regardless of the point of sale. This results in three logical definitions, described below:

Definition 1: Intrastate consumption in transportation includes all sales of fuels to motor vehicles, airplanes, and vessels in Alaska, including bonded fuels. It excludes fuel consumed by motor vessels which was purchased in other states, and fuel consumed by airlines between Alaska locations unless the fuel was sold in Alaska. It also excludes out of state military fuel purchases.

Definition 2: Intrastate consumption includes fuel consumed by motor vessels, airlines, and vehicles engaged in Alaskan economic activity. It includes use of fuel by American fishing boats in Alaskan waters regardless of where the fuel was purchased, use of fuel purchased in Washington State by Alaska State ferries, and fuel consumed by ships and aircraft involved in Alaska trade. It excludes sales to aircraft on international flights (bonded and unbonded), but includes military out of state purchases.

Definition 3: The final definition is a compromise between the first two. It includes all fuel purchased within the state, plus military uses, but excludes fuel purchased out of state except for military uses.

The basic definition in this report is the third definition. By excluding bonded and exempt jet fuel, the report also approximates Definition 2. Lack of data on out-state purchases by the military makes Definition 1 impractical.

How These Needs Are To Be Met

Any analysis of how the oil and gas needs of the intrastate domestic and industrial sector are to be met could include several sources of supply: state royalty oil and gas, in-state oil and gas reserves under other ownership, probable extensions of proven reserves, and imports of crude oil, petroleum products, and (in theory) natural gas.

APPENDIX D
ALASKA REFINERIES AND TRANSPORTATION FACILITIES

PETROLEUM AND GAS PROCESSING PLANTS

PLANT	UNIT	UNIT CAPACITY	PRODUCT	PRODUCT DESTINATION
Chevron Refinery Nikiski, 1963	Crude	25,000 Bbl/d	Gasoline, unfinished	lower 48
			JP 4	Alaska
			Jet A	Alaska
			Furnice Oil	Alaska
			Diesels	Alaska
			Fuel Oil	lower 48
			Asphalt	Alaska
Mapco Refinery North Pole, 1977	Crude	90,000 Bbl/d	Gasolene, leaded	Fairbanks area, Nenana River villages, Eilson AFB, Delta Junction, Tok, Glenallen and Anchorage area
			Gasoline, unleaded	
			JP 4	
			Jet A	
			Diesel, #1	
			Diesel, #2	
			Diesel, #4	
			Asphalt	
Tesoro Refinery Nikiski, 1969	Crude	80,000 Bbl/d	Propane	Alaska
	Hydrocracker	9,000 Bbl/d	Gasoline, unleaded	Alaska
	PowerFormer	12,000 Bbl/d	Gasoline, regular	Alaska
	PRIP	4,000 Bbl/d	Gasoline, premium	Alaska
	LPG	2,800 Bbl/d	JP 4	Alaska
	Hydrogen	12,800 Mcf/d	Jet A	Alaska
	Sulfur	15 T/d	Diesel, #2	Alaska
			Fuel Oil, #6	lower 48
			Sulfur	lower 48
Petro Star Refinery North Pole, 1985	Crude	6,000 Bbl/d	Kerosine	Alaska north of Alaska Range
			Diesel, #2	
Phillips-Marathon LNG Plant Nikiski, 1969	LNG	230,000 Mcf/d	LNG	Japan: 440,000 Bbl/10 days
Unocal Chemical Nikiski, 1969	Ammonia	1,000,000 T/yr	Anhydrous Ammonia	West Coast and export
	Urea	1,100,000 T/yr	Urea prills, granules	

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SURVEY OF OPERATING REFINERIES IN THE U.S. (State Capacities as of January 1, 1986) [1]

STATE	No. Plants	---Crude Capacity---- b/cd	b/sd	---Charge Capacity (b/sd)--- Vacuum Distil.	Thermal Operations	---Cat Cracking--- Fresh Feed	Recycle	Cat Reforming	Cat Hydro-cracking	Cat Hydro-refining	Cat Hydro-treating	---Production Capacity (b/sd)--- Alkyl-ation	Aromatic Isomer-ization	Lubes	Asphalt	Hydrogen (MMcf/d)	Coke (t/d)
Alabama	2	124,500	128,900	34,000	10,000	---	---	27,000	---	28,000	28,500	---	7,000	---	10500	8.0	400
Alaska	6	203,700	213,157	---	---	---	---	12,000	9,000	---	12,000	---	1,800	---	8000	12.8	---
Arizona	1	5,000	5,263	1,500	---	---	---	---	---	---	---	---	---	---	1000	---	---
Arkansas	4	64,170	67,200	34,425	---	18,500	775	9,000	---	---	18,000	4,400	---	6,100	11500	2.8	---
California	30	2,338,993	2,459,317	1,325,265	493,050	595,500	65,400	524,800	366,000	438,000	826,380	105,100	15,200	26,100	73154	950.9	19,040
Colorado	2	79,500	82,500	28,000	---	23,000	1,500	17,000	---	---	25,500	---	---	---	3300	---	---
Delaware	1	140,000	150,000	95,000	44,000	60,000	15,000	53,000	19,000	---	110,000	8,000	3,370	---	---	40.0	2,180
Florida	1	17,500	19,000	10,000	---	---	---	---	---	---	---	---	---	---	---	---	---
Georga	2	35,000	36,500	---	---	---	---	---	---	---	---	---	---	1,000	26500	---	---
Hawaii	2	109,500	118,426	58,000	---	22,000	---	13,000	16,000	---	16,500	4,500	1,500	---	1300	19.5	---
Illinois	7	914,600	917,000	334,150	132,700	340,000	35,600	292,900	66,500	35,000	478,100	84,600	17,300	5,350	36500	64.3	6,175
Indiana	4	412,200	424,500	230,200	24,000	166,000	6,600	86,500	---	62,000	149,800	29,200	31,000	6,400	43500	---	1,370
Kansas	6	311,700	352,383	101,000	51,000	110,000	9,000	84,600	3,190	40,000	127,100	30,500	13,969	2,500	4000	---	2,070
Kentucky	2	218,900	226,300	90,000	57,600	100,000	---	53,500	---	40,000	130,300	12,000	17,400	8,600	30000	20.0	---
Louisiana	17	2,244,633	2,339,658	880,300	383,300	796,100	42,300	474,500	139,700	248,500	874,600	164,400	56,200	35,900	55500	162.6	13,558
Michigan	4	118,100	125,094	26,000	---	45,000	1,300	33,000	---	12,500	36,700	8,200	---	---	8650	---	---
Minnesota	2	222,143	229,220	132,000	48,000	78,000	1,000	39,000	---	86,500	114,200	14,400	8,000	---	49000	20.0	2,500
Mississippi	5	362,300	383,104	287,000	70,000	74,000	7,400	95,800	68,000	189,000	59,800	19,700	5,500	2,000	40600	215.0	3,450
Montana	5	142,800	149,200	55,250	9,900	50,600	7,700	37,700	4,900	14,000	103,400	10,700	5,400	---	15500	19.3	425
Nevada	1	4,500	4,700	2,500	---	---	---	---	---	---	---	---	---	---	---	---	---
New Jersey	6	415,000	441,368	235,400	34,500	251,000	37,000	86,500	---	65,500	250,500	21,000	41,000	8,500	73000	11.0	975
New Mexico	3	66,375	69,500	6,000	---	27,400	2,375	17,300	---	---	29,600	3,200	---	---	3500	---	---
North Dakota	2	62,800	65,400	---	---	26,000	5,200	12,000	---	1,200	16,200	3,000	4,000	---	---	---	---
Ohio	5	515,700	540,000	174,000	27,400	190,700	36,800	159,700	83,000	23,000	167,500	31,300	58,400	2,100	19000	72.0	1,250
Oklahoma	5	374,000	390,131	131,500	27,800	133,500	12,400	97,000	5,000	26,000	133,000	34,900	12,000	9,500	18300	10.0	1,040
Oregon	1	15,000	15,789	16,000	---	---	---	---	---	---	---	---	---	---	11500	---	---
Pennsylvania	8	712,900	747,300	329,250	---	264,300	12,300	205,200	55,000	61,000	414,853	43,200	10,600	20,700	33000	43.5	---
Tennessee	1	57,000	60,000	12,000	---	30,000	---	8,000	---	---	28,200	3,000	---	---	3500	---	---
Texas	31	4,132,700	4,372,100	1,759,700	342,500	1,587,000	203,050	1,046,800	254,000	775,000	2,155,050	257,700	263,915	94,100	68800	609.0	10,717
Utah	6	153,875	160,368	45,550	8,500	55,300	9,300	27,500	---	5,500	32,100	11,700	3,750	---	1700	---	350
Virginia	1	51,000	53,000	29,000	13,500	27,500	2,000	8,750	---	---	24,500	---	---	---	---	---	825
Washington	7	429,850	447,543	219,254	61,000	91,500	23,000	107,800	50,000	25,000	160,500	24,600	2,900	---	19000	80.0	3,080
West Virginia	2	16,500	17,000	8,175	---	---	---	4,400	---	---	4,800	---	---	5,000	---	1.2	---
Wisconsin	1	32,000	34,000	20,500	---	9,700	1,000	8,000	---	5,800	9,000	1,700	---	---	13500	---	---
Wyoming	6	153,775	159,000	63,000	9,000	61,500	9,700	30,750	---	10,000	56,100	9,250	1,500	1,500	8700	---	550
Total		15,258,214	16,003,921	6,773,919	1,847,750	5,234,100	547,700	3,673,000	1,139,290	2,191,500	6,592,783	940,250	581,704	235,350	692,004	2,362	69,955
ALASKA																	
ARCO, Kuparuk		12,000	12,000	---	---	---	---	---	---	---	---	---	---	---	---	---	---
ARCO, Prudhoe Bay		22,000	22,000	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Chevron, Kenai		22,000	NR	---	---	---	---	---	---	---	---	---	---	---	6,000	---	---
Mapco, North Pole		70,000	70,000	---	---	---	---	---	---	---	---	---	1,800	---	2,000	---	---
Petro Star, North Pole		NR	6,000	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Tesoro, Kenai		72,000	80,000	---	---	---	---	12,000	9,000	---	12,000	---	---	---	---	12.8	---
Total		203,700	213,157	0	0	0	0	12,000	9,000	0	12,000	0	1,800	0	8,000	12.8	0

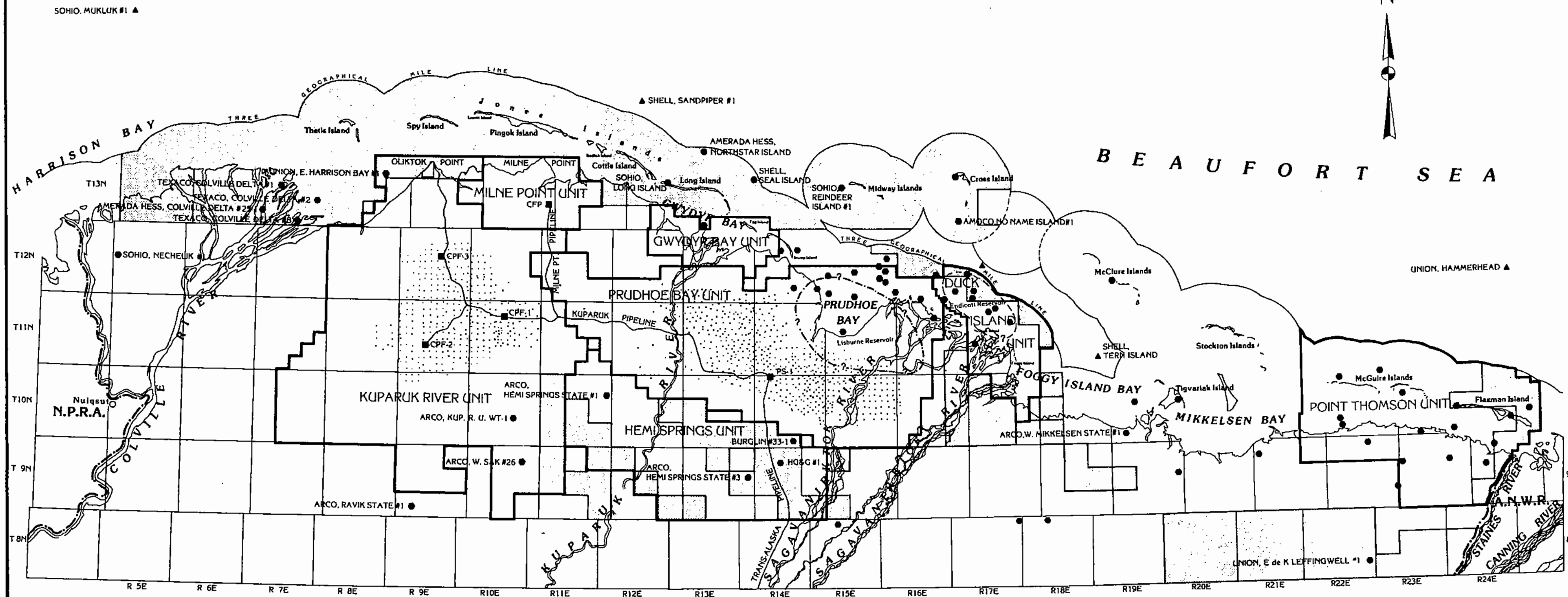
[1] Source: Oil & Gas Journal, 1986.

APPENDIX E
OIL AND GAS FIELD MAPS

NORTH SLOPE UNIT MAP

ALASKA DEPARTMENT OF NATURAL RESOURCES, DIVISION OF OIL AND GAS

JAMES E. EASON, DIRECTOR   COMPILED BY O.D. SMITH, CARTOGRAPHER

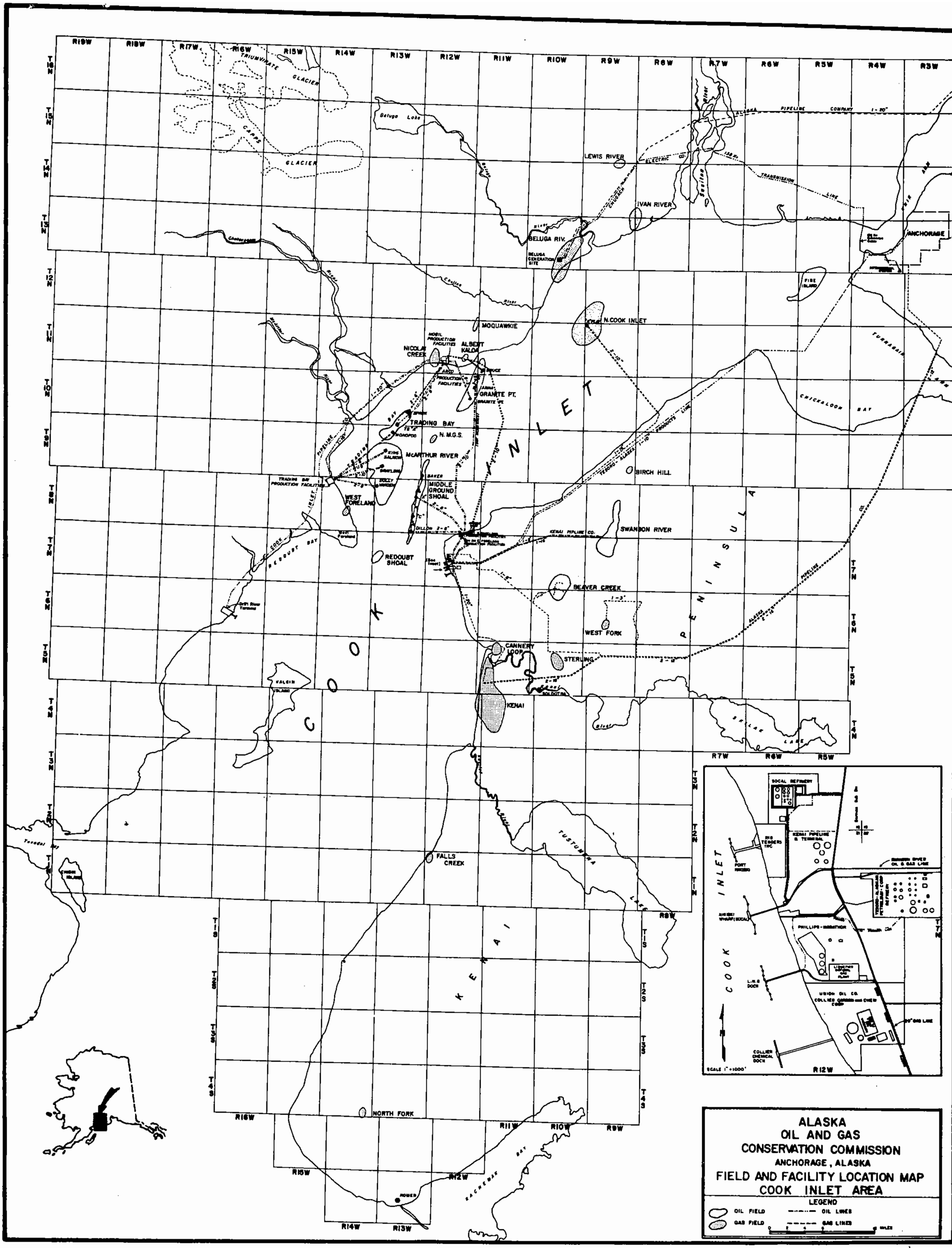


EXPLANATION

Pump Station #1	PS-1	Net Profit Share Leases	
Central Production Facility	CPF	Central Facilities Pad	CFP
Selected State Exploratory Wells	●	Selected Federal Exploratory Wells	▲
Approximate limits of the Endicott Reservoir	-- ? ---- ? --	Approximate limits of the Lisburne Reservoir	--?--·--·--?--·--
Development Oil Wells		Oil and Gas Unit Boundaries	

BASE MAP: Transposed From U.T.M. Projection By U.S.G.S., Original Scale 1:250,000, All Townships - Umiat Meridian.

10/87


ALASKA
OIL AND GAS
CONSERVATION COMMISSION
ANCHORAGE, ALASKA
FIELD AND FACILITY LOCATION MAP
COOK INLET AREA
LEGEND
OIL FIELD
GAS FIELD
OIL LINES
GAS LINES
COOK INLET
KENAI PENINSULA
ANCHORAGE
FIRE ISLAND
LEWIS RIVER
IVAN RIVER
BELUGA RIV.
N. COOK INLET
MOQUAWKIE
NICOLAI CREEK
ALBERT KALOA
GRANITE PT.
TRADING BAY
N. M.G.S.
McARTHUR RIVER
BIRCH HILL
MIDDLE GROUND SHOAL
WEST FORELAND
SWANSON RIVER
REDOUBT SHOAL
BEAVER CREEK
WEST FORK
CANNERY LOOP
STERLING
KENAI
SOLDOTNA
FALLS CREEK
NORTH FORK
HOMER
KALGIN ISLAND
TRIUMVIRATE GLACIER
CAPPS GLACIER
Beluga Lake
CHICKALOON BAY
TURNAGAIN ARM
REDOUBT BAY
TUSTUMENA LAKE
SKILAK LAKE
KACHEMAK BAY
ALASKA PIPELINE COMPANY
KENAI PIPELINE CO.
SOCAL REFINERY
KENAI PIPELINE & TERMINAL
PHILLIPS-MARATHON
UNION OIL CO. COLLIER CARBON and CHEM. CORP.
COLLIER CHEMICAL DOCK
L.N.G. DOCK
SCALE 1" = 1000'
R12W

APPENDIX F
ACKNOWLEDGEMENTS

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