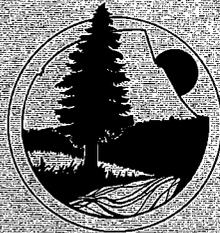


# HISTORICAL AND PROJECTED OIL AND GAS CONSUMPTION

JANUARY 1986



Alaska Department of

**NATURAL  
RESOURCES**  
DIVISION OF OIL & GAS

**STATE OF ALASKA**

**HISTORICAL AND PROJECTED  
OIL AND GAS CONSUMPTION**

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Governor**

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Commissioner  
Department of Natural Resources**

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Fourteenth Alaska Legislature**

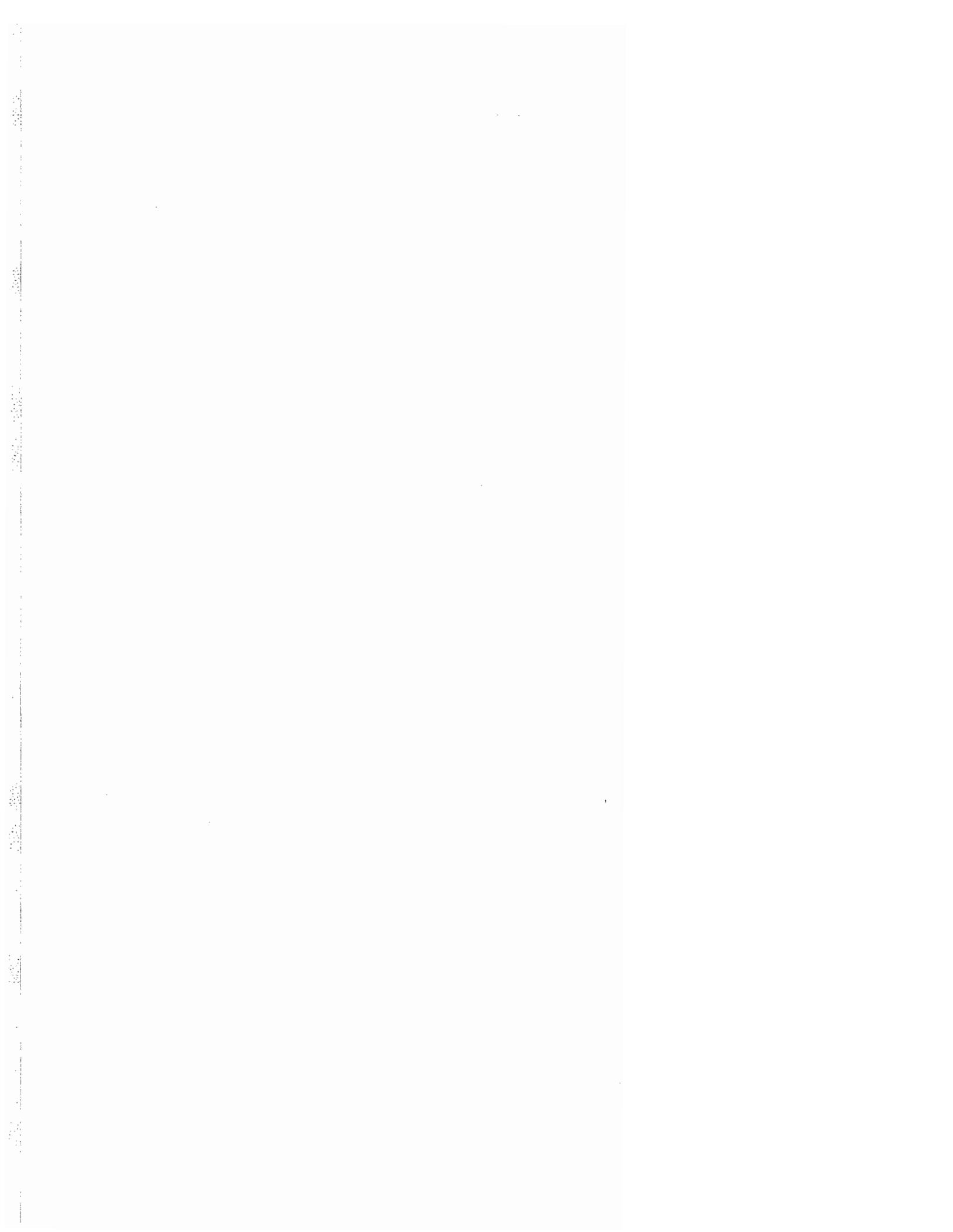


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## EXECUTIVE SUMMARY

This report compares estimates of how much oil and gas Alaska has in reserves with estimates of how much oil and gas Alaska will consume in the 15 years between 1986 and 2000. The 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."<sup>1</sup>

Chapter 1 describes the state's royalty oil program, cites sources of past oil and gas disposals, reviews disposals made during 1985 and outlines the disposals proposed for 1986.

High, mid and low estimates of oil and gas reserves, and their respective royalty shares, are given in Chapter 2. 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. These more modest figures, therefore, are prudent values for long range policy considerations. The mid range oil estimate is 9.5 billion barrels of oil, yielding a 1.2 billion barrel state royalty share. Of this royalty share, 98.7% is on the North Slope. The mid range estimate of gas is 40.8 trillion cubic feet. The state's share of this gas is 4.9 trillion cubic feet. Again, 92.7% of the gas is on the North Slope.

Production estimates of reserves are also given for the 15 year period. North Slope oil production will peak at about 1.9 million barrels per day in 1987, and will then decline to about 700,000 barrels per day by 2000. Cumulative state oil production is expected to be about 6.9 billion barrels. By then, Cook Inlet production will continue to be comparatively modest.

Chapter 3 presents historical data on production and consumption of Alaska oil and gas. Between 1978 and 1985, oil fuel consumption grew 8.9% per year to a total of 1.4 billion gallons in 1985, while in the same period gas consumption grew 3.3% to 217 billion cubic feet in 1985. These figures are the starting points for the consumption projections detailed in Chapter 4.

Chapter 4 presents forecasts of oil and gas consumption from 1986 to 2000. Alaska will consume about 26 billion gallons of fuels and 3.7 trillion cubic feet of gas during that period. Consumption growth rates will be considerably lower than they have been until now; it is estimated that during the period, annual growth will be 1.9% for oil and 1.3% for gas. The methods and assumptions used in generating the forecasts are included.

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<sup>1</sup> See Appendix E for discussion of statutory definitions.

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

The supply and demand projections used in this report are uncertain estimates by nature, and should be viewed as likely outcomes. They are applicable only if the underlying assumptions presented here are approximated by future events. For example, in-state consumption will be influenced by economic and population growth which in turn will be fueled by world energy and natural resource prices. Development of the Susitna hydroelectric project would dramatically affect the in-state demand for natural gas, particularly after the late 1990s. The potential growth of a natural gas export market would similarly affect in-state natural gas availability as well as prices.

The supply side of the in-state balancing equation also is probabilistic. The mid-range estimates of oil and gas resources (9.5 billion barrels, 40.8 trillion cubic feet) are reasonably certain. However, development of a system for natural gas from the North Slope remains uncertain. Estimates of undiscovered resources must be treated as highly speculative and of minimal value for planning or projection purposes. Even if these undiscovered resources exist (which they may not), there is no guarantee that they will be discovered or developed in an appropriate time-frame (if ever) to assure long-run continuous hydrocarbon supplies. Fiscal resources devoted to the hydrocarbon discovery and development process by the major oil firms will be largely determined by world market conditions, not by surplus or deficit conditions in Alaska's relatively small intrastate market.

In summary, under reasonable assumptions about in-state reserves and consumption, not only is the current inventory of hydrocarbon reserves more than adequate to meet the estimated demands of Alaskans for the next 15 years, but significant quantities of hydrocarbons are surplus to requirements and therefore are available for export from the state.

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 the 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 is currently receiving royalty payments from oil and gas production in Cook Inlet and on the North Slope.

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, or in money, individual lessees market the state's share of production and reimburse the state accordingly.

The history of the state's royalty in-kind disposals to January 1, 1983 may be found in the department's Review of Alaska Royalty Oil of that date. The long term negotiated royalty in-kind disposals to Chevron U.S.A., Inc. and Tesoro Alaska Petroleum Company of December 9, 1983, and to the Golden Valley Electric Association (GVEA) of February 8, 1985 were reviewed in the 1985 Historical and Projected Oil and Gas Consumption report (Supply/Demand study). The delivery of ANS royalty oil to Chevron and Tesoro began in May 1984 and October 1985, respectively. GVEA began taking ANS royalty oil under its new contract in July 1985. The 1985 Supply/Demand study also addressed the termination of the Tesoro Cook Inlet royalty oil contract in October 1985, at which time the state began receiving Cook Inlet royalty oil in value, as well as the competitive royalty oil sale of December 1984 and its attendant contingent backup disposals.

One royalty in-kind disposal in addition to the GVEA royalty oil disposal occurred in 1985. This was the disposal resulting from the department's April 18, 1985 solicitation to sell 15,000 bpd of Kuparuk royalty oil. The contract term of six months called for delivery of Kuparuk royalty oil upon the October 1, 1985 expiration of the six-month competitive contracts resulting from the 1984 competitive sale. The termination of the royalty oil contracts resulting from the solicitation of April 18, 1985 will coincide with the April 1, 1986 termination of all outstanding competitive royalty oil contracts.

At this time North Slope royalty oil is taken both in-value and in-kind. Three in state refiners, Chevron, Tesoro, and MAPCO Petroleum, Inc., hold long term negotiated contracts with the state for the purchase of Prudhoe Bay royalty oil taken in-kind. Tables 2.2A and 2.2B depict estimated total North Slope production to 2012 and current North Slope royalty oil sales. In addition to the three in-state refineries mentioned above, these sales include the GVEA disposal, the one year competitive royalty contracts resulting from the 1984 competitive sale, and the six-month Kuparuk River Unit royalty contracts resulting from the solicitation of April 18, 1985.

On September 16, 1985 the department issued a document entitled Analysis and Recommendations for Disposition of State Royalty Oil (Analysis). The Analysis reviewed the state's December 1984 competitive sale and the solicitation of April 18, 1985, and evaluated negotiated royalty oil disposal options resulting from the department's Solicitation for Proposal(s) to Purchase Prudhoe Bay and/or Kuparuk River Unit Royalty Oil of April 1, 1985 (Solicitation). After considering comments from the Royalty Oil and Gas Development Advisory Board, legislators and many members of the public, the Commissioner of Natural Resources determined that the state's interests would be best served by a negotiated long term sale to Petro Star, Inc. (Petro Star) and Chevron, and additional short term competitive sales. That policy was implemented through the department's Final Findings and Determination to Sell Kuparuk River Unit Royalty Oil to Petro Star, Inc. and Chevron U.S.A., Inc. of December 9, 1985 and the Final Findings and Determination to Conduct a Competitive Sale of Prudhoe Bay Royalty Oil of December 13, 1985.

Under the proposed contract with Petro Star and Chevron, the department intends to sell approximately 6,500 barrels per day of royalty oil from the Kuparuk River Unit. Of this volume, a maximum of 2,500 barrels per day will be sold to Petro Star and about 4,000 barrels per day will be sold to Chevron, with both sales occurring under a single long-term noncompetitive contract. The volume to be sold is expressed as a percentage of unit production. Owing to its long-term nature, the Petro Star/Chevron royalty oil contract requires legislative approval. The department also intends to hold a short-term competitive royalty oil sale on February 4, 1986 for 9.6 percent (approximately 18,000 barrels per day) of state royalty oil from the Prudhoe Bay Unit. Since the term (six-months) of these competitive contracts is less than one year, legislative approval is not required for this disposal.

The terms and conditions of the above planned disposals may be found in the final findings and determination documents referenced above. Such decision documents have accompanied all of the state's previous royalty in-kind disposals and likewise describe the terms and conditions of those disposals.

During 1986, several amendments to Tables 2.2A and 2.2B may be expected as a result of 1) the termination of the competitive contracts issued for the competitive sale of December 1984, 2) the termination of the Kuparuk River Unit royalty oil contracts resulting from the solicitation of April 18, 1985, and 3) the two new disposals mentioned above, which are expected to take effect in 1986.

As mentioned, the state began taking all Cook Inlet Royalty oil in-value on October 1, 1985. The department's decision to convert Cook Inlet royalty in-kind to royalty in-value was based on the state's desire to have Cook Inlet royalty oil available for foreign export. Following the federal administration's October 28, 1985 announcement of its intention to permit the export of oil produced in Cook Inlet, the department issued the Cook Inlet Royalty Oil Export Sale Comment Document on November 25, 1985 (Comment Document). The Comment Document outlined the department's tentative schedule and terms for a proposed competitive sale of approximately 4,000 bpd of royalty oil gathered on the west shore of Cook Inlet for export to and refining in Japan. The department's desire to negotiate a "backup" or contingent royalty oil contract to facilitate the competitive royalty oil sale was also outlined in the Comment Document.

Pursuant to the department's intent, the Preliminary Findings and Decision for West Side Cook Inlet Royalty Oil Solicitation for Backup Contract was published on December 20, 1985. That preliminary finding addresses the solicitation for a negotiated backup purchase of the west side Cook Inlet royalty oil proposed for competitive sale and export to Japan. The primary purposes of the proposed backup contract are 1) to insure that the state will have a responsible purchaser for the royalty oil nominated for in-kind disposal for the competitive export sale, and 2) to allow the department to reduce the lag time between the sale and delivery of royalty oil. The selection of a backup purchaser and the publication of a final finding is expected soon after the close of the comment period, which is January 20, 1986.

The execution of a backup contract and subsequent six-month notice to commence taking west side Cook Inlet royalty oil in-kind (to enable near term delivery for the proposed competitive export sale) is predicated on the planned actions of the federal government, which are subject to postponement. Nevertheless, the department expects that the present in-value status of Cook Inlet royalty oil will change in 1986 as a result of the anticipated backup royalty oil contract and the planned competitive Cook Inlet royalty export sale.



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. 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 less satisfactory than predicted reservoir performance. The high estimates assume rising oil and gas prices and better than expected reservoir performance. The mid case estimates assume stable oil and gas prices and average 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, the North Slope and the "undiscovered" category, as different sources of information were drawn upon for each category.

### Cook Inlet

Considerable historical and subsurface information is available about the oil and gas reserves 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, 1.3% of the mid, and 0.9% of the high estimates of statewide total proven and probable 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 in the Prudhoe Bay Unit and the Kuparuk River reservoir in the Kuparuk River Unit and the Kuparuk River Formation in the Milne Point Unit. Full scale production from the Lisburne Reservoir is expected to commence in 1986 and production from the Endicott field in the Duck Island Unit is expected to commence in 1988. There also are some pilot production programs underway in the Lisburne reservoir and in the shallow Cretaceous sands. Additional enhanced oil recovery operations at Prudhoe Bay Unit, over and above what is already planned, recovery of gas condensate and natural gas liquids from the Sadlerochit and Lisburne gas caps and enhanced oil recovery from the Lisburne reservoir represent an oil resource (versus oil reserves) of about two billion additional barrels of liquids that may, or may not, be economically recoverable some time in the future. Enhanced oil recovery operations are extremely sensitive to capital costs and well head prices. Recovery of liquids from the Sadlerochit and Lisburne gas caps (and absent gas sales, concomitant reinjection of the dry gas back into the reservoirs) would require additional investment by the respective gas cap owners. The possibility for conversion of any of the above mentioned resources to the proven reserves category and the timing of that conversion must be view as speculative at this time.

Various lease holders on the North Slope continue to experiment with techniques to economically produce the vast amounts of oil held in the shallow Tertiary and Cretaceous age sands located west of Prudhoe Bay. Technology and equipment already exists to produce these types of deposits in more temperate climates. However, permafrost considerations, surface-related construction and operating constraints, and the projected well head price of the produced oil to date have combined to stymie any commercial development of these relatively shallow (but large) reservoirs. Pilot production projects and laboratory testing continue in an effort to improve project economics.

Tables 2.2A and 2.2B lists 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 until 1987, then begin to decline in 1988.

Currently, no gas is exported from the North Slope. The Alaska Natural Gas Transportation System for carrying gas to the Lower 48 is targeted for completion in the early 1990's at the earliest, but it is uncertain when construction of the line will actually commence. The proposed pipeline capacity will permit exports in the range of 2.0 to 2.4 billion cubic feet per day, with an expected level of 2.0 billion cubic feet per day. Alternative marketing of North Slope natural gas is being considered, but these prospects are also very uncertain at this time.

#### Undiscovered Resources

Estimates of undiscovered oil and gas resources in Alaska are discussed here for the reader's information only and have not been used in the forecasts developed in this report. The United States Minerals Management Service (MMS) estimates the quantities of conventionally producible reserves based upon both public and confidential information to which it has access. At the 95% confidence level, the mean MMS estimates of undiscovered resources are 3.3 billion barrels of oil and 13.8 trillion cubic feet of gas.<sup>1</sup> National Petroleum Council (NPC) resources estimates require yields on investment of greater than 10% for oil and gas and 15% for oil alone before a field is considered "commercial." With these thresholds in mind, NPC estimates that 17.8 billion barrels of undiscovered oil and 10.1 trillion cubic feet of undiscovered gas could be produced commercially.<sup>2</sup> A majority of the oil and gas resources identified by the MMS and the NPC are likely to be found on federal and private lands.

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<sup>1</sup> Minerals Management Service, "Estimates of Undiscovered, Economically Recoverable Oil and Gas Resources for the Outer Continental Shelf as of July 1984," OCS Report, MMS 85-0012, 1985.

<sup>2</sup> "'NPC' Sees Big US-Arctic Resources," Oil and Gas Journal, November 23, 1981.

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		
	LOW	MID	HIGH	LOW	MID	HIGH	LOW	MID	HIGH	LOW	MID	HIGH
<b>COOK INLET [1]</b>												
Beaver Creek	1	1	1	--	--	--	230	230	230 [2]	--	--	--
Beluga River	--	--	--	--	--	--	800	800	800 [2]	60	60	60
Birch Hill	--	--	--	--	--	--	11	11	11	--	--	--
Cannery Loop	--	--	--	--	--	--	300	300	300 [2]	9	9	9
Falls Creek	--	--	--	--	--	--	13	13	13	--	--	--
Granite Point	25	25	25	3	3	3	18	18	18	2	2	2
Ivan River, Lewis River, Pretty Creek and Stump Lake	--	--	--	--	--	--	600	600	600 [2]	75	75	75
Kenai	--	--	--	--	--	--	850	850	850 [2]	17	17	17
McArthur River	58	58	58	7	7	7	650	650	650 [2][3]	81	81	81
Middle Ground Shoal	14	14	14	2	2	2	9	9	9	1	1	1
Nicolai Creek	--	--	--	--	--	--	3	3	3	--	--	--
North Cook Inlet	--	--	--	--	--	--	859	859	859 [2]	107	107	107
North Fork	--	--	--	--	--	--	12	12	12	--	--	--
Sterling	--	--	--	--	--	--	23	23	23	0	0	0
Swanson River	22	22	22	--	--	--	260	260	260 [2]	0	0	0
Trading Bay	3	3	3	<1	<1	<1	[3]	[3]	[3]	[3]	[3]	[3]
West Foreland	--	--	--	--	--	--	20	20	20	3	3	3
West Fork	--	--	--	--	--	--	6	6	6	--	--	--
<b>SUBTOTAL</b>	<b>123</b>	<b>123</b>	<b>123</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>4,664</b>	<b>4,664</b>	<b>4,664</b>	<b>356</b>	<b>356</b>	<b>356</b>
<b>NORTH SLOPE [2]</b>												
Beaufort Sea	0	300	--	0	45	0	--	--	--	--	--	--
Endicott	275	375	450	34	47	56	600	800	1,200	75	100	150
Gwydyr Bay Area	0	30	60	0	4	8	--	--	--	--	--	--
Kuparuk River Unit	820	1,070	1,320	103	134	165	135	220	260	17	28	33
Lisburne reservoir	300	400	600	38	50	75	800	1,100	1,600	100	138	200
Milne Point Area	40	60	100	7	11	18	--	--	--	--	--	--
Point Thomson Area and Flaxman Island Area [4]	300	350	600	38	44	75	3,200	5,000	6,000	400	625	750
Prudhoe Bay Unit	5,000	6,055	7,150	625	757	894	29,000	29,000	29,000	3,625	3,625	3,625
Shallow Cretaceous Sands	0	750	3,000	0	94	375	--	--	--	--	--	--
<b>SUBTOTAL</b>	<b>6,735</b>	<b>9,390</b>	<b>13,280</b>	<b>844</b>	<b>1,185</b>	<b>1,666</b>	<b>33,735</b>	<b>36,120</b>	<b>38,060</b>	<b>4,217</b>	<b>4,515</b>	<b>4,758</b>
<b>STATE TOTAL</b>	<b>6,858</b>	<b>9,513</b>	<b>13,403</b>	<b>856</b>	<b>1,197</b>	<b>1,678</b>	<b>38,399</b>	<b>40,784</b>	<b>42,724</b>	<b>4,573</b>	<b>4,871</b>	<b>5,114</b>

[1] As of 12/84, except where noted as [2]. Alaska Oil and Gas Conservation Commission, "1984 Statistical Report."

[2] As of 9/85. Estimates by Van Dyke, W..

[3] McArthur River gas reserves include Trading Bay field gas reserves.

[4] Oil and gas condensate.

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# PREDICTED STATE PRODUCTION

(DO&G, 12/85)

FIGURE 2.1

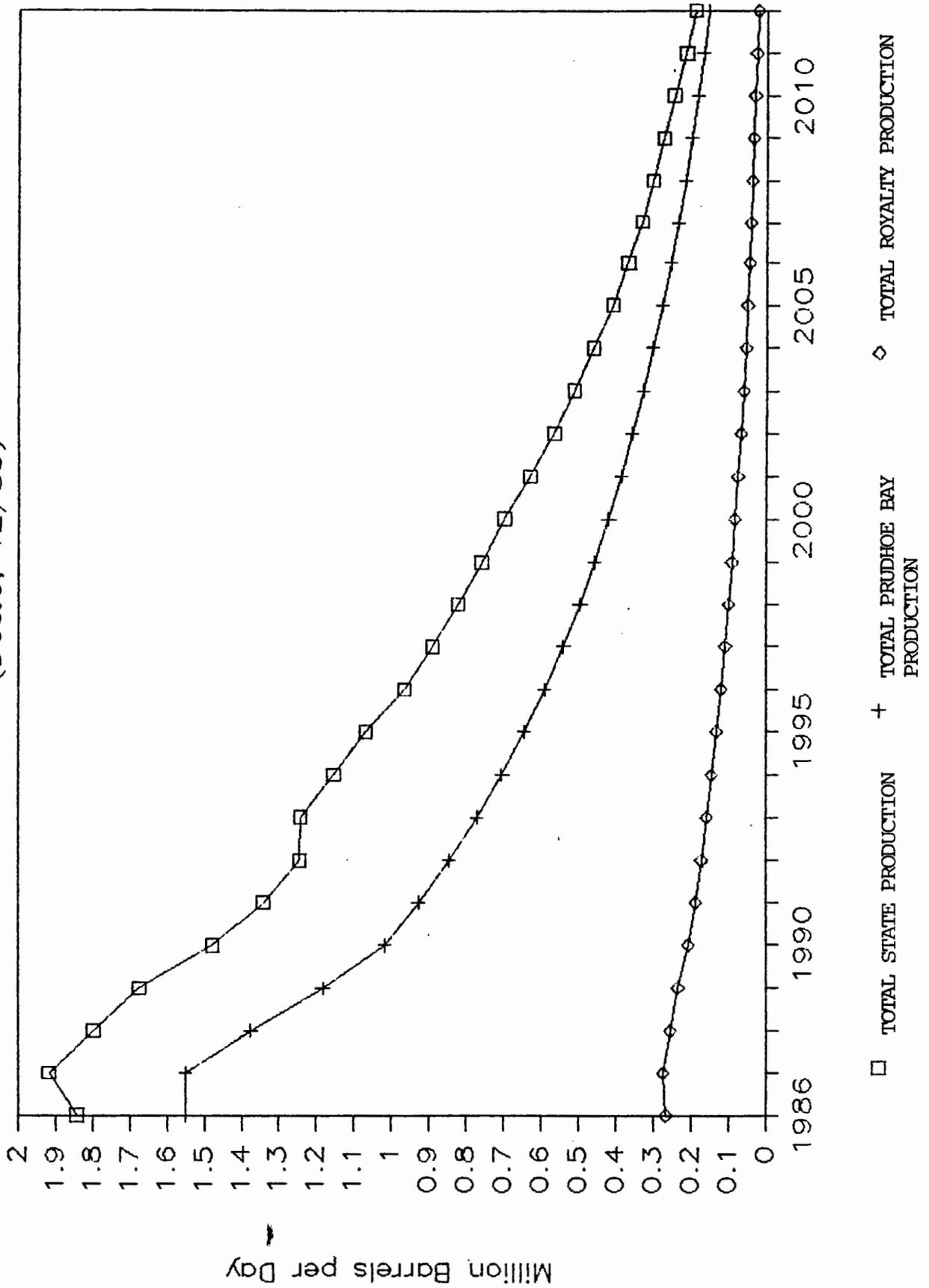


TABLE 2.2A

ESTIMATED AVAILABILITY OF OIL FOR SALE (Thousand Barrels/Day)

PRODUCTION	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	SUM (MMbbl)
North Slope																												
Prudhoe Bay	1,550	1,550	1,376	1,183	1,018	928	846	772	706	646	591	541	498	458	421	387	357	328	302	278	255	235	216	199	183	168	155	5,873,635
Kuparuk	220	220	220	220	187	159	135	122	109	98	89	80	72	65	58	52	47	42	38	34	31	28	25	20	15	10	0	874,940
Lisburne	0	50	60	70	80	100	100	100	100	90	80	72	65	58	52	47	42	38	34	31	28	25	20	15	10	0	0	495,305
Endicott	0	0	50	100	100	100	100	85	75	70	65	60	55	50	45	40	20	10	0	0	0	0	0	0	0	0	0	374,125
Milne Point	30	30	30	25	20	15	15	10	10	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71,175
Other	0	0	0	20	20	20	20	155	155	155	140	128	123	118	112	105	100	95	88	67	56	44	42	40	38	37	35	698,245
Cook Inlet																												
Granite Point	7,288	6,560	5,904	5,312	4,784																							10,895
McArthur River	22,872	19,048	15,888	13,272	11,104																							29,997
Trading Bay	1,864	1,464	1,184	0,984	0,832																							2,310
Middle Ground Shoal	7,184	6,216	5,376	4,656	4,032																							10,024
NGL	3,360	3,360	3,360	3,360	3,360																							6,132
<b>SUBTOTAL-NORTH SLOPE</b>	<b>1,800</b>	<b>1,850</b>	<b>1,736</b>	<b>1,618</b>	<b>1,423</b>	<b>1,312</b>	<b>1,216</b>	<b>1,244</b>	<b>1,155</b>	<b>1,069</b>	<b>965</b>	<b>881</b>	<b>813</b>	<b>749</b>	<b>688</b>	<b>631</b>	<b>566</b>	<b>513</b>	<b>462</b>	<b>410</b>	<b>370</b>	<b>332</b>	<b>303</b>	<b>274</b>	<b>246</b>	<b>215</b>	<b>190</b>	<b>8,407,045</b>
<b>SUBTOTAL-COOK INLET</b>	<b>42,568</b>	<b>36,648</b>	<b>31,712</b>	<b>27,584</b>	<b>24,112</b>																							<b>59,358</b>
<b>TOTAL</b>	<b>1,843</b>	<b>1,887</b>	<b>1,768</b>	<b>1,646</b>	<b>1,449</b>	<b>1,312</b>	<b>1,216</b>	<b>1,244</b>	<b>1,155</b>	<b>1,069</b>	<b>965</b>	<b>881</b>	<b>813</b>	<b>749</b>	<b>688</b>	<b>631</b>	<b>566</b>	<b>513</b>	<b>462</b>	<b>410</b>	<b>370</b>	<b>332</b>	<b>303</b>	<b>274</b>	<b>246</b>	<b>215</b>	<b>190</b>	<b>8,466,403</b>
<b>ROYALTY OIL FOR SALE</b>																												
North Slope																												
Prudhoe Bay (1)	194	194	172	148	127	116	106	97	88	81	74	68	62	57	53	48	45	41	38	35	32	29	27	25	23	21	19	736,707
Kuparuk (1)	28	28	28	28	23	20	17	15	14	12	11	10	9	8	7	6	5	4	4	4	4	4	3	3	2	1	0	109,318
Lisburne (1)	0	6	8	9	10	11	13	13	13	11	10	9	8	7	6	5	4	4	4	4	4	3	3	2	1	0	0	61,913
Endicott (2)	0	0	7	14	14	14	14	12	11	10	9	8	8	7	6	6	3	1	0	0	0	0	0	0	0	0	0	52,378
Milne Point (3)	5	5	5	5	4	3	3	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12,812
Other (1)	0	0	0	3	3	3	3	23	23	23	20	19	18	17	16	15	14	13	12	9	7	6	5	5	5	5	4	98,596
Cook Inlet																												
Granite Point	0,911	0,820	0,738	0,664	0,598																							1,362
McArthur River	2,859	2,381	1,986	1,659	1,388																							3,730
Trading Bay	0,233	0,183	0,148	0,123	0,104																							289
Middle Ground Shoal	0,898	0,777	0,672	0,582	0,504																							1,233
NGL	0,420	0,420	0,420	0,420	0,420																							767
<b>SUBTOTAL-NORTH SLOPE</b>	<b>227</b>	<b>233</b>	<b>219</b>	<b>205</b>	<b>181</b>	<b>166</b>	<b>154</b>	<b>161</b>	<b>150</b>	<b>139</b>	<b>125</b>	<b>114</b>	<b>105</b>	<b>97</b>	<b>89</b>	<b>81</b>	<b>73</b>	<b>66</b>	<b>59</b>	<b>52</b>	<b>47</b>	<b>42</b>	<b>38</b>	<b>34</b>	<b>31</b>	<b>27</b>	<b>24</b>	<b>1,071,722</b>
<b>SUBTOTAL-COOK INLET</b>	<b>5,321</b>	<b>4,581</b>	<b>3,964</b>	<b>3,448</b>	<b>3,014</b>																							<b>7,420</b>
<b>TOTAL</b>	<b>232</b>	<b>237</b>	<b>223</b>	<b>209</b>	<b>184</b>	<b>166</b>	<b>154</b>	<b>161</b>	<b>150</b>	<b>139</b>	<b>125</b>	<b>114</b>	<b>105</b>	<b>97</b>	<b>89</b>	<b>81</b>	<b>73</b>	<b>66</b>	<b>59</b>	<b>52</b>	<b>47</b>	<b>42</b>	<b>38</b>	<b>34</b>	<b>31</b>	<b>27</b>	<b>24</b>	<b>1,079,142</b>
<b>ROYALTY OIL SALES</b>																												
Magma	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	229,950
GVEA (4)	5	5	5	4	3	3	3	3	2																			12,082
Tesoro (Old) (5)	48	48	42	36	31	28	26	24	22																			111,137
(New) (6)	27	27	24	20	18	16	15	13	12																			62,787
Chevron (7)	19	19	17	14	12	11	10	9	8																			43,489
Competitive Sale (8)	65	7	7	7	6	5	4	3	3	3																		18,615
Petrostar (9)	6	7	7	7	6	5	4	3	3																			6,570
Competitive Sale (10)	18																											501,785
<b>TOTAL</b>	<b>204</b>	<b>140</b>	<b>129</b>	<b>117</b>	<b>105</b>	<b>99</b>	<b>93</b>	<b>87</b>	<b>83</b>	<b>38</b>	<b>35</b>	<b>577,357</b>																
<b>ROYALTY OIL IN VALUE (Potential)</b>																												
28	97	94	92	78	68	68	62	74	67	101	90	79	70	62	54	46	38	31	59	52	47	42	38	34	31	27	24	577,357

Note: numbers may not sum to totals due to rounding errors.

(1) 12.5% of production.

(2) 14.0% of production (weighted average).

(3) 18.0% of production (weighted average).

(4) 2.667% of Prudhoe Bay production.

(5) 24.533% of Prudhoe Bay production.

(6) 13.86% of Prudhoe Bay production.

(7) 9.6% of Prudhoe Bay production.

(8) One year sale of 50,000 BPD from Prudhoe and 15,000 BPD from Kuparuk, due to end March 31, 1986.

(9) A proposed Petro Star/Chevron contract will be submitted to the legislature for approval of a sale of 6,500 BPD royalty oil from the Kuparuk River Unit. Petro Star/Chevron initially would purchase 6,000 BPD. The contract is expected to commence in late 1986 and expire September 30, 1996.

(10) On February 4, 1986 the state will sell by competitive bid approximately 18,000 BPD for a six-month term commencing June 1, 1986.

S/D86:12\_21/8/86

STATE OF ALASKA  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL AND GAS

ESTIMATED PRODUCTION AND SALES FOR NORTH SLOPE ROYALTY OIL (9)

YEAR	ESTIMATED TOTAL PRODUCTION (BARRELS PER DAY)				ESTIMATED ROYALTY (BARRELS PER DAY)				ESTIMATED SALES OF ROYALTY OIL (BARRELS PER DAY)				TOTAL ROYALTY	MILE PT. ROYALTY	TOTAL ROYALTY	HAPCD	SUEA	TESORO (OLD)	TESORO (NEW)	CHEVRON	COMPETITIVE SALE 12-11-84 (PROPOSED)	PETRO/CHEVRON (PROPOSED)	COMPETITIVE SALE 7-1-86 (PROPOSED)	ROYALTY IN VALUE	
	TOTAL PRODUCE	TOTAL KUPARUK	TOTAL LISBURN	TOTAL ENDICOTT	TOTAL MILE PT.	PRODUCE ROYALTY	KUPARUK ROYALTY	LISBURN ROYALTY	ENDICOTT ROYALTY	MILE PT. ROYALTY	PRODUCE ROYALTY	KUPARUK ROYALTY													LISBURN ROYALTY
1985	1,520,000	180,000	0	0	3,000	193,750	22,500	0	0	375	216,625	35,000	0	0	0	216,625	35,000	5,167	47,533	26,867	18,400	45,000	6,000	18,000	18,430
1986	1,520,000	220,000	50,000	30,000	3,000	193,750	27,500	6,250	7,000	5,400	216,650	35,000	6,250	7,000	5,400	216,650	35,000	5,167	47,533	26,867	18,400	45,000	6,000	18,000	27,483
1987	1,520,000	220,000	60,000	30,000	3,000	193,750	27,500	7,500	7,000	5,400	216,650	35,000	7,500	7,000	5,400	216,650	35,000	5,167	47,533	26,867	18,400	45,000	6,000	18,000	30,733
1988	1,181,000	220,000	70,000	25,000	3,000	147,875	21,375	8,750	7,000	4,500	202,625	35,000	8,750	7,000	4,500	202,625	35,000	4,587	47,137	23,851	16,512	40,000	6,500	16,500	36,202
1989	1,181,000	187,000	80,000	20,000	3,000	177,250	23,375	10,000	14,000	4,500	202,625	35,000	10,000	14,000	4,500	202,625	35,000	3,943	36,278	20,506	14,196	40,000	6,500	16,500	43,227
1990	1,181,000	159,000	90,000	15,000	3,000	177,250	23,375	11,000	14,000	4,500	202,625	35,000	11,000	14,000	4,500	202,625	35,000	3,943	36,278	20,506	14,196	40,000	6,500	16,500	45,354
1991	846,000	135,000	100,000	10,000	3,000	105,750	16,875	12,500	14,000	2,700	163,825	35,000	12,500	14,000	2,700	163,825	35,000	3,093	28,458	16,086	11,136	40,000	6,500	16,500	50,254
1992	846,000	109,000	100,000	10,000	3,000	88,250	15,625	12,500	14,000	1,800	137,950	35,000	12,500	14,000	1,800	137,950	35,000	2,820	25,944	14,644	10,152	40,000	6,500	16,500	50,872
1993	772,000	127,000	100,000	10,000	3,000	88,250	15,625	11,250	10,500	1,800	126,675	35,000	11,250	10,500	1,800	126,675	35,000	2,573	23,674	13,382	9,264	40,000	6,500	16,500	43,741
1994	706,000	109,000	90,000	10,000	3,000	80,750	12,750	10,000	9,100	1,800	115,850	35,000	10,000	9,100	1,800	115,850	35,000	2,353	21,650	12,238	8,472	40,000	6,500	16,500	43,741
1995	646,000	89,000	80,000	10,000	3,000	73,875	11,125	10,000	8,400	1,800	104,100	35,000	10,000	8,400	1,800	104,100	35,000	2,167	20,100	11,400	7,800	40,000	6,500	16,500	46,470
1996	591,000	80,000	72,000	10,000	3,000	67,625	10,000	9,000	8,400	1,800	95,025	35,000	9,000	8,400	1,800	95,025	35,000	2,000	19,000	10,800	7,400	40,000	6,500	16,500	46,470
1997	498,000	72,000	65,000	10,000	3,000	62,250	9,000	8,125	7,700	1,800	87,075	35,000	8,125	7,700	1,800	87,075	35,000	1,833	17,833	10,200	7,000	40,000	6,500	16,500	52,075
1998	458,000	65,000	58,000	10,000	3,000	57,250	8,125	7,250	7,000	1,800	79,625	35,000	7,250	7,000	1,800	79,625	35,000	1,667	16,667	9,600	6,300	40,000	6,500	16,500	44,625
1999	421,000	58,000	52,000	10,000	3,000	52,625	7,250	6,500	6,300	1,800	72,675	35,000	6,500	6,300	1,800	72,675	35,000	1,500	15,000	8,800	5,600	40,000	6,500	16,500	37,675
2000	387,000	57,000	47,000	10,000	3,000	48,375	6,500	5,875	5,600	1,800	66,350	35,000	5,875	5,600	1,800	66,350	35,000	1,400	14,000	8,000	5,200	40,000	6,500	16,500	31,350
2001	357,000	47,000	41,000	10,000	3,000	44,625	5,875	5,250	5,000	1,800	59,550	35,000	5,250	5,000	1,800	59,550	35,000	1,300	13,000	7,400	4,800	40,000	6,500	16,500	23,350
2002	328,000	42,000	38,000	10,000	3,000	41,000	5,250	4,750	4,600	1,800	52,400	35,000	4,750	4,600	1,800	52,400	35,000	1,200	12,000	6,800	4,400	40,000	6,500	16,500	17,400
2003	302,000	38,000	34,000	10,000	3,000	37,750	4,750	4,250	4,200	1,800	46,750	35,000	4,250	4,200	1,800	46,750	35,000	1,100	11,000	6,200	4,000	40,000	6,500	16,500	14,750
2004	278,000	34,000	31,000	10,000	3,000	34,750	4,250	3,875	3,800	1,800	42,875	35,000	3,875	3,800	1,800	42,875	35,000	1,000	10,000	5,800	3,750	40,000	6,500	16,500	12,875
2005	253,000	31,000	28,000	10,000	3,000	31,875	3,875	3,500	3,500	1,800	39,250	35,000	3,500	3,500	1,800	39,250	35,000	900	9,000	5,400	3,500	40,000	6,500	16,500	11,250
2006	235,000	28,000	25,000	10,000	3,000	29,375	3,500	3,125	3,125	1,800	36,625	35,000	3,125	3,125	1,800	36,625	35,000	800	8,000	5,000	3,250	40,000	6,500	16,500	10,000
2007	218,000	25,000	22,000	10,000	3,000	27,000	3,125	2,750	2,750	1,800	34,250	35,000	2,750	2,750	1,800	34,250	35,000	700	7,000	4,600	3,000	40,000	6,500	16,500	8,875
2008	191,000	20,000	18,000	10,000	3,000	24,875	2,750	2,375	2,375	1,800	31,750	35,000	2,375	2,375	1,800	31,750	35,000	600	6,000	4,000	2,750	40,000	6,500	16,500	7,750
2009	181,000	18,000	16,000	10,000	3,000	22,875	2,375	2,125	2,125	1,800	29,250	35,000	2,125	2,125	1,800	29,250	35,000	500	5,000	3,600	2,500	40,000	6,500	16,500	6,875
2010	158,000	15,000	14,000	10,000	3,000	21,000	2,125	1,875	1,875	1,800	26,625	35,000	1,875	1,875	1,800	26,625	35,000	400	4,000	3,200	2,250	40,000	6,500	16,500	6,000
2011	155,000	10,000	0	0	0	21,000	1,250	1,250	0	0	22,250	35,000	1,250	0	0	22,250	35,000	300	3,000	2,800	2,000	40,000	6,500	16,500	5,250
2012	155,000	0	0	0	0	19,375	0	0	0	0	19,375	35,000	0	0	0	19,375	35,000	200	2,000	1,800	1,500	40,000	6,500	16,500	4,750

(1) MAX ESTIMATE OF FIELD PERFORMANCE, DECEMBER 1985.

(2) SUEA'S TEN-YEAR CONTRACT COMMENCED JULY 1, 1985. QUANTITY IS 2.6672 OF DAILY PRODUCE ROYALTY OIL.

(3) TESORO'S CONTRACT IS CURRENTLY AT ITS MAXIMUM QUANTITY OF 24,533 OF DAILY PRODUCE ROYALTY OIL. THE CONTRACT EXPIRES JANUARY 1995.

(4) ON OCTOBER 1, 1985 TESORO COMMENCED DELIVERIES UNDER 12/9/83 PRODUCE CONTRACT WHICH HAS A MAXIMUM QUANTITY OF 13,861 OF DAILY PRODUCE ROYALTY OIL AND EXPIRES JAN. 1, 1995.

(5) CHEV ON'S CONTRACT CALLS FOR A MAXIMUM QUANTITY OF 9.63 OF DAILY PRODUCE ROYALTY OIL. THE CONTRACT EXPIRES JANUARY 1, 1995.

dbj

(6) DELIVERIES COMMENCED APRIL 1985 FOR 50,000 BPD OF PRODUCE AND WILL COMMENCE APRIL 1986 FOR 15,000 BPD OF KUPARUK RIVER UNIT ROYALTY OIL, AND WILL CONTINUE FOR ONE YEAR AS A RESULT OF THE DEC. 11, 1984 COMPETITIVE SALE AND THE SUBSEQUENT KUPARUK SOLICITATION. PRIOR TO THAT TIME THIS OIL REMAINED "IN VALUE."

(7) A PROPOSED PETRO/CHEVRON CONTRACT WILL BE SUBMITTED TO THE LEGISLATURE FOR APPROVAL OF A SALE OF 4,500 BPD ROYALTY OIL FROM THE KUPARUK RIVER UNIT. PETRO STAR/CHEVRON INITIALLY WOULD PURCHASE 4,000 BPD. THE CONTRACT IS EXPECTED TO COMMENCE IN LATE 1986 AND EXPIRE SEPTEMBER 30, 1996.

(8) ON FEBRUARY 4, 1986 THE STATE WILL SELL BY COMPETITIVE BID APPROXIMATELY 18,000 BPD FOR A SIX-MONTH TERM COMMENCING JUNE 1, 1986.

(9) Includes only fields in, or planned for production in the near future.

### Oil Production

Aside from a minor amount produced from Katalla field before 1933, all significant Alaska oil has been produced from two areas, Cook Inlet and the North Slope. Cook Inlet fields have produced a total of 1.058 billion barrels, including an estimated 17 million barrels in 1985. North Slope fields have produced a cumulative 4.556 billion barrels, of which about 647 million barrels were produced in 1985. Historical oil production data are shown in Table 3.1 and Figure 3.1. More specific data and information on individual fields are included in Appendix A.1, A.2, and A.3.

### Oil Consumption

Nearly all of the oil products consumed in Alaska are refined fuels. Much of these fuels are refined in state, and the balance is imported (see Chapter 5 for further discussion). Figures 3.6 through 3.11 show Alaskan coastal fuel movements in 1981.

The state Division of Revenue (DOR) collects and reports fuel sales from distributors. The major categories of this data are shown in Table 3.2 and Figure 3.2. During the nine year reporting span, aviation fuel data probably indicate the general quantity consumed and end use of these fuels. Other categories, however, are less reliable both in quantity consumed and end use. This is due to interaction of many factors affecting the reports sent to DOR, year by year, including variability in completions of reports, shifts in taxation and alternation between reporting categories. The most spectacular effect of these, and possibly other, factors are the large changes between 1984 and 1985 sales, when "Other Diesel" increased 50%, "Marine Gas" increased 88% and "Marine Diesel" decreased 27%.

### Gas Production

Natural gas is produced from the same areas as oil, Cook Inlet and the North Slope. Production data for these areas are given in Table 3.3 and Figure 3.3. Cook Inlet fields began production in the mid 1960's and since then have produced about 4,742 Billion cubic feet to the end of 1985. Of the estimated 1985 production of 303 billion cubic feet, 29.0% was injected, resulting in net production (i.e. net of injection) of 215 billion cubic feet. Since North Slope production began in the mid 1970's, cumulative production has been about 5,680 billion cubic feet to the end of 1985. Of the estimated 1985 production of 1019 billion cubic feet, 81.3% was injected for a net production of 109 billion cubic feet.

### Gas Consumption

Table 3.4 and Figures 3.4 and 3.5 show gas consumption data from 1971 to 1985. Between 1978 and 1985, Cook Inlet gas sales increased by an annual average of 2.6%, while field uses decreased by 5.3%. Of the net 215 billion cubic feet produced in 1985, 197 billion cubic feet (91.6%) were sold and 18 billion cubic feet (8.4%) were consumed in field operations. Of the gas sold, 33% was exported as LNG, 27% was used to produce Ammonia-Urea, 20% was consumed for electrical generation, 11% went to producers and 12% was sold to gas utilities. (These percentages total to 103%, a result of discrepancies between data sources).

Most of the net North Slope gas production is consumed in field operations and the remainder is sold, primarily to TAPS. In 1985, of the net 109 billion cubic feet produced, 89 billion cubic feet (81.7%) was used in field operations and the 20 billion cubic feet balance was sold, including 14 billion cubic feet to TAPS. Most of the gas produced from fields near Barrow is used for electricity generation and gas utilities in Barrow.

HISTORICAL OIL PRODUCTION

TABLE 3.1

YEAR:	1977	1978	1979	1980	1981	1982	1983	1984	1985 [1]	Growth [4] 1978-1985
PRODUCTION [2] (MMbbl/Year)										
Gross State Production	171.318	447.810	511.335	591.640	587.339	618.910	625.527	630.408	663.158	5.77%
Item:										
TAPS Throughput, PS #1	112.315	397.149	467.939	554.934	556.067	591.142	600.859	608.836	647.807	7.24%
Item:										
Liftings at Valdez	96.669	394.080	464.394	548.895	547.026	583.370	592.319	596.588	643.512	7.26%

[1] Estimated from part-yearly reports.

[2] Alaska Oil and Gas Conservation Commission, "Statistical Report," 1977-1985 and Alyeska Pipeline Service Co., personal communication.

[3] Average annual growth.

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HISTORICAL OIL CONSUMPTION - SALES AND SHIPMENTS

TABLE 3.2

YEAR:	1977	1978	1979	1980	1981	1982	1983	1984	1985 [1]	Growth [4] 1978-1985
FUEL SALES [3] (Million Gallons/Year)										
Aviation Gas	16.770	15.830	16.925	16.912	18.754	16.596	15.244	17.398	18.566	2.30%
Exempt	1.521	0.685	0.552	0.558	0.574	0.589	0.498	0.574	0.491	-4.65%
Taxable	15.249	15.145	16.373	16.354	18.180	16.007	14.746	16.825	18.075	2.56%
Aviation Jet	330.744	363.607	415.164	416.184	400.177	432.366	517.575	603.671	471.239	3.77%
Exempt	227.581	250.601	288.974	286.110	247.619	99.957	242.815	304.177	210.551	-2.43%
Taxable	103.163	113.006	126.190	130.074	152.558	332.409	274.760	299.494	260.688	12.68%
Marine Gas	11.766	7.714	8.296	7.598	7.602	7.878	8.568	8.956	17.122	12.06%
Exempt	5.707	0.554	0.292	0.025	0.085	0.032	0.052	0.120	0.183	-14.65%
Taxable	6.059	7.160	8.004	7.573	7.517	7.846	8.516	8.835	16.939	13.09%
Marine Diesel	38.613	51.985	59.492	67.711	72.282	99.443	147.569	124.416	90.095	8.17%
Exempt	6.396	10.116	6.325	5.370	5.153	30.443	75.395	50.874	1.038	-27.77%
Taxable	32.217	41.869	53.167	62.341	67.129	69.000	72.174	73.542	89.057	11.38%
Other Gas	186.213	187.359	181.329	177.353	186.446	210.644	197.968	223.188	221.145	2.40%
Exempt	5.094	8.290	7.527	8.162	9.084	12.809	10.887	11.038	14.152	7.94%
Taxable	181.119	179.069	173.802	169.191	177.362	197.835	187.081	212.150	206.993	2.09%
Other Diesel	165.752	184.876	269.377	302.647	326.440	411.125	420.279	436.308	654.387	19.79%
Exempt	46.160	54.050	120.960	120.939	117.074	187.856	178.494	191.195	411.396	33.64%
Taxable	119.592	130.826	148.417	181.708	209.366	223.269	241.785	245.113	242.991	9.25%
TOTAL FUEL SALES	749.858	811.371	950.583	988.405	1,011.701	1,178.052	1,307.203	1,413.937	1,472.554	8.89%

SHIPMENTS [2] (MMbbl/Year)

Liftings at Valdez	96.669	394.080	464.394	548.895	547.026	583.370	592.319	596.588	643.512	7.26%
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[1] Estimated from part-yearly reports.

[2] Alaska Oil and Gas Conservation Commission, "Statistical Report," 1977-1985 and Alyeska Pipeline Service Co., personal communication.

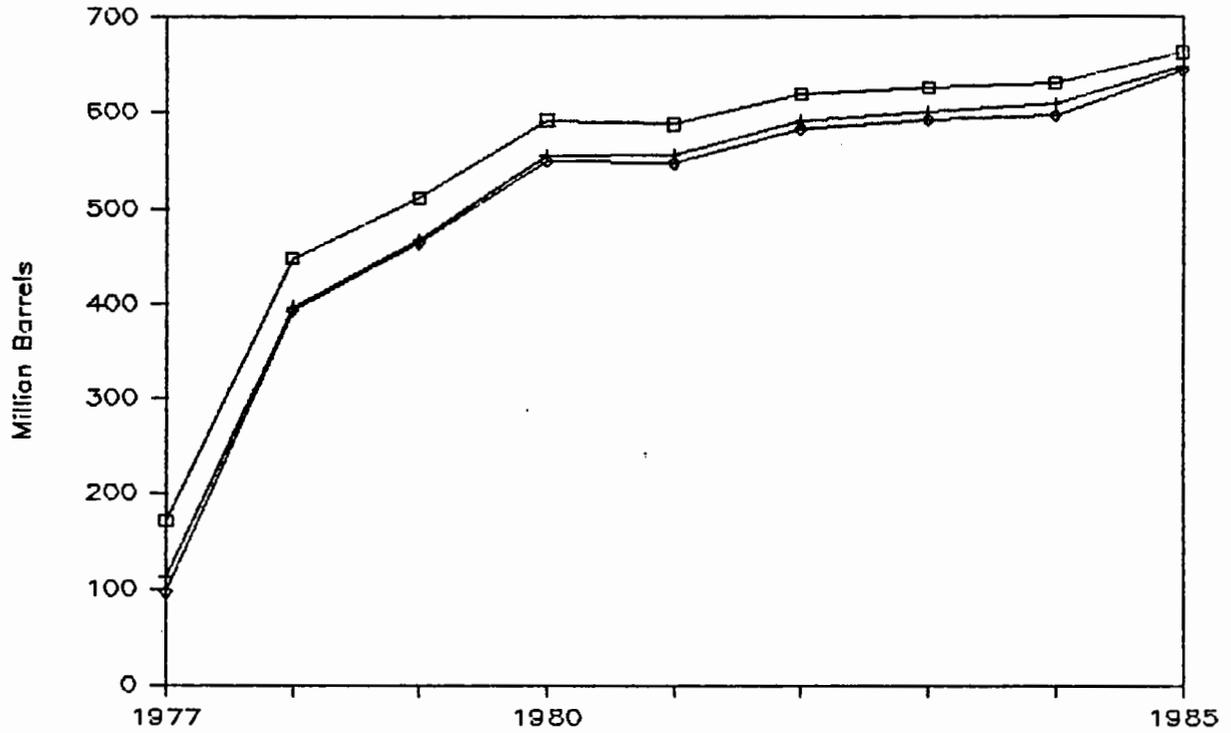
[3] Alaska Department of Revenue, "Report of Motor Fuel Sold or Distributed in Alaska."

[4] Average annual growth.

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FIGURE 3.1

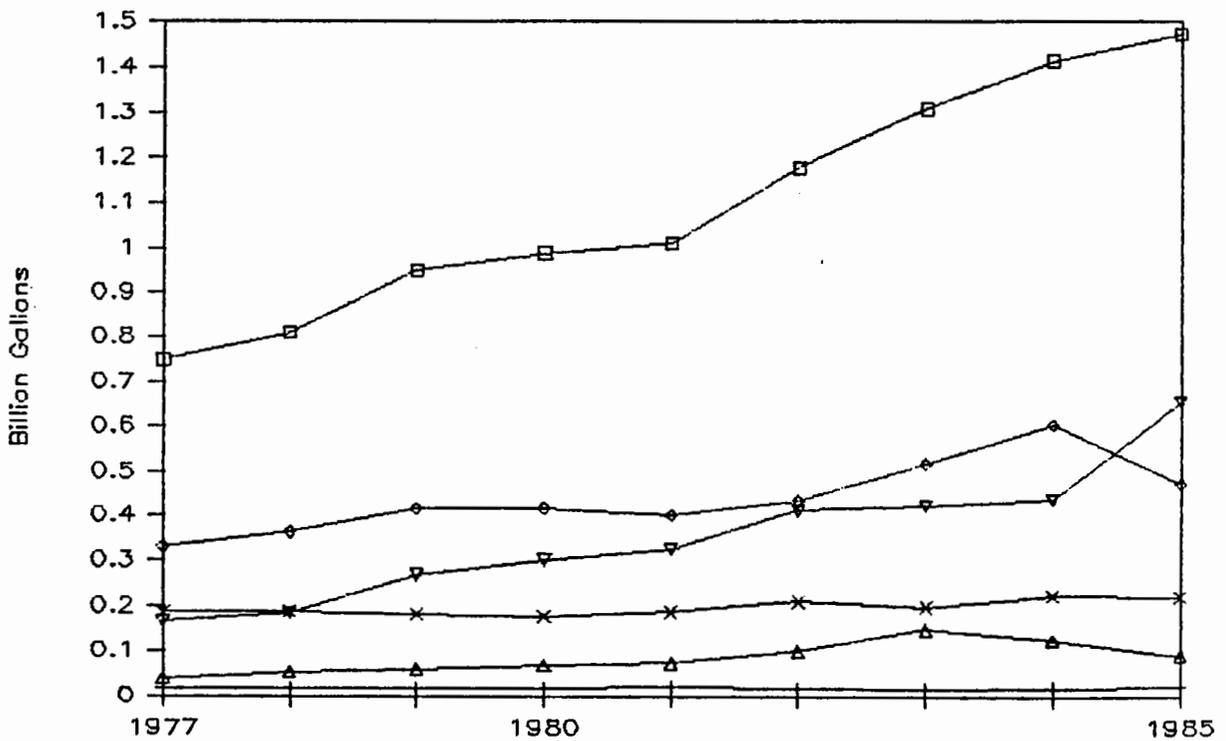
# HISTORICAL OIL PRODUCTION



□ TOTAL STATE PRODUCTION
+ THROUGHPUT AT PS #1
◊ LIFTINGS AT VALDEZ

FIGURE 3.2

# HISTORICAL OIL CONSUMPTION—FUEL SALE



□ TOTAL FUEL SALES
+ AVIATION GAS
◊ AVIATION JET
△ MARINE DIESEL
× OTHER GAS
▽ OTHER DIESEL

HISTORICAL GAS PRODUCTION (Billion Cubic Feet/Year)

TABLE 3.3

STATE [2]	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985 [1]	Growth [3] 1978-1985
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	1,321.874	11.87%
Injection	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	997.746	14.99%
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	324.128	5.20%
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	302.703	0.43%
Injection	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	87.932	-2.31%
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	214.771	1.75%
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	1,019.171	18.59%
Injection	---	---	---	0.00	0.000	0.000	68.080	271.854	390.136	546.509	595.106	715.615	791.979	815.929	909.813	18.84%
Net Production	---	---	---	2.79	3.845	5.909	27.791	37.033	43.274	51.705	54.398	65.921	72.799	89.820	109.358	16.73%

[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.  
1974-85: Alaska Oil and Gas Conservation Commission, "Report of Gas Disposition," monthly reports. "Injection" does not include gas rented from Beaver Creek and Kenai fields for injection into Swanson River field.

[3] Average annual growth.

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HISTORICAL GAS CONSUMPTION (Billion Cubic Feet/Year)

TABLE 3.4

STATE [2]	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985 [1]	Growth [12] 1978-1985
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	107.248	9.96%
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	5.986	-0.46%
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	82.675	13.04%
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	1.716	-9.40%
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	16.871	6.99%
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	216.880	3.36%
Power generation	14.69	15.38	16.70	17.45	25.461	27.613	28.590	29.718	33.141	33.520	33.947	36.222	36.651	37.000	40.606	4.56%
Public [4][5]	8.14	8.91	10.63	11.76	19.619	22.189	23.590	24.592	28.155	28.757	29.386	31.392	32.055	32.662	35.815	5.52%
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	4.791	-0.96%
Gas Utilities	10.24	13.10	14.76	15.13	12.092	12.551	12.683	13.454	14.045	15.521	16.213	19.564	19.518	20.911	24.958	9.53%
Residential [4][5]	5.44	6.03	6.52	6.72	5.548	5.916	6.010	6.536	6.911	7.773	8.385	10.520	10.609	11.507	12.860	10.15%
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	12.098	8.31%
LNG [6]	63.74	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	65.381	1.03%
Ammonia-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	53.977	1.43%
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	21.341	10.63%
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	0.983	22.53%
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	14.369	10.94%
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	(4.735)	
RAILBELT																
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	17.780	-5.26%
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	2.345	-6.91%
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	13.719	-2.37%
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	1.716	-9.40%
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	-9.40%
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	207.840	196.990	2.63%
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	40.096	4.37%
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	35.306	5.30%
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	4.791	-0.96%
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	24.470	8.92%
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	12.372	9.54%
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	12.098	8.31%
LNG [6]	63.74	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	65.381	1.03%
Ammonia-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	53.977	1.43%
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	21.341	10.63%
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	16.090	(8.275)	
NON-RAILBELT																
Field Operations	---	---	---	2.65	2.808	3.856	24.444	29.231	33.763	39.697	41.607	51.921	58.210	74.732	89.468	17.33%
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	3.641	6.70%
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	68.956	20.38%
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	0.00%
Other	---	---	---	0.02	0.000	0.000	0.000	8.092	8.364	8.929	9.480	10.567	10.849	15.034	16.871	11.07%
Sold [3]	---	---	---	0.14	1.037	2.054	3.347	7.802	9.512	12.007	12.791	14.000	14.589	15.088	19.890	14.50%
Power generation [5]	---	---	---	---	---	---	---	---	---	---	0.315	0.404	0.482	0.480	0.467	10.34%
Gas Utilities [5]	---	---	---	---	---	---	---	---	---	---	0.435	0.539	0.407	0.508	0.447	0.68%
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	0.983	22.53%
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	14.369	10.94%
Unaccounted for [11]	---	---	---	(2.231)	---	0.269	1.394	0.616	0.579	0.941	0.619	0.619	(0.079)	0.306	3.624	

- [1] Estimated from part-yearly reports of cited sources.
- [2] Does not include NON-RAILBELLY items marked ----.
- [3] Alaska Oil and Gas Conservation Commission, "Report of Gas Disposition," monthly reports.
- [4] 1971-82: Annual reports from Alaska Pipeline Co., ENSTAR and Kenai Utility Service Co. to Alaska Public Utilities Commission
- [5] 1983-85: Enstar Natural Gas Co., personal communication.
- [6] Barrow Utilities and Electric Cooperative Inc., personal communication.
- [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) 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."  
 1980-85: Royalty reports from producers to Division of Oil and Gas.  
 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."
- [8] 1980-85: Royalty reports from producers to Division of Oil and Gas.
- [9] Royalty reports from Union to Division of Oil and Gas, item Rental Gas.
- [10] Royalty reports from ARCO to Division of Oil and Gas, items Alaska Pipeline-Nikiski, Chevron Rental Gas and Metering.
- [11] Calculated difference between "Sold" and sum of listed "Sold" items.
- [12] Average annual growth, 1981-1985.
- [13] Average annual growth, 1981-1985.

S/D86:TS\_3\_4:1/7/86

FIGURE 3.3

# HISTORICAL GAS PRODUCTION

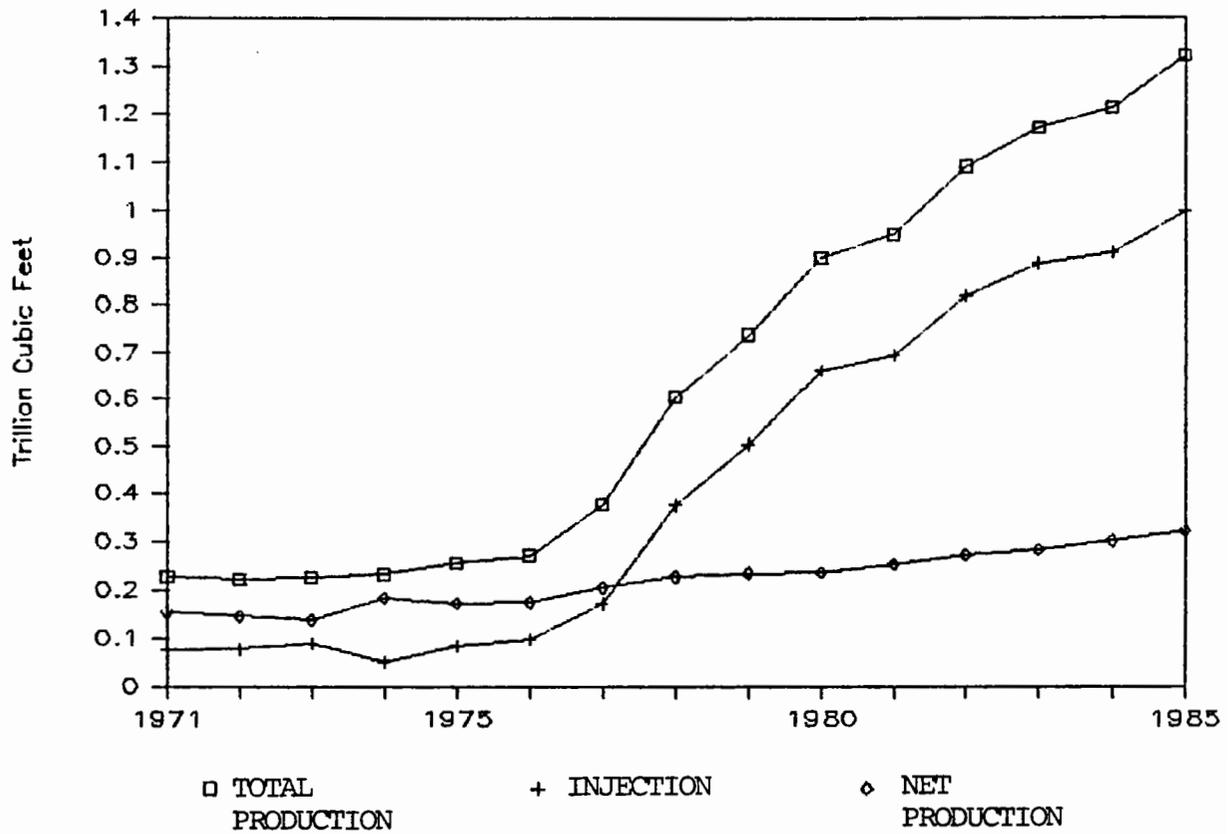


FIGURE 3.4

# HISTORICAL GAS CONSUMPTION—PUB.

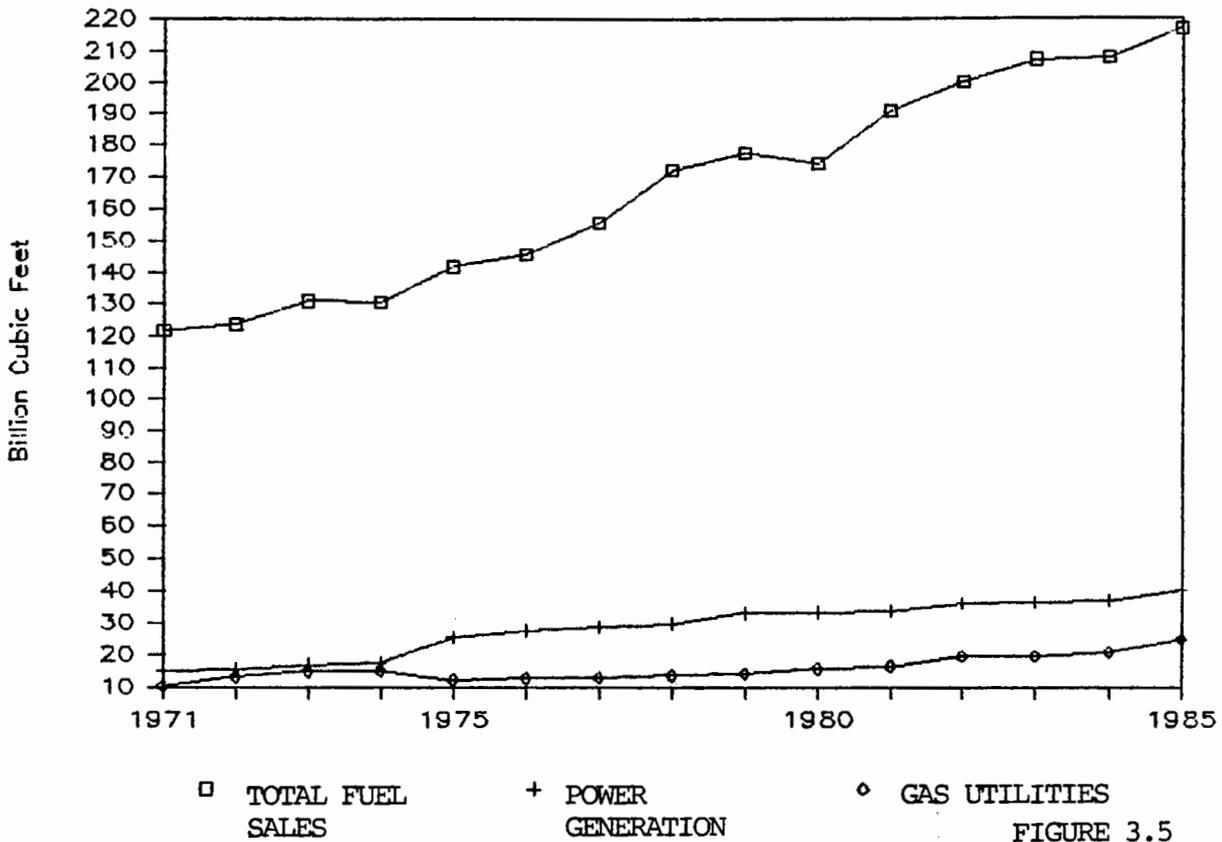
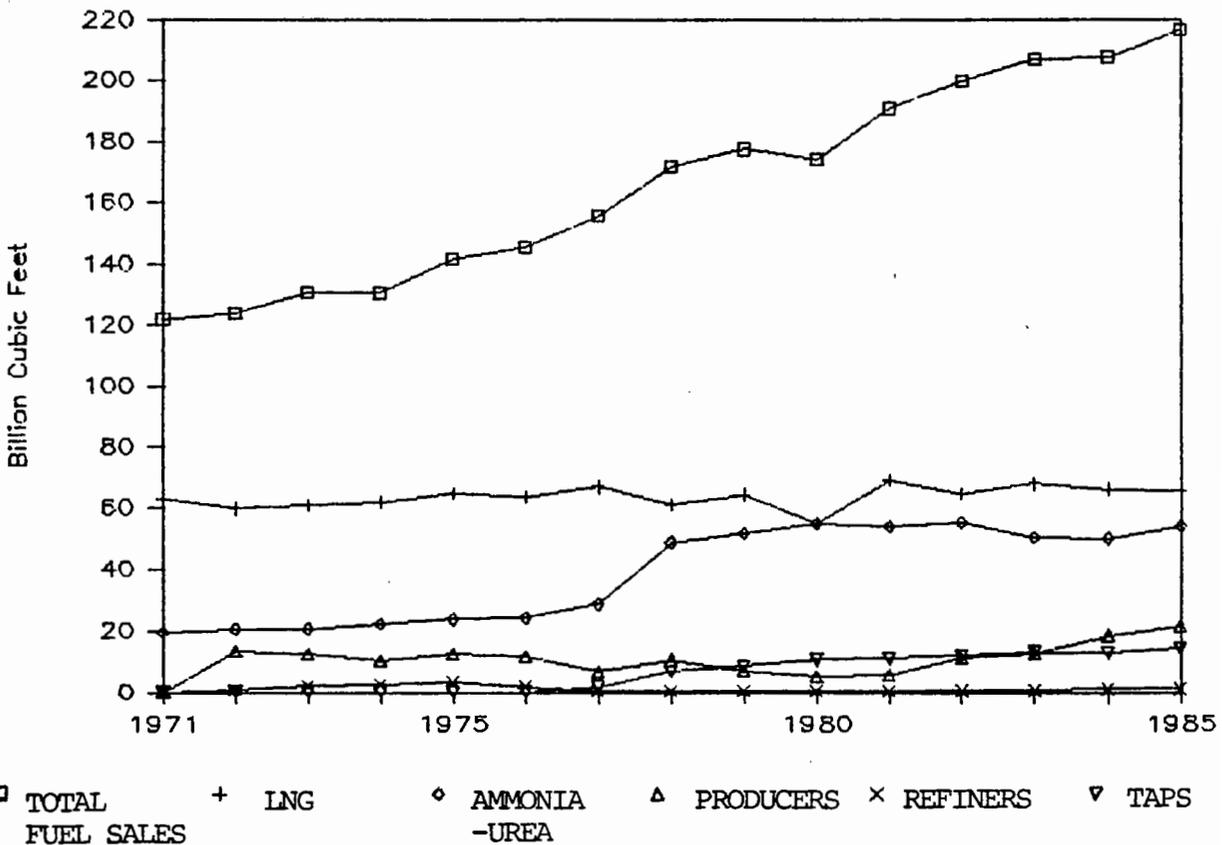
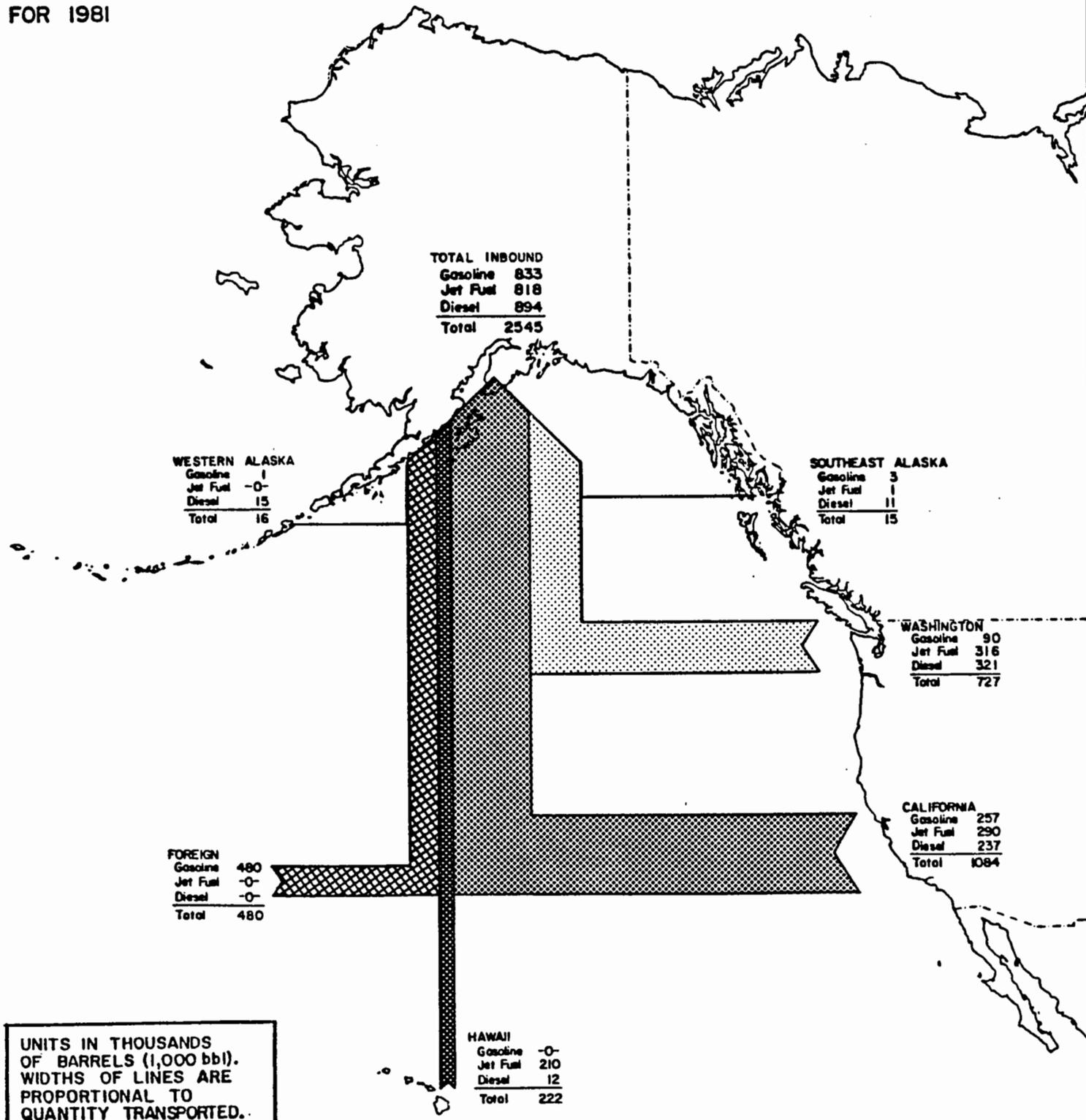


FIGURE 3.5

# HISTORICAL GAS CONSUMPTION—IND.



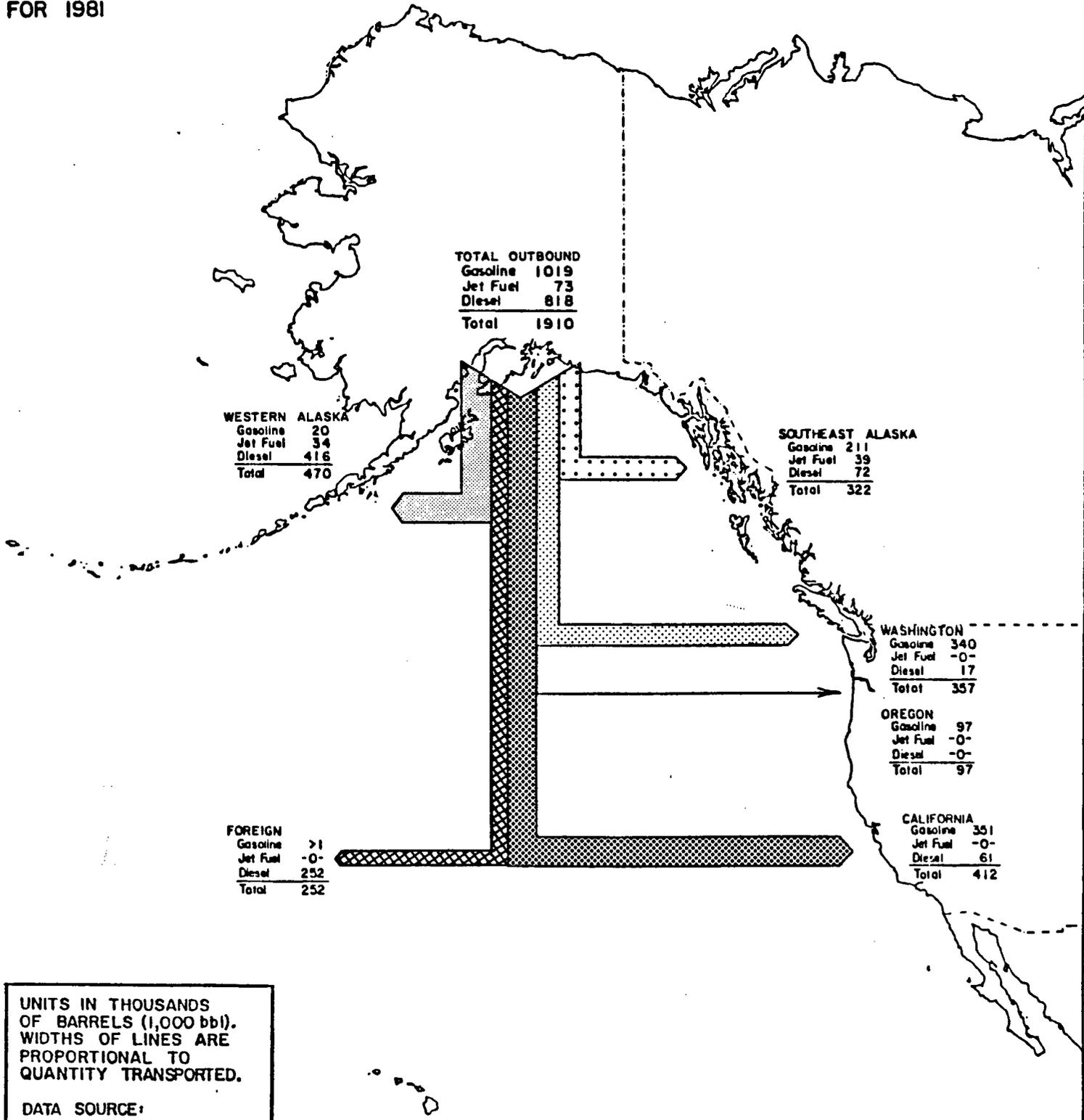
**SOUTHCENTRAL ALASKA  
COASTAL FUEL MOVEMENTS-INBOUND  
FOR 1981**



UNITS IN THOUSANDS OF BARRELS (1,000 bbl). WIDTHS OF LINES ARE PROPORTIONAL TO QUANTITY TRANSPORTED.

DATA SOURCE:  
KEISER, G., TEAL, D.,  
FUEL CONSUMPTION AND PRICING IN ALASKA, A REGIONAL ANALYSIS,  
HOUSE RESEARCH AGENCY REPORT 83-C, JAN. 1984

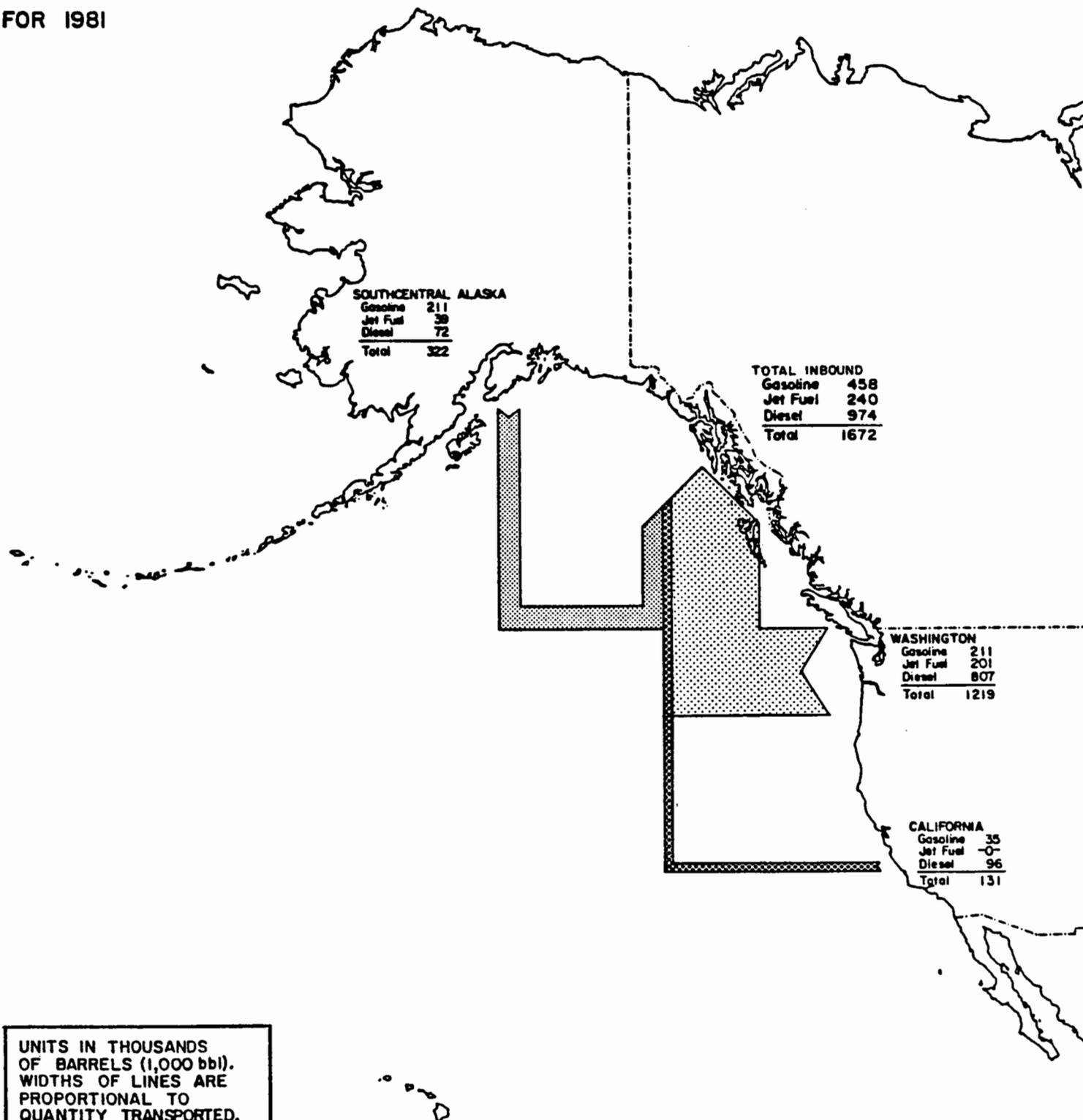
**SOUTHCENTRAL ALASKA  
COASTAL FUEL MOVEMENTS-OUTBOUND  
FOR 1981**



UNITS IN THOUSANDS OF BARRELS (1,000 bbl). WIDTHS OF LINES ARE PROPORTIONAL TO QUANTITY TRANSPORTED.

DATA SOURCE:  
KEISER, G., TEAL, D.,  
FUEL CONSUMPTION AND PRICING IN ALASKA, A REGIONAL ANALYSIS, HOUSE RESEARCH AGENCY REPORT 83-C, JAN. 1984

**SOUTHEAST ALASKA  
COASTAL FUEL MOVEMENTS-INBOUND  
FOR 1981**

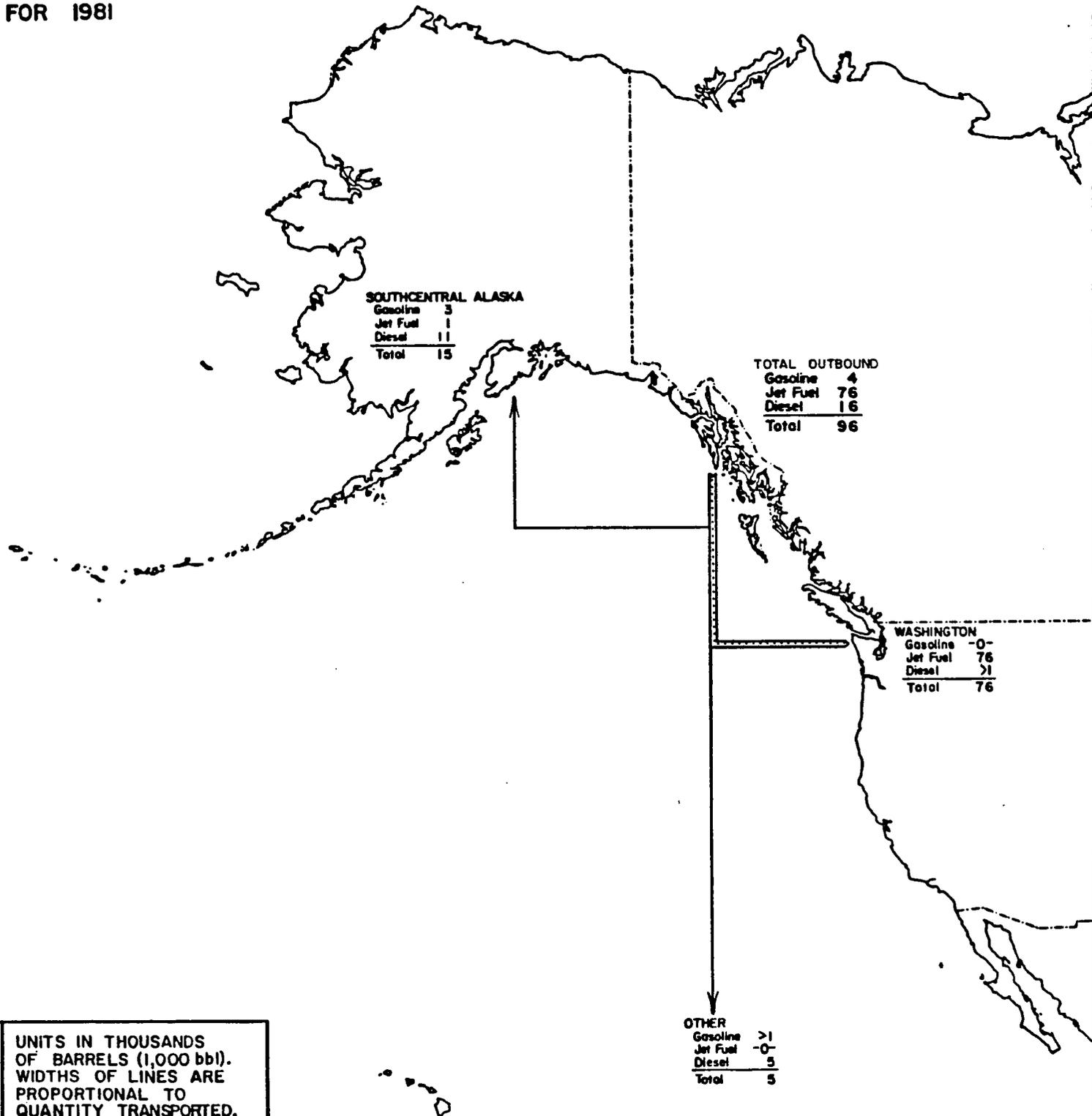


UNITS IN THOUSANDS OF BARRELS (1,000 bbl). WIDTHS OF LINES ARE PROPORTIONAL TO QUANTITY TRANSPORTED.

DATA SOURCE:  
 KEISER, G., TEAL, D.,  
 FUEL CONSUMPTION AND  
 PRICING IN ALASKA, A  
 REGIONAL ANALYSIS,  
 HOUSE RESEARCH AGENCY  
 REPORT 83-C, JAN. 1984

FIGURE 3.9

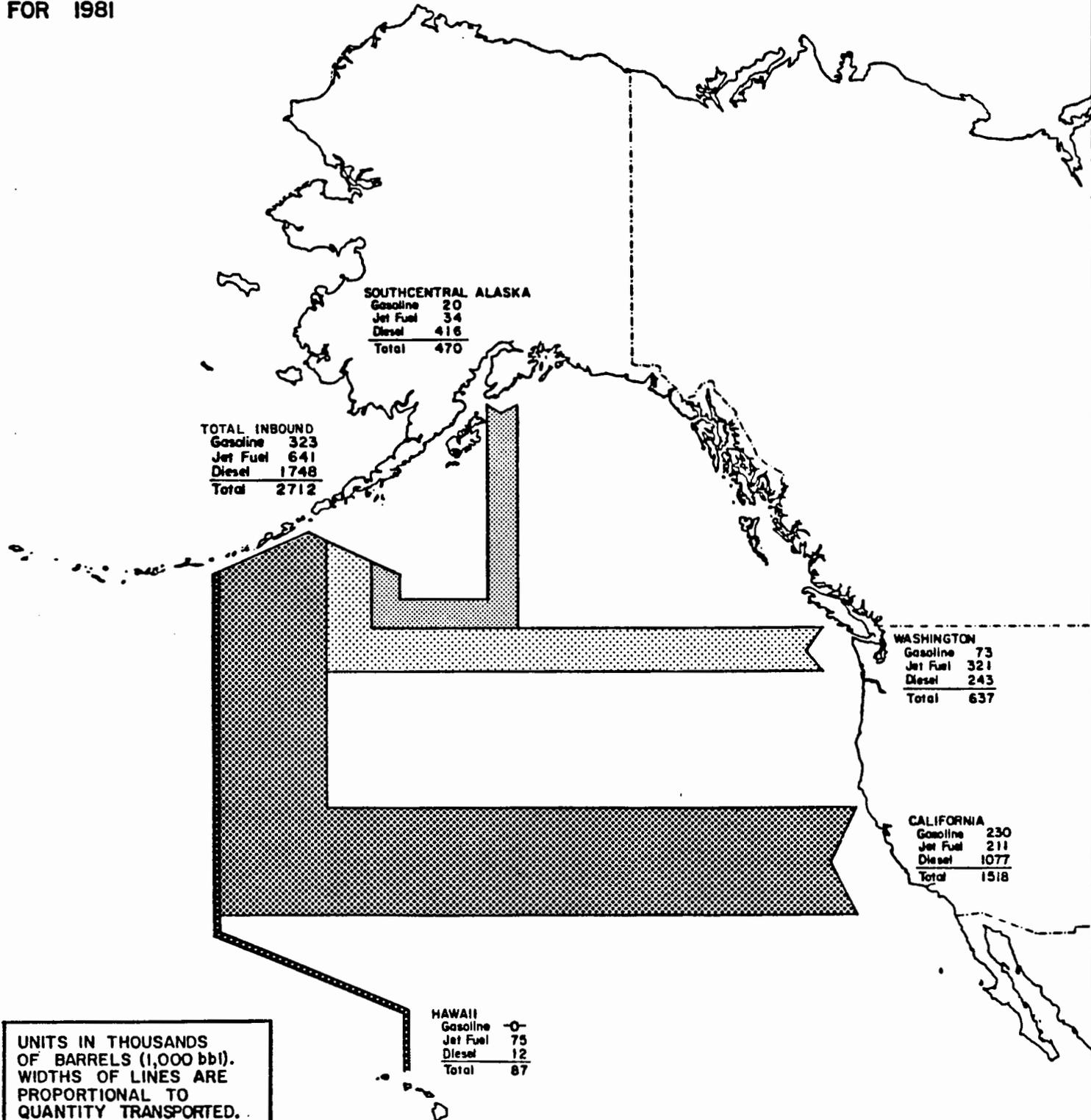
**SOUTHEAST ALASKA  
COASTAL FUEL MOVEMENTS-OUTBOUND  
FOR 1981**



UNITS IN THOUSANDS OF BARRELS (1,000 bbl). WIDTHS OF LINES ARE PROPORTIONAL TO QUANTITY TRANSPORTED.

DATA SOURCE:  
KEISER, G., TEAL, D.,  
FUEL CONSUMPTION AND  
PRICING IN ALASKA, A  
REGIONAL ANALYSIS,  
HOUSE RESEARCH AGENCY  
REPORT 83-C, JAN. 1984

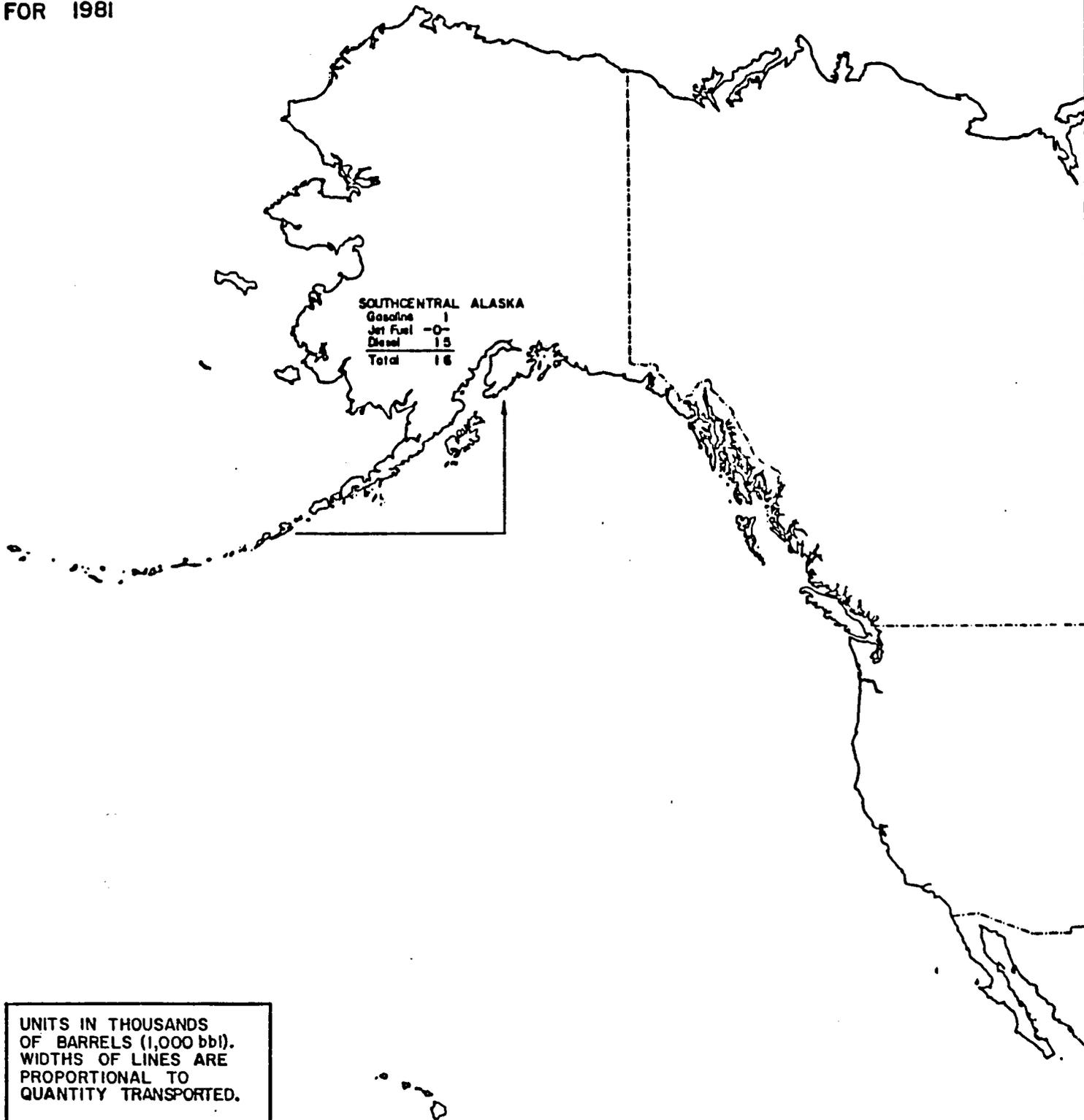
**WESTERN ALASKA  
COASTAL FUEL MOVEMENTS-INBOUND  
FOR 1981**



UNITS IN THOUSANDS OF BARRELS (1,000 bbl). WIDTHS OF LINES ARE PROPORTIONAL TO QUANTITY TRANSPORTED.

DATA SOURCE:  
KEISER, G., TEAL, D.,  
FUEL CONSUMPTION AND  
PRICING IN ALASKA, A  
REGIONAL ANALYSIS,  
HOUSE RESEARCH AGENCY  
REPORT 83-C, JAN. 1984

WESTERN ALASKA  
 COASTAL FUEL MOVEMENTS-OUTBOUND  
 FOR 1981



UNITS IN THOUSANDS  
 OF BARRELS (1,000 bbl).  
 WIDTHS OF LINES ARE  
 PROPORTIONAL TO  
 QUANTITY TRANSPORTED.

DATA SOURCE:  
 KEISER, G., TEAL, D.,  
 FUEL CONSUMPTION AND  
 PRICING IN ALASKA, A  
 REGIONAL ANALYSIS,  
 HOUSE RESEARCH AGENCY  
 REPORT 83-C, JAN. 1984



A projection of consumption of oil and gas for the 15 year period from 1985 to 1999 was prepared by the Institute for Social and Economic Research (ISER) for the January 1985 issue of this report. The ISER projection has been retained in this report except for two adjustments: projected consumption of Aviation Jet fuel has been reduced because of lower than expected actual consumption in 1985, and projections for all categories have been extended one year to the year 2000.

### Summary

Consumption of oil and gas in all major categories is forecast to increase in future years.<sup>1</sup>

Consumption of liquid petroleum will increase from 1,507 million gallons in 1986 (about 36 million barrels of crude oil equivalent) to 1,970 million gallons in 2000 (47 million barrels). This represents a 1.9 percent annual growth rate. The five and ten year annual growth rates are 1.6 and 1.9 percent, respectively. Space heating use of petroleum will grow 2.0 percent annually. Vehicle transportation use will increase 2.0 percent annually. The use of fuel oil for electricity generation in 1986 reflects the introduction of several hydroelectric facilities which replace fuel oil generation. Fuel oil consumption subsequently increases, and the 15-year growth rate will be 3.1 percent annually. Industrial use of petroleum liquids will remain constant.

Consumption of natural gas will grow from 218 billion cubic feet in 1986 to 262 billion cubic feet in 2000 (annual growth of 1.3 percent). Although industry currently consumes the majority of natural gas and is forecast to continue to be the dominant user, growth of gas use for space heating will outstrip growth in industrial use. Over the next 15 years, use of gas for space heating will increase from 21.0 billion cubic feet in 1986 to 36.0 billion cubic feet in 2000 (3.9 percent annual growth). Use of gas for electricity generation will grow from 38.0 billion cubic feet in 1986 to 45.0 billion cubic feet in 2000 (1.2 percent annual growth). The consumption of natural gas for industrial uses will grow from 158.0 billion cubic feet in 1986 to 182.0 billion cubic feet in 2000 (1.0 percent annual growth).

### Transportation Liquid Fuels

Transportation fuel consumption will grow moderately with population growth in future years, increasing from 1,190 million gallons in 1986 to 1,578 million gallons in 2000 (Table 4.1). Jet fuel consumption will grow most rapidly (3.3 percent annually), followed by diesel fuel consumption (1.3 percent annually) and gasoline (0.4 percent annually).

Fuel-use efficiency will increase in all types of uses but will be most evident in highway gasoline consumption which is projected to decline on a per capita basis.

<sup>1</sup>See Appendix B for methodology and assumptions.

Total consumption projected over the 15-year period from 1986 to 2000 is 20,411 million gallons. This is approximately equivalent to 486 million barrels of crude oil.

### Space Heating

The majority of fuel oil used for space heating is consumed outside the railbelt although fuel oil is important where natural gas is not available. Outside of the railbelt, most space heating is done with fuel oil. Fuel oil consumption for this use grows from 181 million gallons in 1986 to 239 million gallons in 2000.

Space heating fuel consumption will increase moderately with population and an increase in the size of the building stock relative to population. Natural gas use will grow more rapidly than fuel oil use, from 21.0 billion cubic feet in 1986 to 36.0 billion cubic feet in 2000 (Table 4.2).

The relatively rapid growth of natural gas use is attributable to the rapid population growth in the railbelt, as well as to the extension of the natural gas market into the Matanuska Valley. The expansion of the natural gas market is estimated to increase gas use by about 9 percent by 1995. 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 only 1.2 percent. This is due to the availability of power from several recently completed hydroelectric plants in locations currently using fuel oil for generation.

Natural gas use for utility electricity generation will exhibit strong growth in the next 15 years as the majority of incremental electricity demand growth in the railbelt is met with additions to natural gas-fired generation. Natural gas use increases from 38.0 billion cubic feet in 1986 to 45.0 billion cubic feet in 2000. The percentage of electricity in the railbelt provided by natural gas reaches a high of 81 percent in 1992 but declines in 1993 to 72.9 percent, when the Bradley Lake hydroelectric facility comes on line.<sup>2</sup> After 1993, the proportion of railbelt electricity generated by natural gas begins to increase, reaching 75.4 percent in 1999.

### 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 expanded petroleum activity will be concentrated. The other large use of natural gas, the production of Ammonia-Urea, will continue requiring constant amounts of natural gas.

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<sup>2</sup>The Susitna Hydroelectric Project is considered in Chapter 5.

PROJECTED DEMAND FOR OIL (Million Gallons/Year)

TABLE 4.1

	YEAR: 1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	TOTAL [1]	Growth [3]
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1986-2000
<b>STATE</b>																	
Vehicle Transportation [2]	1190	1205	1217	1242	1269	1294	1316	1344	1378	1411	1443	1471	1509	1543	1578	20411	2.04%
Jet Fuel	489	502	515	532	550	568	585	605	627	650	672	694	720	745	771	9225	3.31%
Civilian Domestic	260	270	280	293	308	323	336	353	372	391	410	428	451	472	495	5441	4.71%
Military and International	229	232	235	239	242	245	249	252	255	259	262	266	269	273	276	3784	1.34%
Gasoline	253	252	250	252	253	254	255	256	259	261	262	263	265	267	268	3870	0.41%
Aviation	19	19	19	20	20	20	20	21	21	22	22	22	22	23	23	314	1.37%
Highway	224	223	221	222	223	224	224	225	227	228	230	230	232	233	234	3399	0.31%
Marine	10	10	10	10	10	10	10	11	11	11	11	11	11	11	12	157	1.31%
Diesel	448	451	452	459	466	472	476	483	493	501	508	514	524	531	539	7316	1.33%
Highway	311	313	313	318	323	327	330	335	342	347	352	357	363	368	373	5072	1.31%
Marine	138	138	139	141	143	145	146	148	151	154	156	158	161	163	165	2244	1.28%
Space Heat	181	184	185	189	193	195	199	203	207	212	221	224	235	237	239	3103	2.01%
Utility Generation	32	33	34	34	36	36	37	39	40	41	44	45	49	49	49	598	3.09%
Industry	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	1574	0.00%
Pipeline Fuel	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	1260	0.00%
Electricity Generation	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	314	0.00%
TOTAL [1]	1507	1527	1541	1571	1603	1629	1657	1690	1730	1770	1813	1845	1898	1934	1970	25685	1.93%
<b>RAILBELT</b>																	
Vehicle Transportation [2]	905	913	925	948	972	998	1016	1039	1073	1100	1115	1146	1158	1203	1250	15760	2.33%
Jet Fuel	405	414	425	439	453	469	483	498	517	534	545	565	575	602	630	7553	3.23%
Civilian Domestic	214	221	229	240	252	265	276	288	304	319	330	346	358	379	402	4422	4.61%
Military and International	192	193	196	199	201	205	207	209	213	215	215	218	217	223	228	3131	1.24%
Gasoline	187	186	185	186	187	188	188	189	191	192	191	192	190	193	197	2842	0.37%
Aviation	16	16	16	16	16	17	17	17	18	18	18	18	18	18	19	256	1.24%
Highway	166	164	163	164	165	166	165	165	167	168	167	168	166	168	171	2493	0.21%
Marine	6	6	6	6	6	6	6	6	6	6	6	7	6	7	93	1.11%	
Diesel	313	314	315	324	332	340	345	352	365	374	379	389	393	408	423	5366	2.17%
Highway	216	218	219	226	232	239	243	249	260	268	273	280	285	297	309	3813	2.59%
Marine	96	96	97	98	99	101	102	103	105	107	107	109	108	111	114	1553	1.24%
Space Heat	75	75	75	76	76	77	77	77	78	78	79	80	80	82	85	1169	0.90%
Utility Generation	8	8	8	8	8	8	8	8	8	8	8	8	8	9	9	123	0.84%
Industry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL [1]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>NON-RAILBELT</b>																	
Vehicle Transportation [2]	285	292	292	294	298	296	300	305	305	312	328	326	350	340	329	4651	1.03%
Jet Fuel	84	88	90	93	97	99	102	107	110	116	127	129	145	143	141	1673	3.77%
Civilian Domestic	46	49	51	53	56	58	61	65	67	72	80	82	93	93	93	1019	5.16%
Military and International	38	39	39	40	41	41	42	43	43	44	48	47	52	50	48	654	1.68%
Gasoline	65	66	65	66	67	66	66	67	68	69	72	71	75	73	72	1028	0.73%
Aviation	3	4	4	4	4	4	4	4	4	4	4	4	5	4	4	59	2.08%
Highway	58	59	58	58	59	58	59	59	59	61	63	62	66	64	63	906	0.59%
Marine	4	4	4	4	4	4	4	4	4	4	5	5	5	5	64	1.61%	
Diesel	136	137	137	135	134	132	131	131	127	126	129	126	130	123	117	1950	-1.07%
Highway	94	95	94	92	91	88	87	85	81	79	80	76	78	72	66	1260	-2.49%
Marine	41	42	42	43	44	44	44	45	46	47	49	49	52	52	51	691	1.57%
Space Heat	106	110	111	114	117	118	122	126	129	134	142	144	155	154	154	1934	2.70%
Utility Generation	24	25	26	26	28	28	29	30	31	33	36	37	40	41	41	475	3.90%
Southeast	5	7	7	7	7	8	9	9	10	10	11	12	12	13	14	142	7.63%
Rest of State	18	19	19	19	20	20	20	21	22	23	25	25	28	27	26	333	2.66%
Industry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL [1]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[1] Sums may not equal totals due to rounding errors.

[2] Includes industrial, military and government use. Excludes pipeline fuel.

[3] Average annual growth.

S/DB6;T4\_1;1/7/86

FIGURE 4.1

# PROJECTED DEMAND FOR OIL

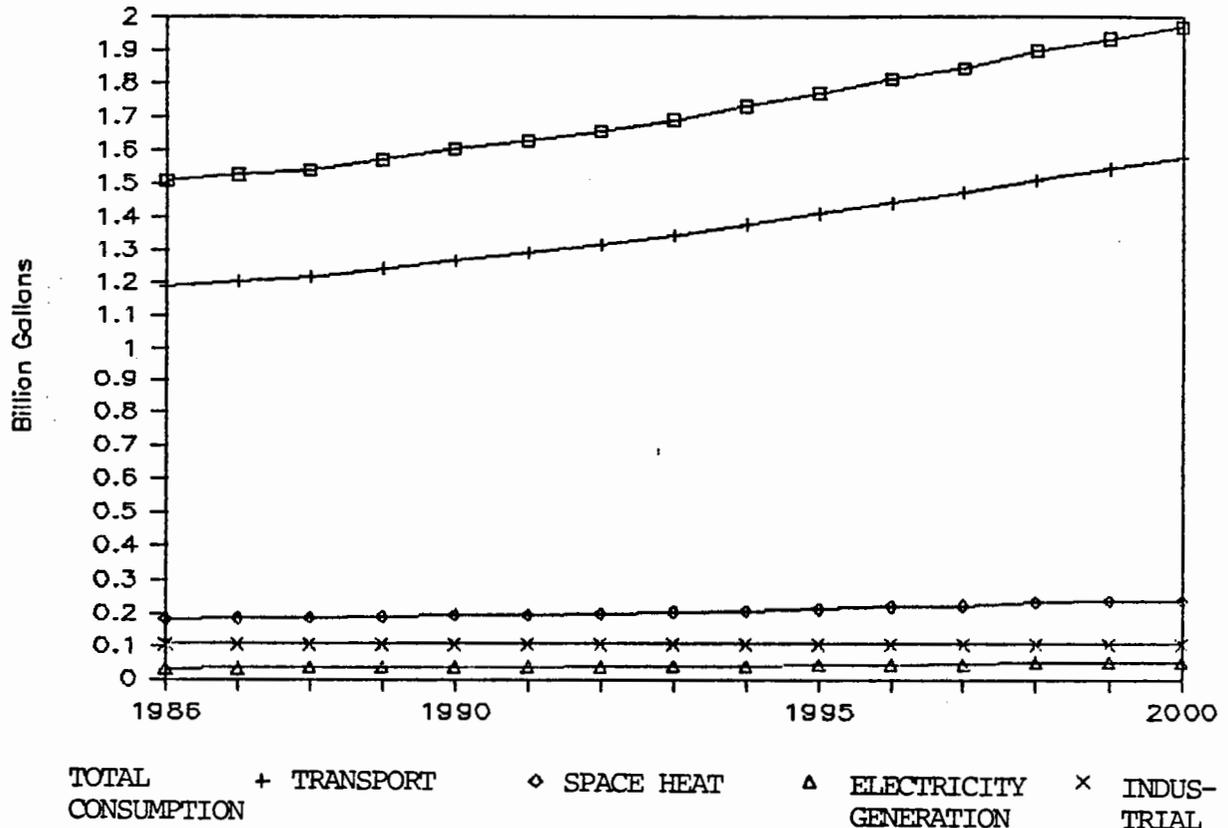
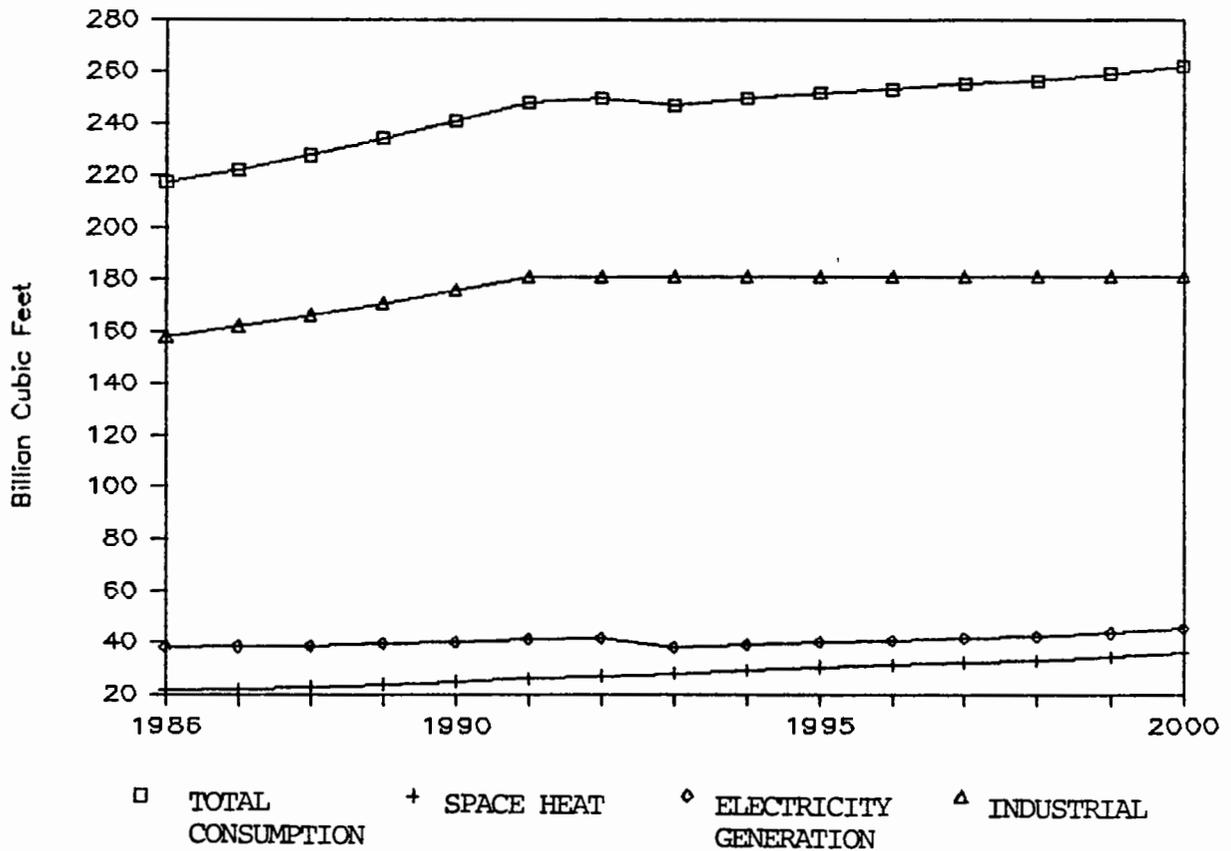


FIGURE 4.2

# PROJECTED DEMAND FOR GAS



PROJECTED DEMAND FOR GAS (Billion Cubic Feet/Year)

TABLE 4.2

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	TOTAL [1]	Growth [2] 1986-2000
<b>STATE</b>																	
Vehicle Transportation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Space Heat	21	22	23	24	25	26	27	28	29	30	31	32	33	34	36	420	3.92%
Utility Generation	38	38	39	39	40	41	42	38	39	40	41	42	42	44	45	607	1.22%
Industry	158	162	167	171	176	182	182	182	182	182	182	182	182	182	182	2650	1.02%
Ammonia-Urea Production	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	750	0.00%
Military Power Generation	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	69	0.00%
Petroleum Production	104	108	112	117	122	127	127	127	127	127	127	127	127	127	127	1831	1.44%
Pipeline Fuel	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	191	0.00%
Miscellaneous	91	95	99	104	109	114	114	114	114	114	114	114	114	114	114	1641	1.62%
TOTAL [1]	218	222	228	234	241	248	250	247	250	252	253	255	256	259	262	3678	1.32%
Item: Injection																	
Item: LNG																	
<b>RAILBELT</b>																	
Vehicle Transportation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Space Heat	21	22	23	24	25	26	27	28	29	30	31	32	33	34	36	418	3.98%
Current Market	21	21	22	23	23	24	25	26	27	28	28	29	30	31	33	393	3.28%
Matanuska Valley	0	0	1	1	1	1	2	2	2	2	2	2	2	3	3	25	
Utility Generation	38	38	38	39	40	40	41	37	39	39	40	41	41	43	44	597	1.05%
Industry	87	87	87	87	87	87	87	87	87	87	87	87	87	87	87	1307	0.00%
Ammonia-Urea Production	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	750	0.00%
Military Power Generation	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	69	0.00%
Petroleum Production	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	488	0.00%
Pipeline Fuel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Miscellaneous	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	488	0.00%
TOTAL [1]	146	147	148	149	151	153	155	152	155	157	158	160	161	164	167	2321	0.96%
Item: Injection																	
Item: LNG																	
<b>NON-RAILBELT</b>																	
Vehicle Transportation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Space Heat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.00%
Utility Generation	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10	0.00%
Southeast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%
Rest of State	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10	0.00%
Industry	71	75	79	84	89	94	94	94	94	94	94	94	94	94	94	1344	2.02%
Petroleum Production	71	75	79	84	89	94	94	94	94	94	94	94	94	94	94	1344	2.02%
Pipeline Fuel	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	191	0.00%
Miscellaneous	58	62	67	71	76	82	82	82	82	82	82	82	82	82	82	1153	2.50%
TOTAL [1]	72	76	80	85	90	95	95	95	95	95	95	95	96	96	96	1356	2.08%
Item: Injection																	
Item: LNG																	

[1] Sums may not equal totals due to rounding errors.

[2] Average annual growth.



### Summary

Under reasonable assumptions about recoverable reserves and Alaska consumption, the current inventories of both oil and gas are more than sufficient to meet the presently identifiable needs of Alaskans for the next 15 years.

### Liquid Petroleum

Table 5.1 shows that the cumulative 15-year Alaska demand for liquid petroleum is approximately 612 million barrels of crude oil equivalent. This is equal to approximately half the reserves of royalty oil and is 7 percent of total reserves. No attempt has been made to compare petroleum products produced at Alaska refineries with petroleum products consumed in the state. Currently the capacity of Alaskan refineries exceeds Alaskan consumption (about 81 thousand barrels per day), but the product mix which the refineries can produce does not match the product mix demanded (Figures 3.6 thru 3.11). The resulting cross-hauling of crude oil out of Alaska and refined products into the state is a common feature of petroleum markets, in general, and does not represent an inefficient distribution of refining capacity or mismatch of supply and demand.

It is also recognized that a direct volume for volume comparison cannot be made between demand for refined products and availability of crude oil. A direct comparison would be unrealistic since a barrel of crude oil does not yield a barrel of refined products.

### Natural Gas

Table 5.1 indicates that the cumulative 15-year Alaska demand for natural gas is 3.677 trillion cubic feet of gas. This is approximately 76 percent of the state royalty share of gas in the combined current inventory at Cook Inlet and on the North Slope.

Since the transportation of natural gas normally requires a 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 Alaska royalty share of Cook Inlet gas alone, however, is insufficient to meet the projected Cook Inlet requirements over the next 15 years.

### Projections Beyond Current Inventory

We assume recoverable 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 into recoverable reserves, reserves will be "proven up" at a rate to maintain sufficient inventory consistent with the growth in demand. Excessive proven reserves, like excessive inventories, result in unnecessary carrying costs to reservoir

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

### Reserve Estimates

Because the low reserve estimates are quite similar to the mid-range estimates, the positive oil and gas surpluses are not significantly affected by using low reserve estimates.

### 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-related consumption at double the base case rate. Increased use of natural gas would reduce the surplus by an equally small percentage.

### 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 facility comparable to the once proposed Pacific Alaska LNG project were built, it would annually export 160 billion cubic feet. With an assumed first year of operation of 1990, cumulative exports to California through 2000 would be 1,760 billion cubic feet. Combined exports to Japan and California would be 2,705 billion cubic feet, reducing reserves for instate use, and the net surplus, by 6.6 percent. In the absence of new Cook Inlet reserves, assumptions would be negative by just 0.2 trillion cubic feet. If a new export facility were to be constructed it is anticipated that exploration for natural gas in Cook Inlet would accelerate (it is currently at a near stand still) and additional reserves would be discovered once again creating a surplus condition.

### Susitna Hydroelectric Project

If the Susitna hydroelectric Project were built, it could begin to replace electricity generation by natural gas and fuel oil in 1996. If natural gas use were cut back 75 percent beginning in that year, cumulative gas consumption would decline 161 billion cubic feet. Fuel oil use for electricity consumption in the Railbelt could be eliminated at a savings of 33 million gallons (about 786,000 barrels).

## Natural Gas Availability in Fairbanks

If, by some means, natural gas became available in Fairbanks, electricity generation space heating in Fairbanks could be converted to gas. This could increase annual natural gas consumption by 5 billion cubic feet as coal and fuel oil were backed out. Fuel oil use would fall by 8 million gallons annually.

Natural gas consumption for space heating would gradually replace fuel oil and coal, and could 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 25 billion cubic feet, and fuel oil consumption could fall by 145 million gallons.

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

## SURPLUS OIL AND GAS

TABLE 5.1

	OIL (Thousand Barrels)		GAS (Billion Cubic Feet)	
	Total	State Royalty	Total	State Royalty
STATE				
Reserves [1]	9,513	1,197	40,784	4,871
Estimated Production from reserves thru 1985 [2]	664	83	81 [3]	7 [3]
Estimated reserves as of Jan. 1, 1986	8,849	1,114	40,703	4,864
Estimated cumulative consumption, 1986-2000 (15 years)	612 [4]	612 [4]	3,677	3,677
NET SURPLUS (DEFICIT)	8,237 [5]	502 [5]	37,026	1,187
COOK INLET				
Reserves [1]	123	12	4,664	356
Estimated Production from reserves thru 1985	17	2	54	4
Estimated reserves as of Jan. 1, 1986	106	10	4,610	352
Estimated cumulative consumption, 1986-2000 (15 years)	--	--	2,321	2,321
NET SURPLUS (DEFICIT)	--	--	2,289	(1,969)
NORTH SLOPE				
Reserves [1]	9,390	1,185	36,120	4,515
Estimated Production from reserves thru 1985	647	81	27	3
Estimated reserves as of Jan. 1, 1986	8,743	1,104	36,093	4,512
Estimated cumulative consumption, 1986-2000 (15 years)	--	--	1,356	1,356
NET SURPLUS (DEFICIT)	--	--	34,737	3,156

[1] From Table 2.1.

[2] Estimate of production from date of reserve estimate to end of 1985. Production from state royalty share is proportional to state royalty share of reserve.

[3] Total gas disposition net of reinjection, from Chapter 3. Production from state royalty share is proportion of state royalty gas in total.

[4] Consumption in gallons converted to 42 gallon barrels.

[5] Although availability of crude oil can not be directly compared, on a volume per volume basis, to consumption of refined products.

S/D86;T5\_1;1/7/86

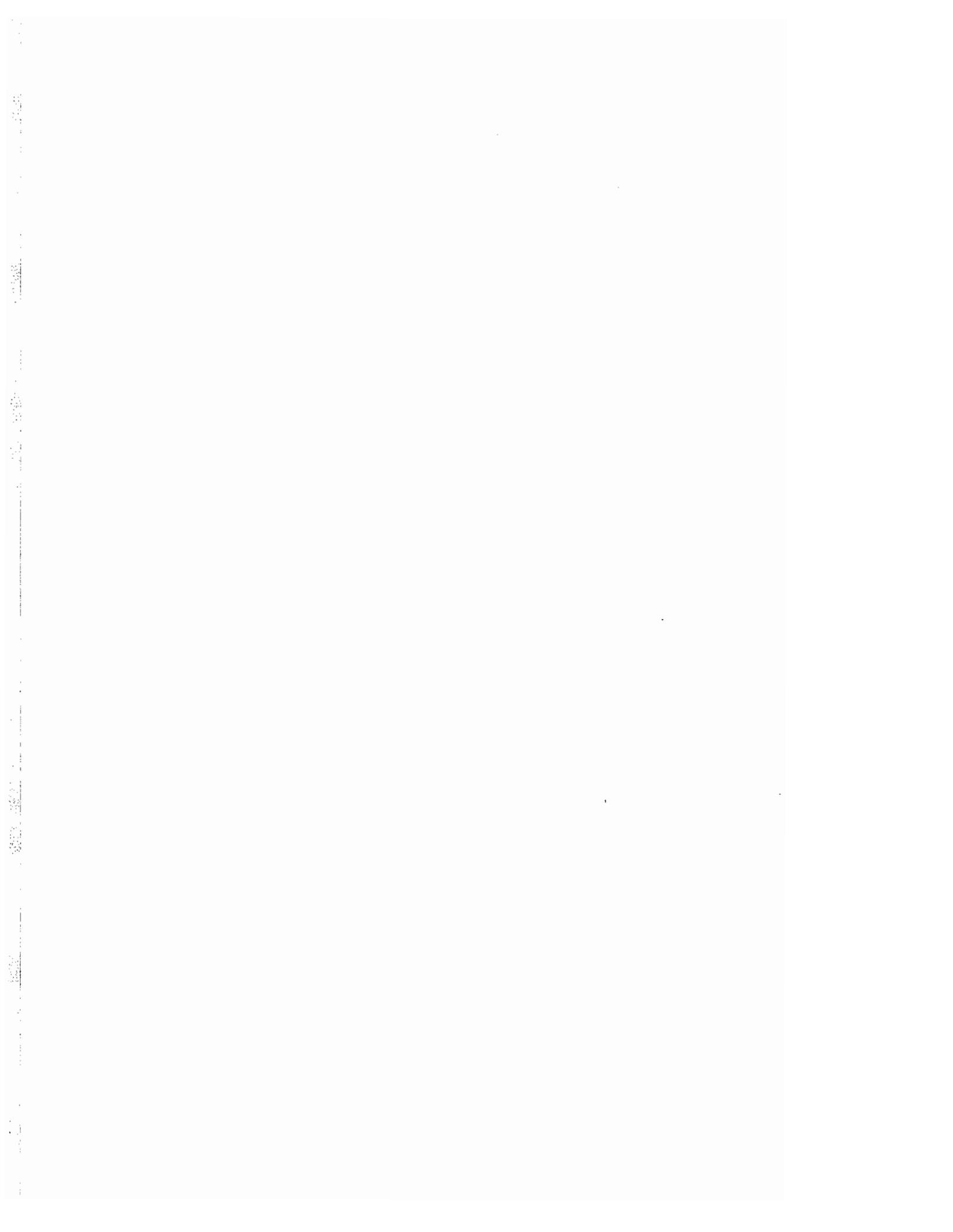
## SENSITIVITY ANALYSIS OF NET OIL AND GAS

TABLE 5.2

	Percent Reduction in Net Surplus	
	Oil (Million Barrels)	Gas (Billion Cubic Feet)
Low Reserve Estimate	27.9%	5.8%
50% increase in growth of population-related consumption	0.5%	0.5%
Export of LNG	--	6.6%
Susitna Hydro	0.0%	0.4%
Natural Gas available in Fairbanks	+2.0%	0.0%

S/D86;T5\_2;1/7/86

APPENDIX A.1  
OIL AND GAS FIELD PRODUCTION DATA



## OIL AND GAS FIELD PRODUCTION DATA

APPENDIX A.1

FIELD	BELUGA RIVER			
LOCATION	Cook Inlet, onshore, west side			
BEGAN PRODUCTION	1/68			
OWNER	ARCO, Chevron, Shell			
OPERATOR	Chevron			
	OIL		GAS	
		Casinghead		Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	---	Bbl	---	MCF 1,770,235 MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	---	Bbl	---	MCF 202,521,275 MCF
ESTIMATED RESERVES AS OF 12/31/85	---	Bbl	---	MCF 794,689,295 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---		---	20%

-----  
 ROYALTY 12.5%, Effective rate: 7.555%

PURCHASER Chugach Electric, ENSTAR

LEASES State ADL: 17592, 17599, 17658, 21126, 21127, 21128, 21129, 58815, 58820, 58831

## COMMENTS

Until recently, Chugach Electric was the only current purchaser of this gas. Chugach uses this gas for power generation which is delivered to the Anchorage market.

Enstar has recently purchased Beluga River gas under contract from Shell and just completed a pipeline from the field through the Mat-Su Valley to Anchorage.

Due to the existence of several Federal leases, the state's effective royalty share is 7.555%.

FIELD	CANNERY LOOP			
LOCATION	Cook Inlet, onshore, east side			
BEGAN PRODUCTION	Field delineation underway			
OWNER				
OPERATOR	Union			
	OIL		GAS	
		Casinghead		Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	---	Bbl	---	MCF --- MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	---	Bbl	---	MCF --- MCF
ESTIMATED RESERVES AS OF 12/31/85	---	Bbl	---	MCF 300,000,000 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---		---	---

-----  
 ROYALTY

PURCHASER

LEASES State ADL:

## COMMENTS

Production to commence in 1986.

FIELD  
LOCATION  
BEGAN PRODUCTION  
OWNER  
OPERATOR

DUCK ISLAND / SAG DELTA (ENDICOTT RESERVOIR)  
North Slope, onshore/offshore  
Facilities design underway, production expected to begin in 1988.  
SONIO

	OIL	Casinghead	GAS	Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	--- Bbl	--- MCF	---	MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	--- Bbl	--- MCF	---	MCF
ESTIMATED RESERVES AS OF 12/31/85	375,000,000 Bbl	---	MCF	800,000,000 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---	---	---	---

-----  
ROYALTY

PURCHASER

-----  
LEASES State ADL:

COMMENTS

FIELD  
LOCATION  
BEGAN PRODUCTION  
OWNER  
OPERATOR

FALLS CREEK  
Cook Inlet, onshore, east side  
Shut-in 1961  
Chevron

	OIL	Casinghead	GAS	Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	--- Bbl	--- MCF	---	MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	--- Bbl	--- MCF	---	18,983 MCF
ESTIMATED RESERVES AS OF 12/31/85	--- Bbl	--- MCF	---	13,000,000 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---	---	---	<1%

-----  
ROYALTY

PURCHASER

-----  
LEASES State ADL:

COMMENTS

FIELD LOCATION GRANITE POINT  
 BEGAN PRODUCTION 12/67  
 OWNER AMOCO, ARCO, Chevron, Getty, Mobil, Phillips, Superior, Texaco, Union  
 OPERATOR AMOCO, ARCO, Texaco, Union

	OIL	Casinghead	GAS	Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	251,153 Bbl	177,210 MCF	---	MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	100,844,065 Bbl	87,422,650 MCF	---	MCF
ESTIMATED RESERVES AS OF 12/31/85	21,986,163 Bbl	15,873,480 MCF	---	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	82%	84%	---	

-----  
 ROYALTY 12.5 %

PURCHASER Tesoro  
 ARCO [1]  
 AMOCO Platform [1]  
 Union [1]

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

-----  
 LEASES State ADL: 17586, 17587, 18742, 18761

COMMENTS  
 Gas from this field is casinghead gas and was formerly flared. DOGC Flaring Order #104, 6/30/71, has prohibited flaring since 7/1/72 and this gas is now recovered and used locally.

FIELD LOCATION GWYDYR BAY UNIT AREA  
 BEGAN PRODUCTION North Slope, onshore/offshore  
 OWNER Field delineation underway  
 OPERATOR Conoco

	OIL	Casinghead	GAS	Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	--- Bbl	--- MCF	---	MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	--- Bbl	--- MCF	---	MCF
ESTIMATED RESERVES AS OF 12/31/85	--- Bbl	--- MCF	---	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---	---	---	

-----  
 ROYALTY

PURCHASER

-----  
 LEASES State ADL:

COMMENTS

FIELD  
LOCATION  
BEGAN PRODUCTION  
OWNER  
OPERATOR

HEMI SPRINGS UNIT AREA  
North Slope, onshore  
Unit agreement approved in 1984.

ARCO

	OIL		Casinghead	GAS	Gas Well	
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	---	Bb1	---	MCF	---	MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	---	Bb1	---	MCF	---	MCF
ESTIMATED RESERVES AS OF 12/31/85	---	Bb1	---	MCF	---	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---		---		---	

-----  
ROYALTY

PURCHASER

-----  
LEASES State ADL:

COMMENTS

FIELD  
LOCATION  
BEGAN PRODUCTION  
OWNER  
OPERATOR

IVAN RIVER  
Cook Inlet, onshore, west side  
Shut-in 1966, suspended

Chevron

	OIL		Casinghead	GAS	Gas Well	
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	---	Bb1	---	MCF	---	MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	---	Bb1	---	MCF	---	MCF
ESTIMATED RESERVES AS OF 12/31/85	---	Bb1	---	MCF	[1]	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---		---		---	

[1] Ivan River, Lewis River, Pretty Creek and Stump Lake reserves are combined under Lewis River reserves, below.

-----  
ROYALTY

PURCHASER

-----  
LEASES State ADL:

COMMENTS

FIELD LOCATION BEGAN PRODUCTION OWNER OPERATOR	KAVIK North Slope, onshore Suspended  ARCO				
		OIL		Casinghead	GAS Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	---	Bbl	---	MCF	---
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	---	Bbl	---	MCF	---
ESTIMATED RESERVES AS OF 12/31/85	---	Bbl	---	MCF	No Data MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---		---		---

-----  
ROYALTY

PURCHASER

-----  
LEASES State ADL:

COMMENTS

FIELD LOCATION BEGAN PRODUCTION OWNER OPERATOR	KENAI Cook Inlet, onshore, east side 1/62 ARCO, Chevron, Marathon, Union Union				
		OIL		Casinghead	GAS Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	---	Bbl	---	MCF	9,854,629 MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	11,877	Bbl [1]	---	MCF	1,659,033,655 MCF
ESTIMATED RESERVES AS OF 12/31/85	---	Bbl	---	MCF	820,436 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---		---		67%

[1] Natural gas liquids.

-----  
ROYALTY 12.5%, Effective rate: Kenai, 2.06879%; Kenai Deep, 0.0%

PURCHASER Alaska Pipeline  
Chevron  
City of Kenai  
Marathon LNG  
Rental gas (Swanson River oil field)  
Union  
Union-Chevron exchange

-----  
LEASES State ADL: 00593, 00594, 00588, 02411, 308223, 324598

COMMENTS

The Kenai Unit provides most of the gas sales in the Cook Inlet area.

The state does not receive the full 12.5% royalty share because of the predominance of Federal leases in the unit and the conveyance of land to Cook Inlet Region Inc.

FIELD KUPARUK  
 LOCATION North Slope, onshore  
 BEGAN PRODUCTION 12/81  
 OWNER ARCD, BP, Chevron, Exxon, Mobil, Phillips, Sohio, Union  
 OPERATOR ARCD

	OIL		GAS	
		Casinghead-Gross	Casinghead-Net	Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	6,525,877 Bbl [1]	8,210,727 MCF	1,425,406 MCF	---
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	197,859 Bbl [1]	224,032,900 MCF	38,579,355 MCF	---
ESTIMATED RESERVES AS OF 12/31/85	1,050,422,369 Bbl	---	215,723,783 MCF	---
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	16%	---	15%	---

[1] Includes NGL.

ROYALTY 12.5 %

PURCHASER All owners

LEASES State ADL: 25512, 25513, 25519, 25520, 25521, 25522, 25523, 25524, 25527, 25531  
 25532, 25545, 25546, 25547, 25548, 25549, 25550, 25567, 25568, 25569  
 25570, 25571, 25572, 25573, 25583, 25584, 25585, 25586, 25587, 25588  
 25589, 25590, 25591, 25592, 25601, 25602, 25603, 25604, 25605, 25606  
 25607, 25608, 25609, 25610, 25628, 25629, 25630, 25631, 25632, 25633  
 25634, 25635, 25636, 25637, 25638, 25639, 25640, 25641, 25642, 25643  
 25644, 25645, 25646, 25647, 25648, 25649, 25650, 25651, 25652, 25653  
 25654, 25655, 25656, 25657, 25658, 25659, 25660, 25661, 25664, 25665  
 25666, 25667, 25668, 25669, 25670, 25671, 25672, 25673, 25674, 25675  
 25676, 25677, 25678, 25679, 25680, 25681, 25684, 25685, 25686, 25687  
 25689, 25690, 25691, 25695, 28234, 28236, 28242, 28244, 28247, 28248  
 47449, 81230, 318602, 318603, 318605, 318628, 318630, 348923, 348924  
 348924, 355023, 355024, 355030

COMMENTS

FIELD LEWIS RIVER  
 LOCATION Cook Inlet, onshore, west side  
 BEGAN PRODUCTION 1984  
 OWNER  
 OPERATOR Cities Service

	OIL		GAS	
		Casinghead		Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	---	Bbl	---	MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	---	Bbl	---	MCF
ESTIMATED RESERVES AS OF 12/31/85	---	Bbl	---	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---	---	---	<1%

[1] Ivan River, Lewis River, Pretty Creek and Stump Lake reserves are combined under Lewis River reserves.

ROYALTY 12.5%

PURCHASER /Bbl /MCF

LEASES State ADL: 58798, 58799, 58800, 58801, 58802, 58803, 58804, 58805, 58806, 75999

COMMENTS Short term gas sales to Enstar began in 1984.

FIELD LOCATION BEGAN PRODUCTION LISBURNE RESERVDIR  
 North Slope, onshore/offshore  
 Field delineation and facilities design underway, production expected to begin in 1986-87.

OWNER OPERATOR ARCO

	OIL	Casinghead	GAS	Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	69,244 Bbl	97,263 MCF	---	MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	1,422,266 Bbl	2,041,649 MCF	---	MCF
ESTIMATED RESERVES AS OF 12/31/85	399,792,267 Bbl	1,099,708,211 MCF	---	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	<1%	<1%	---	

-----  
 ROYALTY 12.5%

PURCHASER

-----  
 LEASES State ADL:

COMMENTS

FIELD LOCATION BEGAN PRODUCTION MCARTHUR RIVER  
 Cook Inlet offshore, west side  
 12/69  
 OWNER OPERATOR AMOCO, ARCO, Chevron, Getty, Marathon. Phillips, Union  
 Union

	OIL	Casinghead	GAS	Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	644,894 Bbl [1]	333,460 MCF		504,821 MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	514,855,660 Bbl [1]	186,050,661 MCF		113,953,335 MCF
ESTIMATED RESERVES AS OF 12/31/85	50,261,276 Bbl	---	MCF [2]	647,485,157 MCF [3]
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	91%	---		32%

[1] Includes NGL.

[2] Included under Gas Well reserves.

[3] Trading Bay reserves are combined with McArthur River reserves.

-----  
 ROYALTY 12.5%

PURCHASER Tesoro

-----  
 LEASES State ADL: 17579, 17594, 17602, 18716, 18729, 18730, 18758, 18772, 18777, 21068

COMMENTS

Gas from this field is casinghead gas and was formerly flared. DOGC Flaring Order #104, 6/30/71, has prohibited flaring since 7/1/72 and this gas is now recovered and used locally.

FIELD  
LOCATION  
BEGAN PRODUCTION  
OWNER  
OPERATOR

MIDDLE GROUND SHOAL  
Cook Inlet, offshore, east side  
9/67  
AMOCO, ARCO, Chevron, Getty, Phillips, Shell  
AMOCO, Shell

	OIL	Casinghead	GAS	Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	254,850 Bbl	175,709 MCF		37,910 MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	147,014 Bbl	74,237,880 MCF		1,437,504 MCF
ESTIMATED RESERVES AS OF 12/31/85	10,941,801 Bbl	6,436,571 MCF		--- MCF [1]
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	93%	92%		---

[1] Included under Casinghead reserves.

ROYALTY 12.5 %

PURCHASER Tesoro

LEASES State ADL: 17595, 18754, 18756

COMMENTS

Recent increases in gas prices may encourage a reevaluation of this gas.

Gas from this field is casinghead gas and was formerly flared. DOGC Flaring Order #104, 6/30/71, has prohibited flaring since 7/1/72 and this gas is now recovered and used locally.

FIELD  
LOCATION  
BEGAN PRODUCTION  
OWNER  
OPERATOR

MILNE POINT  
North Slope, onshore  
Production commenced in 1985.  
Champlin, Chevron, Cities Service, CONOCO, Reading & Bates  
Conoco

	OIL	Casinghead	GAS	Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	--- Bbl	--- MCF		--- MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	--- Bbl	--- MCF		--- MCF
ESTIMATED RESERVES AS OF 12/31/85	60,000,000 Bbl	--- MCF		--- MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---	---		---

ROYALTY Estimated effective rate, 18%.

PURCHASER

LEASES State ADL: 25509, 25516, 25518, 315848, 47433, 47434, 47437, 47438

COMMENTS

FIELD  
LOCATION  
BEGAN PRODUCTION  
OWNER  
OPERATOR

NICOLAI CREEK  
Cook Inlet, onshore-offshore, west side  
10/68, now shut-in  
Superior, Texaco  
Texaco

	OIL		Casinghead	GAS	Gas Well	
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	---	Bbl	---	MCF	---	MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	---	Bbl	---	MCF	1,062,055	MCF
ESTIMATED RESERVES AS OF 12/31/85	---	Bbl	---	MCF	3,000,000	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---		---		26%	

-----  
ROYALTY 12.5 %

PURCHASER AMOCO

-----  
LEASES State ADL: 17585, 17598, 63279

COMMENTS

Gas from this small field, when produced, is used only by platform and shore production facilities. At present there is no production and no prospective purchaser for the state's royalty share.

FIELD  
LOCATION  
BEGAN PRODUCTION  
OWNER  
OPERATOR

NORTH COOK INLET  
Cook Inlet, offshore, mid-channel  
3/69  
Phillips  
Phillips

	OIL		Casinghead	GAS	Gas Well	
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	---	Bbl	---	MCF	3,830,682	MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	---	Bbl	---	MCF	733,719,471	MCF
ESTIMATED RESERVES AS OF 12/31/85	---	Bbl	---	MCF	846,507,953	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---		---		46%	

-----  
ROYALTY 12.5 %

PURCHASER Alaska Pipeline  
Phillips

-----  
LEASES State ADL: 17589, 17590, 18740, 18741, 37831

COMMENTS

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

FIELD  
LOCATION  
BEGAN PRODUCTION  
OWNER  
OPERATOR

NORTH FORK  
Cook Inlet, onshore, east side  
Shut-in 1965  
  
Chevron

	OIL		Casinghead	GAS	Gas Well	
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	---	Bbl	---	MCF	---	MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	---	Bbl	---	MCF	104,595	MCF
ESTIMATED RESERVES AS OF 12/31/85	---	Bbl	---	MCF	12,000,000	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---		---		12	

-----  
ROYALTY

PURCHASER

-----  
LEASES State ADL:

COMMENTS

FIELD  
LOCATION  
BEGAN PRODUCTION  
OWNER  
OPERATOR

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

	OIL		Casinghead	GAS	Gas Well	
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	---	Bbl	---	MCF	---	MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	---	Bbl	---	MCF	---	MCF
ESTIMATED RESERVES AS OF 12/31/85	350,000,000	Bbl [1]	5,000,000,000	MCF [1]	---	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---		---		---	

[1] Oil and gas condensate.

-----  
ROYALTY

PURCHASER

-----  
LEASES State ADL:

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.

FIELD  
 LOCATION  
 BEGAN PRODUCTION  
 OWNER  
 OPERATOR

PRUDHOE BAY - SADLERCHIT RESERVOIR  
 North Slope, onshore  
 10/69  
 Amerada-Hess, ARCO, BP, Chevron, Exxon, Getty, LL&E, Marathon, Mobil,  
 Phillips, Shell, Sohio  
 ARCO, Sohio

	OIL	Casinghead-Gross	GAS Casinghead-Net	Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	47,293,162 Bbl [1]	76,513,903 MCF	7,421,810 MCF	--- MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	4,357,077,577 Bbl [1]	5,434,680,942 MCF	513,097,872 MCF	--- MCF
ESTIMATED RESERVES AS OF 12/31/85	5,913,129,514 Bbl	--- MCF	28,977,734,570 MCF	--- MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	42%	---	2%	---

[1] Includes NGL.

-----  
 ROYALTY 12.5%

PURCHASER Mapco-BVEA  
 Tesoro  
 Chevron  
 -----

LEASES	State ADL:	25637,	28238,	28239,	28240,	28241,	28244,	28245,	28246,	28257,	28258
		28259,	28260,	28261,	28262,	28263,	28264,	28265,	28275,	28276,	28277
		28278,	28279,	28280,	28281,	28282,	28283,	28284,	28285,	28286,	28287
		28288,	28289,	28290,	28299,	28300,	28301,	28302,	28303,	28304,	28305
		28306,	28307,	28308,	28309,	28310,	28311,	28312,	28313,	28314,	28315
		28316,	28320,	28321,	28322,	28323,	28324,	28325,	28326,	28327,	28328
		28329,	28330,	28331,	28332,	28333,	28334,	28335,	28339,	28343,	28345
		28346,	28349,	34628,	34629,	34630,	34631,	34632,	47446,	47447,	47448
		47449,	47450,	47451,	47452,	47453,	47454,	47469,	47471,	47472,	47475
		47476									

COMMENTS

The state's royalty share of oil produced is 12.5%, with 14.9% of this share presently being taken in kind and sold to North Pole Refinery and Golden Valley Electric Assn. An additional 35.5178% of the state's share is taken in kind and sold to Tesoro. The remainder is taken in value. Additional royalty oil sales in 1984 are contemplated to be taken in value.

Small amounts of produced gas are presently sold to the Trans-Alaska Pipeline. There presently is no other market. The state's royalty share of gas is 12.5%, which is taken in-value.

Unit Area expansion approved 1984, with additional development work continuing.

FIELD  
LOCATION  
BEGAN PRODUCTION  
OWNER  
OPERATOR

STERLING  
Cook Inlet, onshore, east side  
5/62  
Marathon, Union  
Union

	OIL		Casinghead	GAS	Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	---	Bbl	---	MCF	1,027 MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	---	Bbl	---	MCF	2,084,637 MCF
ESTIMATED RESERVES AS OF 12/31/85	---	Bbl	---	MCF	22,987,672 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---		---		8%

-----  
ROYALTY 12.5%, Effective rate, 1.55461%

PURCHASER Sport Lake Greenhouse

LEASES State ADL: 02497, 320912, 324599

COMMENTS

Since Federal and Cook Inlet Region Inc. leases are included, the state's royalty share is approximately 1.6%. The only gas sold from this field is consumed locally. There is no gas pipeline currently available to deliver this gas from this field to any other market. Because of limited reserves, there is no current prospect of additional markets.

FIELD  
LOCATION  
BEGAN PRODUCTION  
OWNER  
OPERATOR

STUMP LAKE UNIT AREA  
Cook Inlet, onshore, west side  
Suspended  
Chevron

	OIL		Casinghead	GAS	Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	---	Bbl	---	MCF	---
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	---	Bbl	---	MCF	---
ESTIMATED RESERVES AS OF 12/31/85	---	Bbl	---	MCF	[1] MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---		---		---

[1] Ivan River, Lewis River, Pretty Creek and Stump Lake reserves are combined under Lewis River reserves, above.

-----  
ROYALTY

PURCHASER

LEASES State ADL:

COMMENTS

FIELD  
LOCATION  
BEGAN PRODUCTION  
OWNER  
OPERATOR

THEODORE RIVER (PRETTY CREEK UNIT AREA)  
Cook Inlet, onshore, west side  
Suspended

Chevron

	OIL	Casinghead	GAS	Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	--- Bbl	--- MCF		---
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	--- Bbl	--- MCF		---
ESTIMATED RESERVES AS OF 12/31/85	--- Bbl	--- MCF		[1] MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---	---		---

[1] Ivan River, Lewis River, Pretty Creek and Stump Lake reserves are combined under Lewis River reserves, above.

ROYALTY

PURCHASER

LEASES State ADL:

COMMENTS

Production to commence in 1986 with delivery of gas to Enstar.

FIELD  
LOCATION  
BEGAN PRODUCTION  
OWNER  
OPERATOR

TRADING BAY  
Cook Inlet, offshore, west side  
12/67  
Marathon, Union  
Union

	OIL	Casinghead	GAS	Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	84,692 Bbl [1]	87,138 MCF		34,961 MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	87,424,728 Bbl [1]	58,803,352 MCF		2,382,982 MCF
ESTIMATED RESERVES AS OF 12/31/85	1,983,691 Bbl	--- MCF		[2] MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	98%	---		---

[1] Includes NGL.

[2] Trading Bay reserves are combined with McArthur River reserves, above.

ROYALTY

12.5 %

PURCHASER Tesoro

LEASES State ADL: 18731

COMMENTS

Gas from this field is casinghead gas and formerly was flared. DOGC Flaring Order #104, 6/30/71, has prohibited flaring since 7/1/72, and this gas is now recovered and used locally.

FIELD  
LOCATION  
BEGAN PRODUCTION  
OWNER  
OPERATOR

WEST FORK  
Cook Inlet, onshore, east side  
Shut-in gas field.

	OIL		Casinghead	GAS	Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	---	Bbl	---	MCF	2,333 MCF
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	---	Bbl	---	MCF	1,547,210 MCF
ESTIMATED RESERVES AS OF 12/31/85	---	Bbl	---	MCF	5,972,004 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---		---		21%

-----  
ROYALTY

PURCHASER

-----  
LEASES State ADL:

COMMENTS

FIELD  
LOCATION  
BEGAN PRODUCTION  
OWNER  
OPERATOR

WEST SAK RESERVOIR  
North Slope, onshore  
Pilot production underway  
ARCO, Conoco

	OIL		Casinghead	GAS	Gas Well
AVERAGE MONTHLY PRODUCTION 1/1/85 thru 9/30/85	---	Bbl	---	MCF	---
ESTIMATED CUMULATIVE PRODUCTION AS OF 12/31/85	3,365	Bbl	4,980	MCF	---
ESTIMATED RESERVES AS OF 12/31/85	N/D	Bbl	N/D	MCF	---
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 12/31/85	---		---		---

-----  
ROYALTY

PURCHASER

-----  
LEASES State ADL:

COMMENTS

Reservoir delineation and engineering/geological studies continuing.

S/D Tbl: Apdxa, rev: 1/8/85

APPENDIX A.2  
COOK INLET LEASE OWNERSHIP



COOK INLET LEASE OWNERSHIP  
(Data for 7/1/84 Thru 6/30/85)

APPENDIX A.2

FIELD	Sub-unit Producer Purchaser	LEASE OWNERSHIP		SALE VOLUMES		
		Working Interest	% of field	Average Monthly Production (Mcf/Mo.)	State Royalty Share	
				%	Mcf/Mo.	
<b>BEAVER CREEK</b>						
	Union	50.00%		394,717		
	Marathon	50.00%		394,717		
====				=====		
<b>TOTAL</b>				<b>789,433</b>		
<b>BELUGA RIVER</b>						
Well 214-35						
	Chevron	100.00%		135,985	7.555%	10,274
	Chugach		7.13%	127,863	7.555%	9,660
	Enstar		0.45%	8,122	7.555%	614
All Other Wells						
	Chevron	33.33%		552,855	7.555%	41,768
	Chugach		28.70%	515,065	7.555%	38,913
	Enstar		2.11%	37,790	7.555%	2,855
	ARCO	33.33%		552,855	7.555%	41,768
	Chugach		28.70%	515,065	7.555%	38,913
	Enstar		2.11%	37,790	7.555%	2,855
	Shell	33.33%		552,855	7.555%	41,768
	Chugach		28.70%	515,065	7.555%	38,913
	Enstar		2.11%	37,790	7.555%	2,855
-----				-----		
Subtotal- Chugach				1,672,942		
Subtotal- Enstar				121,490 *		
====				=====		
<b>TOTAL</b>				<b>1,764,060</b>		
* 4 month average.						
<b>GRANITE POINT</b>						
Granite Point I						
	Mobil	75.00%		2,321		
	AMOCO					
	Marathon					
	Union	25.00%		784		
	AMOCO					
	Marathon					
Granite Point II						
	AMOCO	25.00%		---		
	ARCO	12.50%		---		
	Chevron	12.50%		---		
	Getty	25.00%		---		
	Phillips	25.00%		---		
-----				-----		
Subtotal- AMOCO				2,312		
Subtotal- Marathon				2,350 *		
====				=====		
<b>TOTAL</b>				<b>3,095</b>		
* 4 month average.						

FIELD	Sub-unit Producer Purchaser	LEASE OWNERSHIP		SALE VOLUMES	
		Working Interest	% of field	Average Monthly Production (Mcf/Mo.)	State Royalty Share % Mcf/Mo.
<b>KENAI</b>					
	Union	50.00%			
	APL I-Anchorage		10.28%	845,622	2.069%
	APL-Nikiski		0.19%	15,888	2.069%
	Union-Chevron Exchange		0.19%	15,518	2.069%
	City of Kenai		0.25%	20,590	2.069%
	Rental		4.50%	370,334	2.069%
	Rental-Additional		2.37%	194,981	2.069%
	Union Chemical		40.73%	3,352,041	2.069%
	Marathon	50.00%			
	APL I-Anchorage		14.38%	1,183,535	2.069%
	APL II-Anchorage		4.48%	368,603	2.069%
	APL-Nikiski		0.19%	15,888	2.069%
	City of Kenai		0.25%	20,599	2.069%
	Rental		4.50%	370,242	2.069%
	Rental-Additional		2.36%	194,450	2.069%
	Tokyo Utilities		15.32%	1,261,073	2.069%
	Subtotal- Union			4,814,974	
	Subtotal- Marathon			3,414,390	
	Subtotal- APL I-Anchorage			2,029,157	
	Subtotal- APL II-Anchorage			368,603	
	Subtotal- APL-Nikiski			31,776	
	Subtotal- Union-Chevron Exchange			15,518	
	Subtotal- City of Kenai			41,189	
	Subtotal- Rental-Swanson R.			740,576	
	Subtotal- Rental-Additional			389,431	
	Subtotal- Union Chemical			3,352,041	
	Subtotal- Tokyo Utilities			1,261,073	
====	TOTAL			8,229,364	
<b>LEWIS RIVER</b>					
	Group 1				
	Cities Svcs	81.00%		N/D	
	Enstar				
	Pacific Ltg	19.00%		N/D	
	Enstar				
	Group 2				
	Cities Svcs	15.00%		N/D	
	Enstar				
	Pacific Ltg	85.00%		N/D	
	Enstar				
	Group 3				
	Pacific Ltg	100.00%		---	
	Enstar				
====	TOTAL			153,171 *	
	*4 month average.				
<b>McARTHUR RIVER</b>					
	West Foreland				
	Union	49.00%		3,248	
	Marathon	49.00%		3,248	
	ARCO	2.00%		133	
	Middle Kenai 6				
	Union	49.00%		7,484	
	Marathon	49.00%		7,484	
	ARCO	2.00%		305	
	Healock				
	Union	40.95%		49,192	
	ARCO	12.90%		15,496	
	Marathon	40.95%		49,192	
	AMOCO	1.40%		1,682	
	Phillips	1.40%		1,682	
	Getty	1.40%		1,682	
	Chevron	1.00%		1,201	
	Kenai 6 Zone-K10				
	Union	100.00%		213,401	
====	TOTAL			355,431	

FIELD	Sub-unit Producer Purchaser	LEASE OWNERSHIP		SALE VOLUMES		
		Working Interest	% of field	Average Monthly Production (Mcf/Mo.)	State Royalty Share %	Mcf/Mo.
MIDDLE GROUND SHOAL						
	Group 1					
	AMOCO	25.00%		8,071		
	ARCO	12.50%		4,036		
	Chevron	12.50%		4,036		
	Getty	25.00%		8,071		
	Phillips	25.00%		8,071		
	Group 2					
	Shell	66.67%		---		
	ARCO	33.33%		---		
====				=====		
	TOTAL			32,284		
NORTH COOK INLET						
	Phillips	100.00%		3,932,294		
	Phillips			3,931,648		
	Boiler fuel			93		
	Turbine fuel			347		
NORTH TRADING BAY						
	Group 1					
	ARCO	100.00%		---		
	Group 2					
	Texaco	50.00%		---		
	Superior	50.00%		---		
====						
	TOTAL					
SOUTH MIDDLE GROUND SHDAL						
	AMOCO	25.00%		---		
	ARCO	12.50%		---		
	Chevron	12.50%		---		
	Getty	25.00%		---		
	Phillips	25.00%		---		
====						
	TOTAL					
STERLING						
	Union	50.00%				
	Peninsula Greenhouse			736	1.555%	11
	Marathon	50.00%				
	Peninsula Greenhouse			736	1.555%	11
====				=====		
	TOTAL			1,472		
SWANSON RIVER						
	Soldotna Creek Unit					
	Chevron	50.00%		---		
	ARCO	50.00%		---		
	Swanson River Unit					
	Chevron	44.75%		---		
	ARCO	44.75%		---		
	Union	5.25%		---		
	Marathon	5.25%		---		
====						
	TOTAL					

FIELD	Sub-unit Producer Purchaser	LEASE OWNERSHIP		SALE VOLUMES		
		Working Interest	% of field	Average Monthly Production (Mcf/Mo.)	State Royalty %	Share Mcf/Mo.
TRADING BAY						
A-6						
	Marathon C166S	33.33%		25	12.500%	3
	Union C166S	33.33%		25	12.500%	3
	Superior C166S	16.67%		12	12.500%	2
	Texaco C166S	16.67%		12	12.500%	2
A-15						
	Marathon C166S	33.33%		0	12.500%	1
	Union C166S	33.33%		0	12.500%	1
	Superior C166S	16.67%		4	12.500%	0
	Texaco	16.67%		4	12.500%	0
	Non-Pool			4	12.500%	0
	Union C166S	50.00%		547	12.500%	68
	Marathon C166S	50.00%		547	12.500%	68
====				=====		
TOTAL				1,190		

- 1/ Average monthly volume is calculated as annual volume divided by 12 months.
  - 2/ Royalty and contract values are the most current in effect as of July 1985.
  - 3/ Quantity term could extend or shorten the contract period.
  - 4/ Price reported by Marathon is being paid under protest.
  - 5/ Contract price is a gross price before transportation costs.
- BVOLVAL;9/18/85

APPENDIX A.3  
COOK INLET FIELD OWNERSHIP



COOK INLET FIELD OWNERSHIP

APPENDIX A.3

FIELD ADMINISTRATOR Field Sub-unit Lease Owner, Interest	LEASE NUMBER	OIL			GAS			
		P/A Tract Factor	Admin. % of Lease	Admin. % of P/A	P/A Tract Factor	Admin. % of Lease	Admin. % of P/A	
<b>BEAVER CREEK UNIT</b>								
<b>FEDERAL</b>								
Marathon	100.000Z	002-028078	---	---	---	N/D	100.0000000Z	N/D
		002-028083	100.0000000Z	82.8125000Z	82.8125000Z	N/D	100.0000000Z	N/D
		002-028118	---	---	---	N/D	100.0000000Z	N/D
		002-028120	---	---	---	N/D	100.0000000Z	N/D
	Subtotal					67.6868666Z		67.6868666Z
<b>CIRI</b>								
Marathon	100.000Z	002-028078	---	---	---	7.8405018Z	100.0000000Z	7.8405018Z
		002-028083	100.0000000Z	17.1875000Z	17.1875000Z	8.3165326Z	100.0000000Z	8.3165326Z
		002-028118	---	---	---	13.1048177Z	100.0000000Z	13.1048177Z
		002-028120	---	---	---	3.0512813Z	100.0000000Z	3.0512813Z
	Subtotal		100.0000000Z		17.1875000Z	32.3131334Z		32.3131334Z
	TOTAL: FEDERAL+CIRI		100.0000000Z		100.0000000Z	100.0000000Z		100.0000000Z

FIELD ADMINISTRATOR Field Sub-unit Lease Owner, Interest	LEASE NUMBER	OIL			GAS		
		P/A Tract Factor	Admin. % of Lease	Admin. % of P/A	P/A Tract Factor	Admin. % of Lease	Admin. % of P/A
<b>LEWIS RIVER UNIT</b>							
<b>STATE</b>							
Group 1							
Cities Svc	81.000Z ADL-58798	---	---	---	100.000000Z	100.000000Z	100.000000Z
Pacific Lt	19.000Z ADL-58799	---	---	---	100.000000Z	100.000000Z	100.000000Z
	ADL-58800	---	---	---	100.000000Z	100.000000Z	100.000000Z
	ADL-58802	---	---	---	100.000000Z	100.000000Z	100.000000Z
	ADL-58803	---	---	---	100.000000Z	100.000000Z	100.000000Z
	ADL-58804	---	---	---	100.000000Z	100.000000Z	100.000000Z
	ADL-58805	---	---	---	100.000000Z	100.000000Z	100.000000Z
	ADL-58806	---	---	---	100.000000Z	100.000000Z	100.000000Z
	Subtotal				100.000000Z		100.000000Z
Group 2							
Cities Svc	15.000Z ADL-58801	---	---	---	100.000000Z	100.000000Z	100.000000Z
Pacific Lt	85.000Z						
Group 3							
Pacific Lt	100.000Z ADL-75999	---	---	---	100.000000Z	100.000000Z	100.000000Z
	TOTAL: STATE						100.000000Z
<b>MCARTHUR RIVER</b>							
<b>STATE</b>							
West Foreland							
Union	49.000Z ADL-18730	43.470000Z	100.000000Z	43.470000Z	43.470000Z	100.000000Z	43.470000Z
Marathon	49.000Z ADL-17594	39.130000Z	100.000000Z	39.130000Z	39.130000Z	100.000000Z	39.130000Z
Arco	2.000Z ADL-18729	8.700000Z	100.000000Z	8.700000Z	8.700000Z	100.000000Z	8.700000Z
	ADL-18772	8.700000Z	100.000000Z	8.700000Z	8.700000Z	100.000000Z	8.700000Z
	Subtotal	100.000000Z		100.000000Z	100.000000Z		100.000000Z
Middle Kenai G							
Union	49.000Z ADL-17594	26.670000Z	100.000000Z	26.670000Z	26.670000Z	100.000000Z	26.670000Z
Marathon	49.000Z ADL-18730	32.590000Z	100.000000Z	32.590000Z	32.590000Z	100.000000Z	32.590000Z
Arco	2.000Z ADL-18729	34.810000Z	100.000000Z	34.810000Z	34.810000Z	100.000000Z	34.810000Z
	ADL-18772	5.930000Z	100.000000Z	5.930000Z	5.930000Z	100.000000Z	5.930000Z
	Subtotal	100.000000Z		100.000000Z	100.000000Z		100.000000Z
Healock							
Union	40.950Z ADL-17579	12.948000Z	100.000000Z	12.948000Z	12.948000Z	100.000000Z	12.948000Z
Arco	12.900Z ADL-17602	3.700000Z	100.000000Z	3.700000Z	3.700000Z	100.000000Z	3.700000Z
Marathon	40.950Z ADL-18758	2.775000Z	100.000000Z	2.775000Z	2.775000Z	100.000000Z	2.775000Z
Amoco	1.400Z ADL-18777	4.601000Z	100.000000Z	4.601000Z	4.601000Z	100.000000Z	4.601000Z
Phillips	1.400Z ADL-21068	0.925000Z	100.000000Z	0.925000Z	0.925000Z	100.000000Z	0.925000Z
Getty	1.400Z ADL-17594	28.648000Z	100.000000Z	28.648000Z	28.648000Z	100.000000Z	28.648000Z
Chevron	1.000Z ADL-18729	17.833000Z	100.000000Z	17.833000Z	17.833000Z	100.000000Z	17.833000Z
	ADL-18730	16.648000Z	100.000000Z	16.648000Z	16.648000Z	100.000000Z	16.648000Z
	ADL-18772	9.249000Z	100.000000Z	9.249000Z	9.249000Z	100.000000Z	9.249000Z
	ADL-18716	2.673000Z	100.000000Z	2.673000Z	2.673000Z	100.000000Z	2.673000Z
	Subtotal	100.000000Z		100.000000Z	100.000000Z		100.000000Z
Kenai G Zone, K-10							
Union	100.000Z ADL-18777	100.000000Z		100.000000Z	100.000000Z		100.000000Z
	TOTAL: STATE			100.000000Z			100.000000Z

FIELD ADMINISTRATOR Field Sub-unit Lease Owner, Interest	LEASE NUMBER	OIL			GAS		
		P/A Tract Factor	Admin. % of Lease	Admin. % of P/A	P/A Tract Factor	Admin. % of Lease	Admin. % of P/A
<b>MIDDLE GROUND SHOAL STATE</b>							
Group 1							
Amoco	25.000% ADL-17595	26.5880000%	100.0000000%	26.5880000%	26.5880000%	100.0000000%	26.5880000%
Arco	12.500%						
Chevron	12.500%						
Getty	25.000%						
Phillips	25.000%						
Group 2							
Shell	33.330% ADL-18754	45.2340000%	100.0000000%	45.2340000%	45.2340000%	100.0000000%	45.2340000%
Arco	33.330% ADL-18756	28.1780000%	100.0000000%	28.1780000%	28.1780000%	100.0000000%	28.1780000%
Chevron	33.340%						
Subtotal		73.4120000%		73.4120000%	73.4120000%		73.4120000%
TOTAL: STATE				100.0000000%			100.0000000%
<b>NORTH COOK INLET STATE</b>							
Phillips	100.000% ADL-17589	---	---	---	44.7324000%	100.0000000%	44.7324000%
	ADL-17590	---	---	---	6.5430000%	100.0000000%	6.5430000%
	ADL-18740	---	---	---	8.1787000%	100.0000000%	8.1787000%
	ADL-18741	---	---	---	6.5430000%	100.0000000%	6.5430000%
	ADL-37831	---	---	---	34.0029000%	100.0000000%	34.0029000%
TOTAL: STATE					100.0000000%		100.0000000%
<b>NORTH TRADING BAY UNIT STATE</b>							
Group 1							
Arco	100.000% ADL-17597	50.0000000%	100.0000000%	50.0000000%	---	---	---
	ADL-18776	28.5700000%	100.0000000%	28.5700000%	---	---	---
Subtotal		78.5700000%		78.5700000%			
Group 2							
Texaco	50.000% ADL-34531	21.4300000%	100.0000000%	21.4300000%	---	---	---
Superior	50.000%						
TOTAL: STATE		100.0000000%		100.0000000%			
<b>SOUTH MIDDLE GROUND SHOALS STATE</b>							
Amoco	25.000% ADL-18744	6.8965600%	100.0000000%	6.8965600%	---	---	---
Arco	12.500% ADL-18746	93.1034400%	100.0000000%	93.1034400%	---	---	---
Chevron	12.500%						
Getty	25.000%						
Phillips	25.000%						
TOTAL: STATE				100.0000000%			

FIELD ADMINISTRATOR Field Sub-unit Lease Owner, Interest	LEASE NUMBER	DIL			GAS			
		P/A Tract Factor	Admin. % of Lease	Admin. % of P/A	P/A Tract Factor	Admin. % of Lease	Admin. % of P/A	
<b>STERLING UNIT STATE</b>								
Union	50.000Z	ADL-324599	---	---	---	4.8484000Z	100.0000000Z	4.8484000Z
Marathon	50.000Z	ADL-324599	---	---	---	1.5990000Z	100.0000000Z	1.5990000Z
		ADL-02497	---	---	---	3.6283000Z	100.0000000Z	3.6283000Z
		ADL-320912	---	---	---	2.3612000Z	100.0000000Z	2.3612000Z
	Subtotal					12.4369000Z		12.4369000Z
<b>FEDERAL</b>								
Union	50.000Z	02-028063	---	---	---	47.6388000Z	40.1451498Z	19.1246676Z
Marathon	50.000Z	02-028135	---	---	---	30.5822000Z	29.3066489Z	8.9626180Z
	Subtotal					78.2210000Z		28.0872856Z
<b>CIRI</b>								
Union	50.000Z	02-028063	---	---	---	47.6388000Z	59.8548502Z	28.5141324Z
Marathon	50.000Z	02-028135	---	---	---	30.5822000Z	70.6933511Z	21.6195820Z
		ADL-01836	---	---	---	2.6316000Z	100.0000000Z	2.6316000Z
		ADL-51502	---	---	---	5.0463000Z	100.0000000Z	5.0463000Z
		ADL-51502	---	---	---	1.6642000Z	100.0000000Z	1.6642000Z
	Subtotal					87.5631000Z		59.4758144Z
	<b>TOTAL: STATE+FEDERAL+CIRI</b>							100.0000000Z

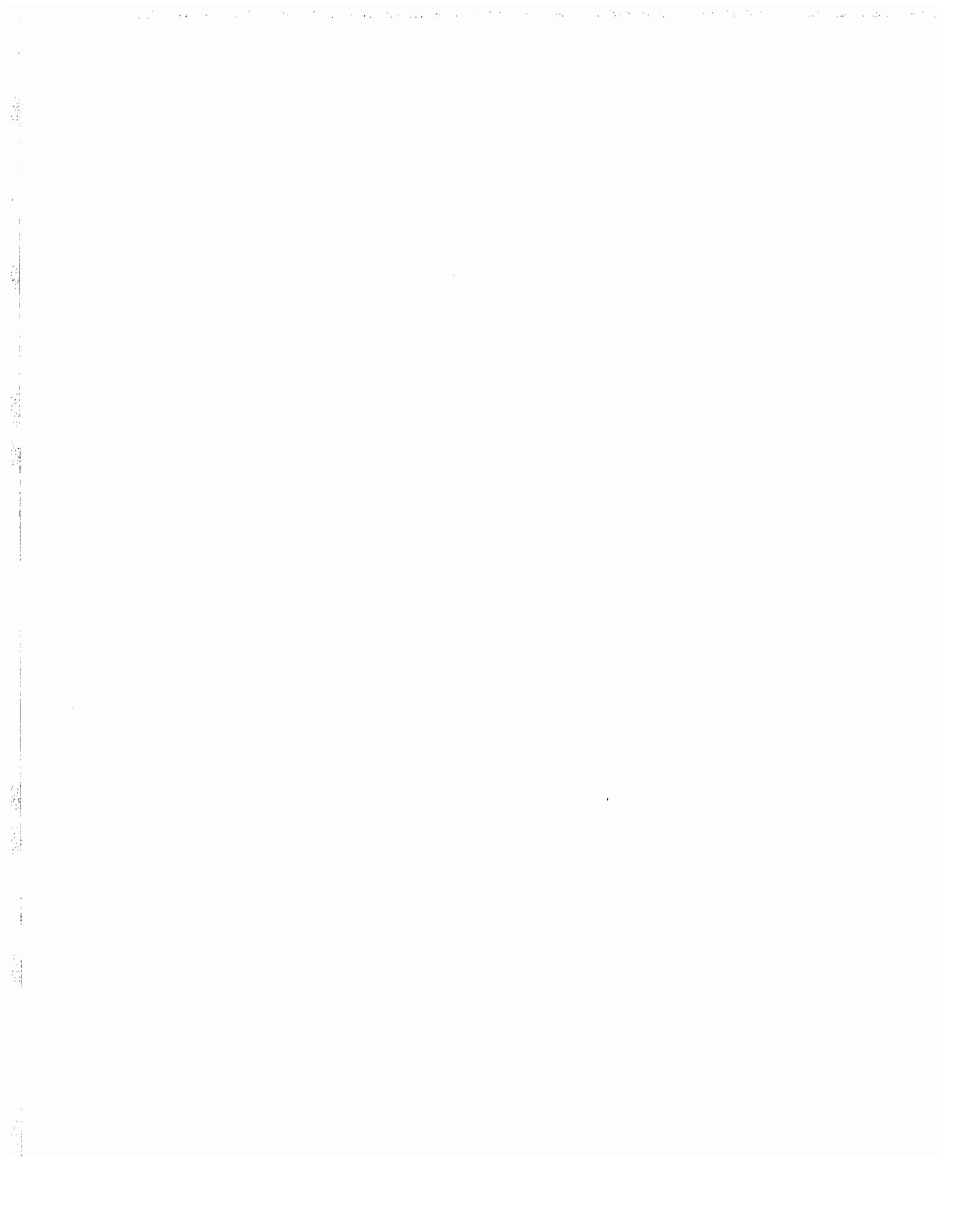
**SWANSON RIVER UNIT \***

<b>FEDERAL</b>								
Chevron	48.486Z	002-028077	0.8614100Z	100.0000000Z	0.8614100Z	0.8614100Z	100.0000000Z	0.8614100Z
Arco	48.486Z	002-028384	0.2907000Z	100.0000000Z	0.2907000Z	0.2907000Z	100.0000000Z	0.2907000Z
Union	1.514Z	002-028396	0.0286637Z	100.0000000Z	0.0286637Z	0.0286637Z	100.0000000Z	0.0286637Z
Marathon	1.514Z	002-028399	2.9888636Z	100.0000000Z	2.9888636Z	2.9888636Z	100.0000000Z	2.9888636Z
		002-028405	0.1710937Z	100.0000000Z	0.1710937Z	0.1710937Z	100.0000000Z	0.1710937Z
		002-028406	11.3919900Z	100.0000000Z	11.3919900Z	11.3919900Z	100.0000000Z	11.3919900Z
		002-028990	1.2663167Z	100.0000000Z	1.2663167Z	1.2663167Z	100.0000000Z	1.2663167Z
		002-028993	0.6648250Z	100.0000000Z	0.6648250Z	0.6648250Z	100.0000000Z	0.6648250Z
		002-028996	16.5466071Z	100.0000000Z	16.5466071Z	16.5466071Z	100.0000000Z	16.5466071Z
		002-028997	30.2338500Z	100.0000000Z	30.2338500Z	30.2338500Z	100.0000000Z	30.2338500Z
		002-029002	0.1693000Z	100.0000000Z	0.1693000Z	0.1693000Z	100.0000000Z	0.1693000Z
	Subtotal		64.6136198Z		64.6136198Z	64.6136198Z		64.6136198Z
<b>CIRI</b>								
Chevron	48.486Z	002-028077	1.4878900Z	100.0000000Z	1.4878900Z	1.4878900Z	100.0000000Z	1.4878900Z
Arco	48.486Z	002-028384	2.0349000Z	100.0000000Z	2.0349000Z	2.0349000Z	100.0000000Z	2.0349000Z
Union	1.514Z	002-028396	0.5601363Z	100.0000000Z	0.5601363Z	0.5601363Z	100.0000000Z	0.5601363Z
Marathon	1.514Z	002-028399	3.5866364Z	100.0000000Z	3.5866364Z	3.5866364Z	100.0000000Z	3.5866364Z
		002-028405	0.9239063Z	100.0000000Z	0.9239063Z	0.9239063Z	100.0000000Z	0.9239063Z
		002-028406	4.5038100Z	100.0000000Z	4.5038100Z	4.5038100Z	100.0000000Z	4.5038100Z
		002-028990	6.3315833Z	100.0000000Z	6.3315833Z	6.3315833Z	100.0000000Z	6.3315833Z
		002-028993	3.8939750Z	100.0000000Z	3.8939750Z	3.8939750Z	100.0000000Z	3.8939750Z
		002-028996	1.9855929Z	100.0000000Z	1.9855929Z	1.9855929Z	100.0000000Z	1.9855929Z
		002-028997	10.0779500Z	100.0000000Z	10.0779500Z	10.0779500Z	100.0000000Z	10.0779500Z
	Subtotal		35.3863802Z		35.3863802Z	35.3863802Z		35.3863802Z
	<b>TOTAL: FEDERAL+CIRI</b>					100.0000000Z		100.0000000Z

FIELD ADMINISTRATOR Field Sub-unit Lease Owner, Interest	LEASE NUMBER	OIL			GAS			
		P/A Tract Factor	Admin. % of Lease	Admin. % of P/A	P/A Tract Factor	Admin. % of Lease	Admin. % of P/A	
TRADING BAY FIELD STATE								
Well A-6								
Marathon	33.333Z	ADL-18731	4.9955900Z	100.0000000Z	4.9955900Z	5.0504100Z	100.0000000Z	5.0504100Z
Union	33.333Z							
Superior	16.667Z							
Texaco	16.667Z							
Well A-15								
Marathon	35.000Z		2.3901000Z	100.0000000Z	2.3901000Z	3.3406100Z	100.0000000Z	3.3406100Z
Union	35.000Z							
Superior	15.000Z							
Texaco	15.000Z							
Non-Pool								
Marathon	50.000Z		92.6143100Z	100.0000000Z	92.6143100Z	91.6089800Z	100.0000000Z	91.6089800Z
Union	50.000Z							
TOTAL: STATE			=====			=====		
			100.0000000Z			100.0000000Z		
WEST FORK UNIT FEDERAL								
Enstar	100.000Z	002-028988A	---	---	---	100.0000000Z	100.0000000Z	100.0000000Z

\* Swanson River factors for LPG are identical to factors for oil and gas.

S/DB6;APXA\_3;1/10/86



APPENDIX B  
DEMAND PROJECTION  
METHODOLOGY AND ASSUMPTIONS



## Introduction

Demand for oil and gas is best calculated by dividing total demand into use categories. Because the factors affecting the level and growth rate of demand by use are similar and the fact that oil and gas often compete with one another in a market for a particular use such as for space heating or electricity generation, demand may otherwise be distorted. The use categories in this study are transportation, electricity, space heat (including cooking, water heating, and clothes drying), and industrial. A model called ENDMOD (ENergy Demand MODel) has been constructed for calculating future energy demands in Alaska.

The factors most important in projecting future demand will vary by use category. In general, the most important are population (or households) and relative fuel prices. The household is the basic consuming unit for the residential sector, and is a good proxy for demand in the commercial sector. In the industrial sector, relative fuel prices are the primary demand determinate. In the residential and commercial sectors, fuel prices are more important in determining the type of fuel used.

## Transportation Use of Liquid Petroleum

### Introduction

Projecting transportation fuel use requires the use of per capita consumption coefficients.

### Gasoline:

- a. Highway use (taxable and exempt) is the largest category of gasoline consumption in Alaska. Historically, demand is related to population, personal income, and the fuel efficiency of the automobile stock. In Alaska, growth in the first two factors will tend to offset the effect of increased fuel efficiency in future years resulting in aggregate growth in use of this fuel. Nationally, per capita consumption of gasoline has fallen in recent years. We assume a continuation of this per capita trend for Alaska. In Alaska, per capita consumption of highway gas peaked in 1975 at 502 gallons per capita and declined to 383 gallons per capita in 1983. The estimated consumption for 1984 is 418 gallons per person. Demand is projected using a per capita, coefficient which declines one percent annually from the previous year. The initial value of 411 gallons per capita is the mean of per capita consumption of 1981 through 1984.
- b. Aviation gasoline (taxable and exempt) use has, in the past decade, been roughly 10 percent as large as highway gasoline use. Between 1971 and 1982, consumption of aviation gas per capita varied between 35 and 43 gallons. In 1982, consumption fell to 36 gallons from the peak of 43 gallons in 1981 and to 30 gallons per capita in 1983. Consumption

increased in 1984 to an estimated 33 gallons per capita. The initial value for aviation gas consumption is the 4-year mean of 35 gallons per capita.

- c. Marine gasoline (taxable and exempt) use has, in the past decade, been roughly 50 percent of the aviation gasoline consumption level with an apparently slightly slower growth rate. We assume a strong income elasticity of demand will result in maintenance of the current per-capita-use coefficient in future years. Consumption in 1983 was 17 gallons per capita. The initial value used to project consumption is the 4-year mean of 17.5 gallons per capita.

#### Jet Fuel:

Jet fuel consumption consists of domestic commercial operations, international commercial operations, and military operations. Domestic commercial operations are a function of the Alaskan population and economy, and as such, have grown rapidly in per capita terms historically (taxable). International commercial operations are a function of world economic and political conditions, as well as aviation technology. Military operations are broadly a function, albeit a different one, of the same factors. These two latter categories cannot be separately identified in the historical data, but their combined total has shown relatively modest, although cyclical, growth since the early 1970s. The sharp decrease in reported exempt aviation fuel consumption (and a corresponding increase in taxable jet fuel consumption) in 1982 is probably a reporting error.

We project domestic commercial consumption separately from international commercial and military use. We assume that the taxable jet fuel category is primarily domestic commercial consumption, and that the exempt jet fuel category includes international commercial and military consumption. The coefficient relating consumption to population for domestic commercial aviation has increased from 153 gallons per capita in 1971 to 350 in 1981 and 575 in 1984. (This excludes the reporting error of 1982.) The initial value for projecting the civilian domestic jet fuel is 525 gallons per capita.

We assume future growth will exceed population but at a slower rate than it has historically because of increased efficiency of the capital stock. The coefficient grows by 3 percent annually.

International commercial and military consumption of jet fuel is the only category of fuel consumption not projected on a per capita basis. While variation in international commercial and military consumption is difficult to project, growth during the preceding decade approximated 1 percent per annum. We use this figure to project future growth with 1984 consumption of 260 million gallons as the initial value.

## Diesel:

The categories used to report diesel fuel sales in Department of Revenue tax records have changed at least twice since 1979, making use of this source of data for projecting highway diesel consumption (or any type of consumption) difficult.

Future growth in consumption is projected at the per capita use rate of 565 gallons. While the most recent reporting system provides a breakout of nontransportation sales in the "exempt other diesel" category, the estimates of highway diesel for earlier years require the assumption that the magnitude of nontransportation diesel sales is small in the "exempt highway" and later "exempt other" categories. Additionally, we assume that the old "off-highway category" is primarily nontransportation use.

The per capita consumption of highway diesel fuel has grown steadily since 1978, when it reached a post-pipeline construction low. Future growth in consumption is projected, based upon the 3-year mean for 1982-1984.

Marine diesel use has increased very rapidly since 1981. The source of this growth is impossible to determine from the data. We assume a constant per capita level of consumption of 250 gallons in future years.

## Regional Allocation

Regional allocation of transportation fuels is made using the 1983 allocations of historical consumption as adjusted by projected shifts in regional population.

## Electric Utility Use of Liquid Fuels and Natural Gas

### Introduction

Electric utility use of oil and gas is a derived demand based upon the demand for electricity and the methods used to generate it. We project this use of liquid fuels and natural gas by first estimating electricity demand for space heating and nonspace heating uses, then determining the proportion generated by fuel oil and natural gas, and, finally, determining demand based upon the efficiency of generation (heat rate). Since the electricity generation alternatives vary by region in Alaska, we project fuel use by three major regions of the state: Railbelt, Southeast, and the rest of the state.

### Railbelt

#### a. Consumption of Electricity

The total electricity demand is split into the demand for residential space heat and for all other uses. The space heating consumption rates are based upon the weighted average of electricity consumption for space heat by housing type as reported in the 1983 version of the Railbelt Electricity Demand (RED) model (Battelle Northwest Laboratories, June 1983). Consumption per household grows over the projection period due to increased electricity consumption for space heat in the new additions to the housing stock.

The number of households using electric space heat depends upon the total number of households and the proportion of housing units which use electric space heat. Two factors are likely to influence the current proportion of households using electric space heat: (1) the extension of the gas utility into the Matanuska Valley and (2) the completion of the electric intertie between Anchorage and Fairbanks. The former will result in a portion of existing structures converting to natural gas from electricity for space heating. This will slow the growth rate of electricity use but increase the use of utility gas. The second factor may alter the relative price of electricity in both Anchorage and Fairbanks relative to natural gas and fuel oil, thus causing some households, especially in Fairbanks, to switch from fuel oil to electric space heat.

We assume the gas utility will continue to extend its market into the Matanuska Valley and aggressively market gas for space heating. Market penetration began in 1984, and during the next ten years, the electric space heating market in the Matanuska Valley will fall to half its current share.

We assume the completion of the Anchorage-Fairbanks intertie does not significantly alter the price of electricity for consumers in either location. In particular, no shift towards electric space heating in Fairbanks is assumed as a result of the tie-in to the inexpensive gas-fired electricity from Anchorage.

The per-household demand for electricity net of residential space heating uses is based upon historical consumption for 1980-1983 and the projected growth in consumption as reported by Battelle in the RED model documentation. This includes both residential and commercial consumption.

#### b. Mode Split

Except as noted below, future additions to capacity within the projection period are all gas-fired turbines. Incremental generation in Anchorage is entirely natural gas. Incremental generation in Fairbanks will depend upon the cheaper of the cost of purchased electricity from Anchorage generated by natural gas and the marginal cost of locally produced electricity generated by fuel oil. We assume electricity moves in both directions in the line at different times. Fairbanks excess capacity provides reserves to Anchorage, and cheap Anchorage generation provides off-peak electricity to Fairbanks. Incremental generation in Fairbanks comes from Anchorage-produced electricity. The following assumptions specifically determine mode split:

1. Coal-fired generation in Fairbanks remains constant at 354 thousand Megawatt hours annually.
2. Existing (Eklutna and Cooper Lake) hydroelectric facilities continue to provide railbelt power.
3. Fuel oil generation in Fairbanks declines 50 percent as a result of the intertie.
4. Solomon Gulch provides a firm annual average production of 54.6 thousand Megawatt hours annually.
5. Bradley Lake comes on line in 1993 and produces 330 thousand Megawatt hours annually. This backs out 4.4 billion cubic feet of natural gas annually.

Heat rates are projected to remain at current levels.

#### Southeast

##### a. Consumption

The growth rate in consumption per capita in Southeast is assumed to be the same rate as in the railbelt. These growth rates are applied to 1983 per capita consumption of 8,000 kwh per capita. The advent of less expensive electricity provided by hydroelectric power may cause electric space heating demand to grow and accelerate that growth rate. We assume this effect is insignificant.

##### b. Mode Split

As recently completed hydroelectric projects are brought on line, they will back out the use of fuel oil in electricity generation in those locations linked to the hydro power. The consumption of electricity in these communities is estimated using the proportion of Southeast Alaska electricity consumption used by these communities in 1983.

#### Rest-of-State

Growth in per capita electricity demand in the rest of the state is assumed to occur at twice the rate projected for the railbelt. These growth rates are applied to 1983 per capita consumption rates of 3,900 kwh per capita.

With the exception of Barrow, this region currently relies on fuel oil for electricity generation. This dependence is projected to continue into the future with the exception of Kodiak, which now receives hydropower from the Terror Lake project.

## Space Heating Use of Liquid Fuels and Natural Gas<sup>1</sup>

### Introduction

In the Anchorage area, natural gas is the most economical fuel for space heating. Elsewhere, fuel oil is the least expensive alternative except where electricity generated by natural gas is available. In projecting future demands, we use different procedures for gas and fuel oil because of differences in data availability. Natural gas use is based upon a projection of the current level of consumption. Fuel oil demand is estimated based upon the proportion of the population assumed to heat with fuel oil, and estimates of mean household fuel oil consumption. This approach is necessitated because there is no reliable direct estimate of current fuel oil consumption for space heating.

### Railbelt

Natural gas for space heating (and a small amount of related uses for gas purchased from utilities) is projected to grow as a function of population. Growth historically has occurred at a rate in excess of population due to gas retrofitting and expansion of the commercial sector. This trend will moderate in the future, and growth is projected to exceed population by two percent annually.

In addition, a new gas market has opened in the Matanuska Valley. We estimate that by 1995, one-half of the building stock in the Matanuska Valley will utilize natural gas for space heating. The proportion of railbelt population heating with gas is 47 percent. This factor forms the basis for estimating the growth of space heating demand for natural gas in the Matanuska Valley. The resulting demand level is estimated on a per household basis for residential consumption and a per capita basis for commercial consumption. Residential natural gas consumption is approximately 200 thousand cubic feet per household. Per capita commercial consumption is 55 thousand cubic feet.

Fuel oil use for space heating is generally preferred only where gas or gas-fired electricity is not available. Growth in its use will depend upon the location of new structures in the railbelt. We assume that the proportion of households using fuel oil for space heat declines slightly from the current share of 24 percent to 22.4 percent in 1999. Per household residential and per capita commercial fuel oil consumption are based on gas consumption figures converted to fuel oil on the basis of BTU equivalency.

### Nonrailbelt

Outside the railbelt, space heating is almost entirely provided by fuel oil, with the exception of Barrow. Fuel oil consumption is calculated using the share of households with fuel oil space heat and the same per capita

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<sup>1</sup>Includes water heating, cooking, and other minor uses.

coefficient of fuel oil use for space heating as applied to the railbelt population. This estimate is consistent with surveys and small regional studies of fuel oil use in rural Alaska. This estimate entails compensating errors. On the one hand, the heating degree days are greater in most parts of the state which rely on fuel oil relative to Anchorage. On the other hand, the stock of structures is smaller outside Anchorage.

For natural gas consumption in Barrow, a growth rate which exceeds population growth by 2 percent is applied to a base of current consumption.

### Industrial Use of Liquid Fuels and Natural Gas

Industrial consumption is not a function of population, but rather of the availability of supplies and market opportunities. Since the major industrial users of petroleum fuels are small in number, they are best projected on a case-by-case basis.

#### Ammonia-Urea Production

Ammonia-Urea production using natural gas is assumed to continue at a constant level.

#### Petroleum Production-Related Use

##### a. Gas Use in Production

Natural gas is utilized in petroleum production in Cook Inlet and on the North Slope for a variety of purposes, including space heating, electricity generation, pump fuel, etc. The level of consumption is difficult to project because of its many uses, but it is primarily dependent upon petroleum production levels and petroleum employment levels. We assume the level remains constant in Cook Inlet. On the North Slope it grows 7 percent annually for seven years, and is constant thereafter.

##### b. Oil Use in Production

A small quantity of fuel oil is used in oil production. This is included in the miscellaneous industrial category.

##### c. Gas Use in Transportation

Included in gas use in production.

##### d. Oil Use in Transportation

Fuel oil fuels the pumps for most of the Alyeska pipeline. Annual consumption is estimated to be two million barrels of oil. This level is projected to remain constant.

## Oil--Miscellaneous

Some fuel oil is used in electricity generation for industrial self-supplied power. This amount, taken from Alaska Power Administration, is projected to remain constant.

## Military

The military uses natural gas for electricity generation and space heating in the Anchorage area and fuel oil elsewhere. Military transportation use of fuel oil is counted in the transportation sector. Military natural gas use is projected to remain constant. Lack of data prevents the calculation of military fuel oil consumption for space heating.

## Injection

Gas is injected into petroleum reservoirs to enhance oil recovery. Because this is only a temporary use of gas, it is not counted a part of final consumption.

## LNG

Liquefied Natural Gas (LNG) is defined as export of gas for the purposes of this report.

## ECONOMIC GROWTH ASSUMPTIONS

Economic projections for estimating future petroleum demands are complicated this year because of the unsettled nature of the world oil market and the recent, rapid growth of the Alaska economy. The former makes it difficult to project activity in the petroleum industry, the most important basic sector industry in the economy, and activity generated by state government spending, which is primarily a function of the availability of petroleum revenues. The latter makes the task of relating recent growth to longer-term trends difficult.

The economic growth during the last 4 years, fueled by the dramatic growth in state spending resulting from the increase in oil prices, has generated an increase in population from 420,000 in 1980 (July 1, 1980) to an estimated 527,000 in 1984. This increase in population exceeds the magnitude of the growth which occurred between 1974 and 1976 during the peak construction years for the oil pipeline (approximately 67,000) and was unanticipated by all forecasts. The annual growth rate of 5.8 percent since 1980 is double the average annual growth rate of 2.9 percent in population between 1960 and 1980. The fact that this population change has been much more rapid than the increase in employment opportunities demonstrates the difficulty in accurately projecting longer-range population trends for Alaska, particularly within the context of a temporary boom generated by state spending.

The base case economic projection used in this analysis contains a population growth rate of 1.4 percent annually and an employment growth rate of 1.3 percent. These growth rates are less than those observed over the first two decades of statehood, but are considerably above projections of growth of the

national economy. For example, the U.S. Department of Commerce has recently projected population growth for the nation to the year 2000 at .8 percentage annually and employment growth at 1.2 percent annually.<sup>1</sup> State population grows from 527,000 in 1984 to 652,000 in 1999. Nonagricultural wage and salary employment grows from 222,000 in 1984 to 285,000 in 1999.<sup>2</sup>

This growth is consistent with many possible sets of assumptions about future basic sector activity and public sector spending as well as support sector and demographic responses. Future basic sector economic activity underlying this projection is similar to that used in the Revised Reference Case scenario used in the Susitna Studies Program.<sup>3</sup>

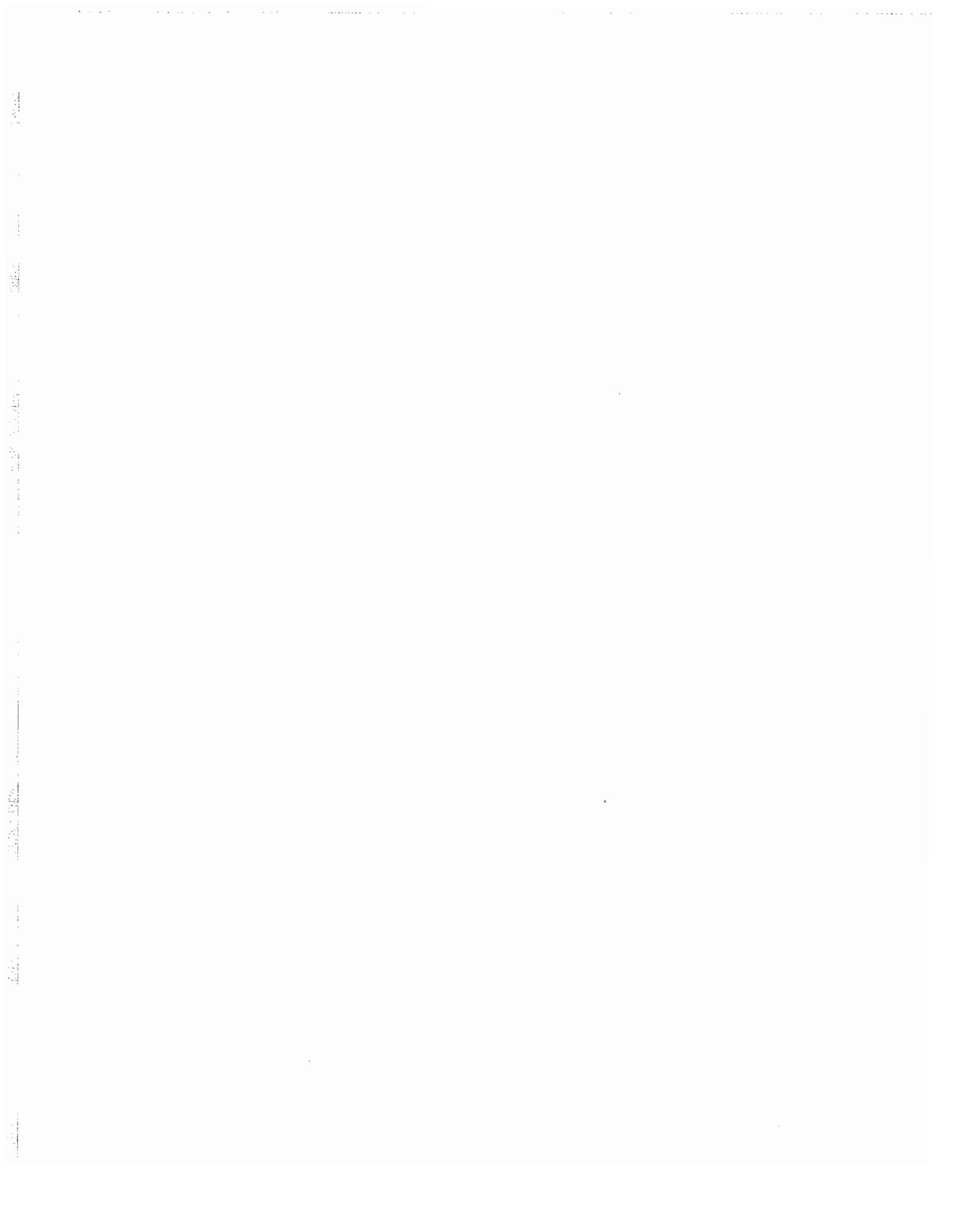
The regional distribution of economic activity, employment, and population continues the historical trend of shifting gradually toward the railbelt as the economic center of the state.

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<sup>1</sup>Survey of Current Business, November 1980.

<sup>2</sup>This projection is identified as UP85.16.

<sup>3</sup>Documented in full in ISER MAP Economic Model: State Model Documentation Version A85.1: December 1984.



APPENDIX C  
CRUDE OIL ANALYSES



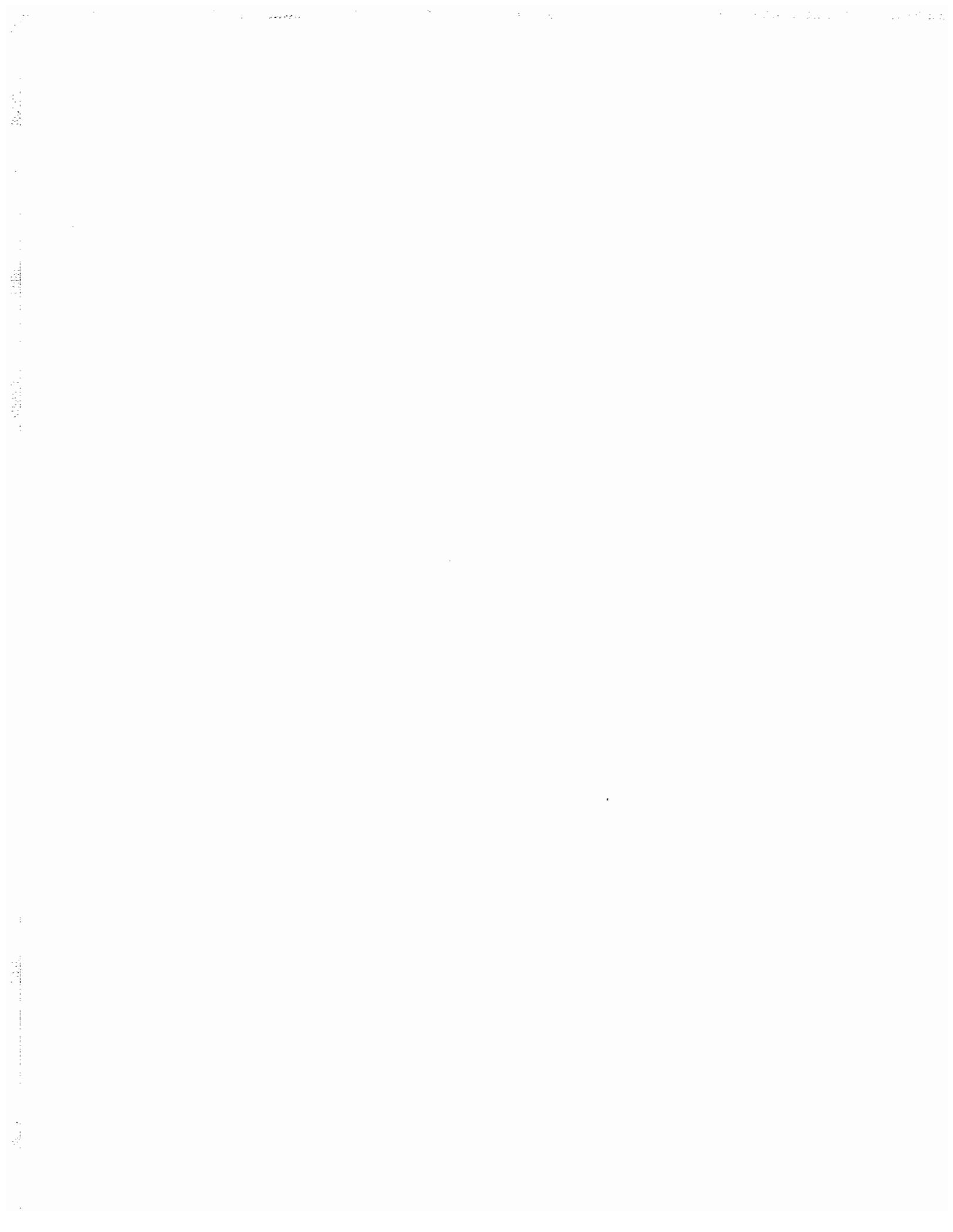
APPENDIX D  
CONVERSION FACTORS



APPENDIX D  
CONVERSION FACTORS

Conversion Factors:

1 gallon diesel	=0.0239 barrel crude oil equivalent
1 gallon gasoline	=0.0215 barrel crude oil equivalent
1 gallon jet fuel	=0.023 barrel crude oil equivalent
1 gallon crude oil	=0.1387 million BTU
1 MCF natural Gas	=1.000 million BTU
1 barrel diesel	=5.825 million BTU
1 barrel gasoline	=5.248 million BTU
1 barrel jet fuel	=5.604 million BTU



**APPENDIX E**  
**DEFINITIONS OF STATUTORY TERMS**



APPENDIX E  
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<sub>4</sub>), ethane (C<sub>2</sub>H<sub>6</sub>), propane (C<sub>3</sub>H<sub>8</sub>), butanes (C<sub>4</sub>H<sub>10</sub>), and pentanes (C<sub>5</sub>H<sub>12</sub>). 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).<sup>1</sup> 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 crude oil. Associated gas occurs in contact

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<sup>1</sup>Definitions vary with processes.

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.<sup>2</sup> 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. Liquefaction to change the phase of the gas is a less obvious case. The liquefaction 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 liquefaction. Neither

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<sup>2</sup> Kramer, L., Williams, B., Erickson, G., In-State Use Study for Propane and Butane. Prepared for the Alaska Department of Natural Resources. Kramer Associates, Juneau, October 1981.

proposal was clearly for in-state 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,<sup>3</sup> a day-to-day 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.

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<sup>3</sup>However, see the short discussion of 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.

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.

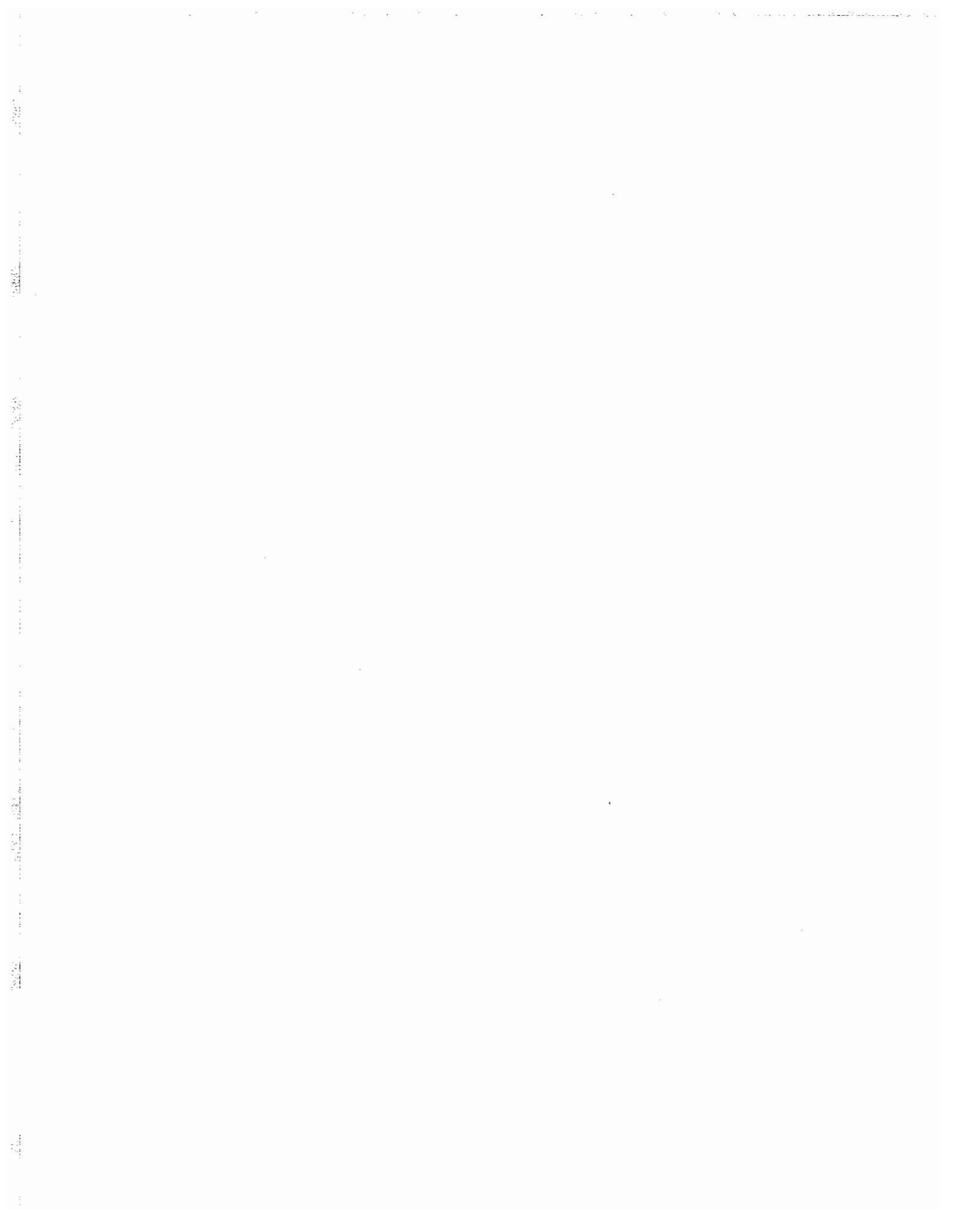
Definition 2: Intrastate consumption includes fuel consumed by motor vessels, airlines, and vehicles engaged in Alaskan economic activity. It includes use of fuel by American fishing boats in Alaskan waters regardless of where the fuel was purchased, use of fuel purchased in Washington State by Alaska 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.

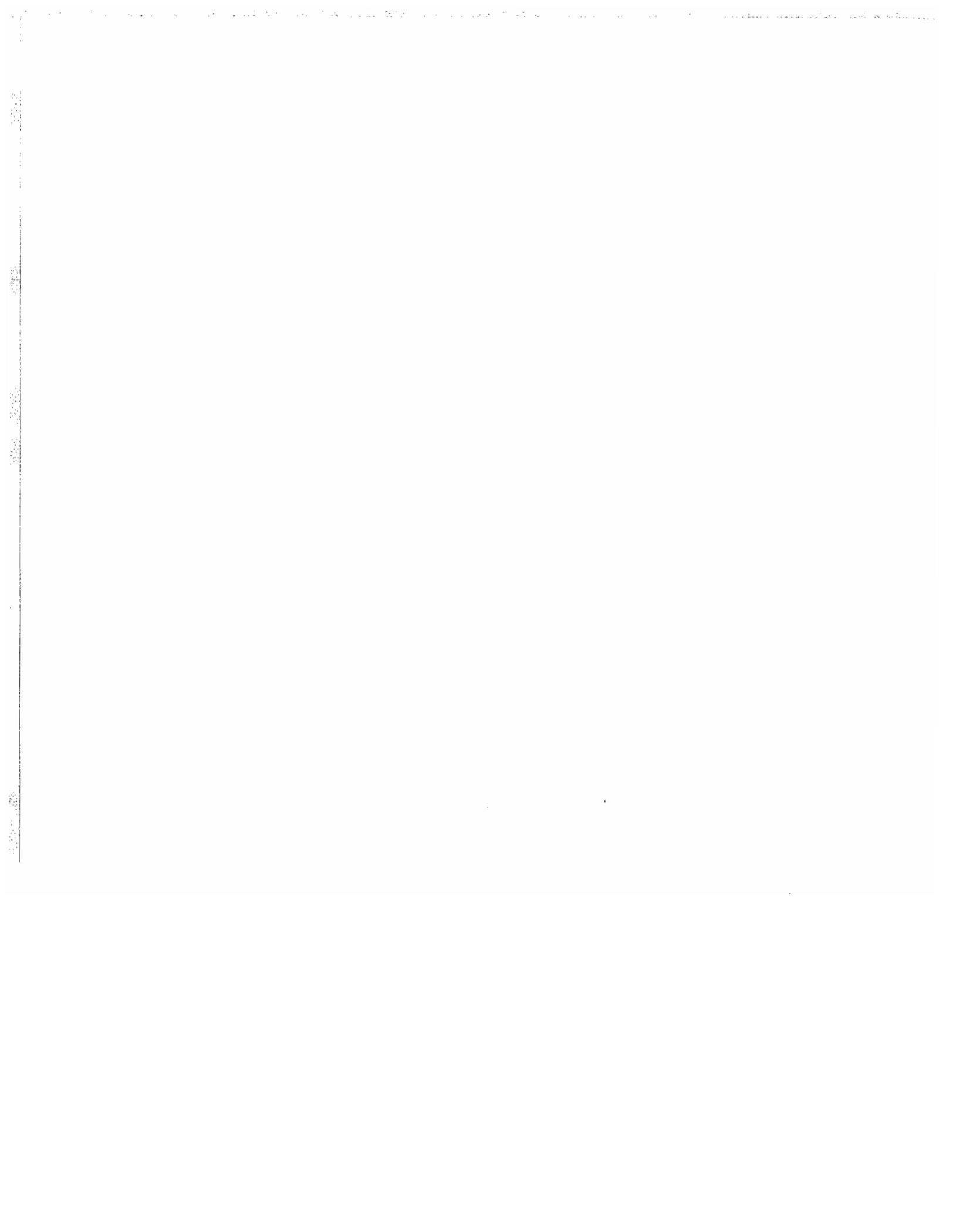
The basic definition in this report is the third definition. By excluding bonded and exempt jet fuel, the report also approximates Definition 2. Lack of data on out-state purchases by the military makes Definition 1 impractical.

### 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 F  
ALASKA REFINERIES AND TRANSPORTATION FACILITIES



**APPENDIX G**  
**OIL AND GAS FIELD MAPS**

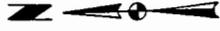


# NORTH SLOPE UNIT MAP

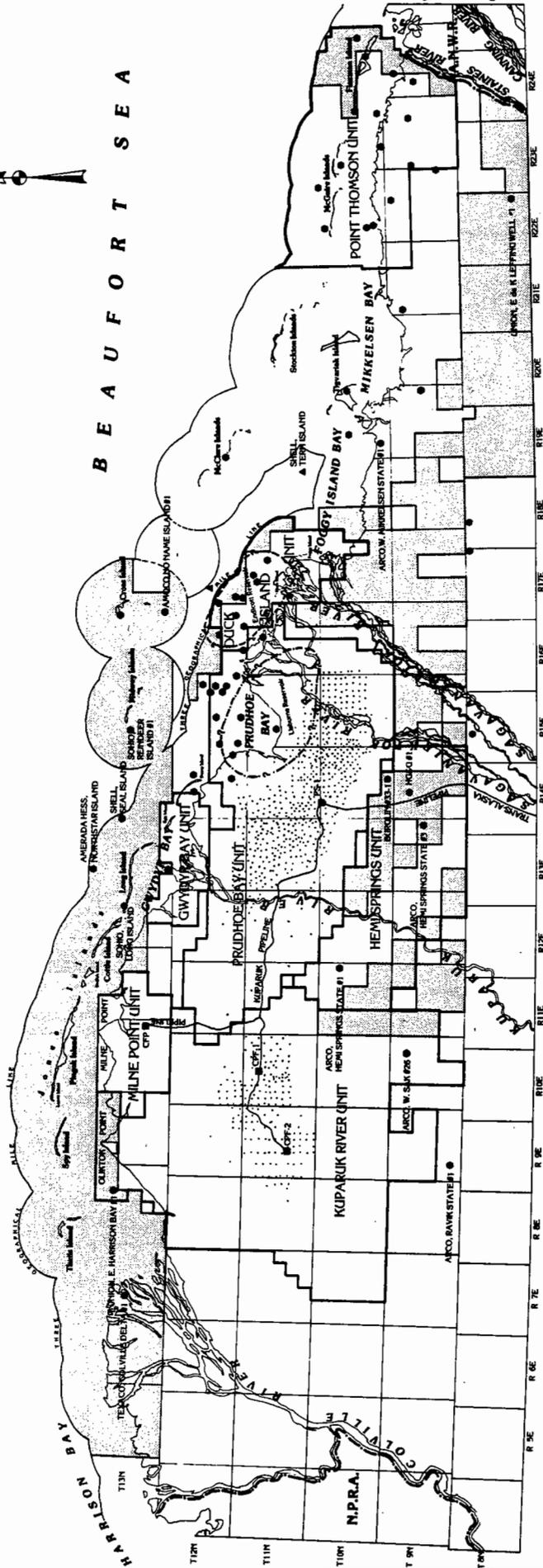
ALASKA DEPARTMENT OF NATURAL RESOURCES, DIVISION OF OIL AND GAS  
 COMPILED BY O.D. SMITH, CARTOGRAPHER

KAY BROWN, DIRECTOR

SOHO, HULLIK #1 A



B E A U F O R T S E A



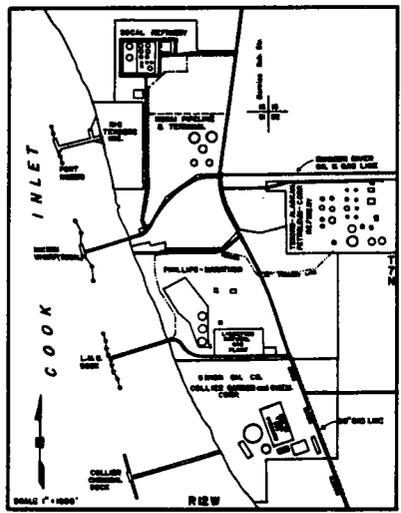
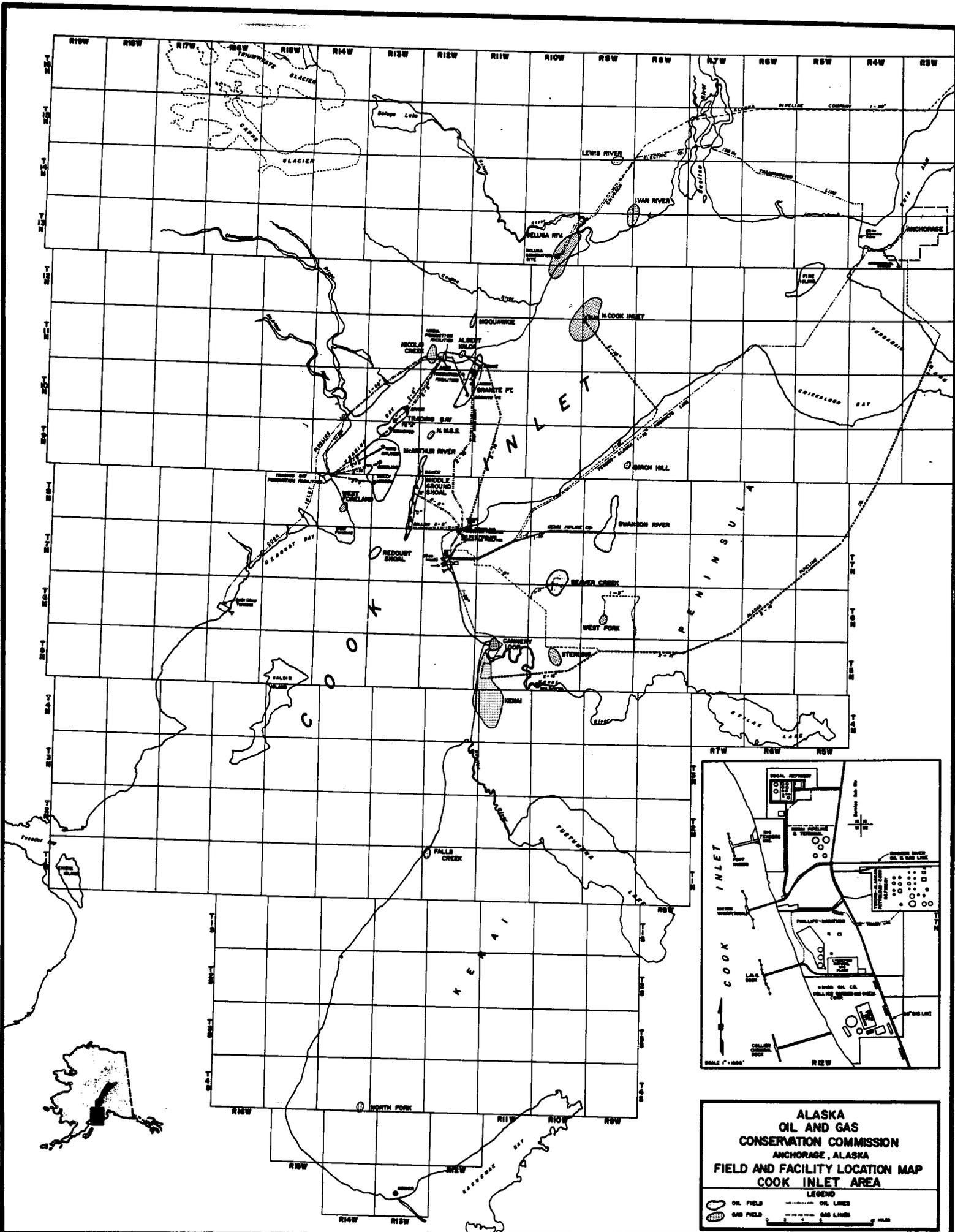
## EXPLANATION

- |  |  |  |  |
|--|--|--|--|
|  | Pump Station #1                              |  | PS-1   |
|  | Central Production Facility                  |  | CPF  |
|  | 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                  |
|  | Net Profit Share Leases                      |  | CFP  |

Scale 1:839,520 approx.  
 1 inch = 13.25 miles



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



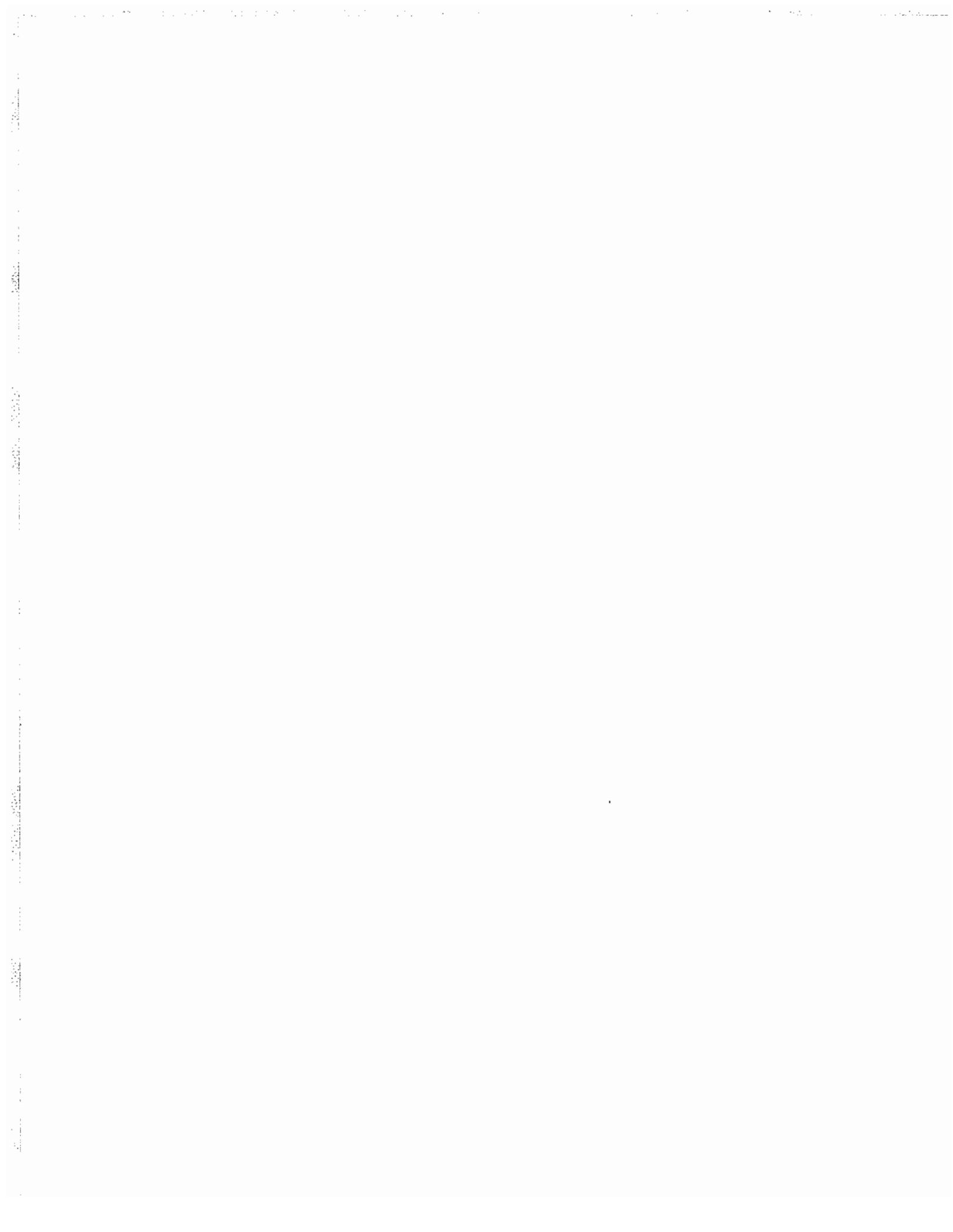
**ALASKA OIL AND GAS CONSERVATION COMMISSION ANCHORAGE, ALASKA FIELD AND FACILITY LOCATION MAP COOK INLET AREA**

**LEGEND**

- OIL FIELD
- OIL LINE
- GAS FIELD
- GAS LINE

SCALE 1" = 1 MILE

**APPENDIX H**  
**ACKNOWLEDGEMENTS**



**APPENDIX H**  
**ACKNOWLEDGEMENTS**

This document was prepared by the staff of the State of Alaska, Division of Oil and Gas:

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