HISTORICAL AND PROJECTED OIL AND GAS CONSUMPTION JANUARY 1984

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF MINERALS AND ENERGY MANAGEMENT

STATE OF ALASKA

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EXECUTIVE SUMMARY

This report provides background on the in-state supply of, and demand for hydrocarbons. The report fulfills the requirements of Alaska Statute 38.05.183, which requires that the Commissioner of the Department of Natural Resources submit an annual report to the Legislature, within 10 days of the convening of the regular session, that shows the immediate and long-range domestic and industrial needs for oil and gas in Alaska.

The statutes require that royalty oil and gas be used to satisfy present and projected intrastate domestic and industrial needs before being sold for export from the state or disposed of otherwise. The statutes contain several ambiguities in wording leading to a variety of possible definitions of "in-state needs." Therefore, in meeting the requirements of the statutes, this report first develops a number of definitions of consumption. The purpose of these definitions is to provide a framework for identifying intrastate and industrial needs.

Historical consumption by major use category is then presented in Section 2. The section on historical consumption updates the January 1983 report and provides estimated 1983 consumption for the state and for three regions, Railbelt, Rest of State and Southeast. Natural gas consumption in the Railbelt increased at about 3% per year over the past decade, while petroleum fuels consumption increased at about 10% per year statewide.

Forecasts of oil and gas consumption are developed in Section 3 for the Railbelt and the remainder of the state (including Southeast) by major use category. These forecasts project cumulative consumption of natural gas over the next 15 years of 3.9 trillion cubic feet. Cumulative refined product demand over the same period is forecast to be 524 million barrels of crude oil equivalent (22,043 million gallons). The projections of future oil and gas demand in the state were not revised from the 1983 forecast.

Low, medium, and high estimates of oil and gas reserves and the corresponding state royalty share of these reserves are presented in section 4. The mid-level estimates show that of the total crude oil reserves of 9.7 billion barrels, about 98% are on the North Slope. The state owns about 1.2 billion royalty barrels of these total crude oil reserves. The mid-level estimate of gas reserves total about 40.1 trillion cubic feet (Tcf) with about 92% located on the North Slope. The state's royalty share is about 4.6 Tcf, of which only 0.2 Tcf are located in the Cook Inlet, the state's major demand center. The remaining reserves lie on the North Slope, and the timing and scope of this gas development will have a significant impact upon the state's future royalty gas surplus/deficit situation.

The projected cumulative 15-year demand for natural gas of approximately 4.0 Tcf is slightly less than the state's royalty share. The projected cumulative refined product demand of 524 million barrels of oil equivalent is considerably less than the existing royalty oil (unrefined) inventory of 1.2 billion barrels. An adequate transportation system for distributing and marketing royalty oil is in place. A similar system for distributing and marketing royalty gas remains to be contracted.

Major in-state demands for hydrocarbons are for transportation, electrical generation and residential space heating. Transportation uses are forecast to consume 402 million bbls of crude oil equivalent between 1983 and 1997. The use of natural gas for electrical generation in the Railbelt is forecast to grow rapidly over the next 15 years. In the base case, demand grows from 32.9 billion cubic feet (Bcf) in 1983 to 62.4 Bcf in 1997. Residential space heating consumption of natural gas is forecast to grow from an annual rate of 18.2 Bcf in 1982 to 37.4 Bcf by 1997. This increase is related to economic and population growth in the Rail Belt area and to the expansion of gas delivery systems into the Matanuska Valley.

The supply and demand projections used in this report are by their very nature probabilistic 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 will in turn be fueled by world energy and natural resource prices. In addition, the development of the Susitna hydroelectric project would dramatically affect the in-state demand for natural gas, particularly after the late 1990s. Finally, the potential growth of a natural gas export market would 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 (9.7 billion barrels, 40.1 Tcf) are reasonably certain though transportation of natural gas off of the north slope remains uncertain. Estimates of undiscovered resources (the high range estimates) 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 the appropriate time-frame (if ever) to assure long-run continuous hydrocarbon supplies. Resources devoted to the hydrocarbon discovery and development process by the major oil firms will be largely determined by world market conditions, not surplus or deficit conditions in Alaska's relatively small intrastate market.

In summary, under reasonable assumptions about in-state reserves and consumption, the current inventory of hydrocarbon reserves is more than adequate to meet the estimated demands of Alaskans for the next 15 years. Additionally, significant quantities of hydrocarbons are presently available for export from the state.

LIST OF TABLES

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 also requires an annual report to the state legislature showing the immediate and long-term domestic and industrial needs of the state for oil and gas and an analysis of how these needs are to be met.

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

Oil and Gas

Crude oil and natural gas are fluids containing hydrocarbon compounds produced from naturally occurring petroleum deposits. Typical crude oil contains several hundred chemical compounds. The lightest of these are gases at normal temperatures and pressure, described as "natural gas." These light fractions of the crude oil stream include both hydrocarbon and non-hydrocarbon gases, such as water, carbon dioxide, hydrogen sulfide, helium, or nitrogen. The principal hydrocarbons are methane (CH_4), ethane (C_2H_6), propane (C_3H_8), butanes (C_4H_{10}), and pentanes (C_5H_{12}). The gaseous component is found most often and in largest volumes, 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). 1/ Natural gas liquids include ethane if ethane is recovered from the gas stream as a liquid. A related term is liquified petroleum gas (LPG), composed of hydrocarbons which liquify 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.

1/ Definitions vary with processes.

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 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.[2/] Potential uses for NGL also include the enriching ("spiking") of pipeline gas and crop drying. The Dow-Shell Petrochemical Group and Exxon have also recently 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. Liquification to change the phase of the gas is a less obvious case. The liquification of natural gas will be considered a transportation process in this report. Still more troublesome is the use of gas and oil for transportation related to export.

2/ 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.

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 furture 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-oi-state markets. Though the offer was made, payments in full were not made. Also, the state once committed royalty gas to the El Paso gas pipeline proposal for export of Prudhoe Bay gas, which involved liquefication. Neither proposal was clearly for in-state 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. Even the "worst case" scenario could be interpreted in varying ways. Consider Alaska Gas and Service Company residential gas consumption form 1970 to 1980. Base year present consumption plausibly could be figured any of the ways shown in Table 1.1.

Obviously, based on even simple calculations like those in Table 1.1, 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 forecast 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

BASE YEAR CONSUMPTION OF ALASKA GAS AND SERVICE COMPANY
NATURAL GAS IN THE RESIDENCIAL SECTOR, 1970 to 1980 TABLE I.1

1.	Actual Residential Consumption, 1980	7.577 BCF
2.	1980 Total Based on Average Consumption	7.794 BCF
3.	1980 Total Based on Weather-Adjusted Average Consumption Per Customer, 1970-1980	8.083 BCF
4.	1980 Total Based on Highest Per Customer Use, 1970-1980	8.416 BCF
5.	1980 Total Based on Most Recent Customer Per Degree Day Use and Coldest Weather Year 1970-1979 (21.43 cf/HDD/customer x 35,482 customers x 12,016 HDD)[1/]	9.137 BCF

(1/) cf = cubic feet; BCF = billion cubic feet, HDD = Heating degree days.

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, 1982. The assumptions used to run their economic model are shown in Appendix D.

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 to encourage in-state economic activity, 3/ 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

3/ See however, 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.

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 of 4 will be used for the purposes of this report.

None of the four definitions treats industrial use (including transportation) to include gas injected to enhance oil recovery, since in theory this gas remains part of the ultimately recoverable gas reserves of the state. Thus, 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 and 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 intrastate domestic and industrial sectors 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. Since some of the State's needs are currently met with imported petroleum products, the State seems to be allowed to export oil and gas as long as in-state needs are being met from some source. This meets the intent of other parts of Alaska state law to receive top dollar for the State's royalty oil and gas. Since it may be cheaper to meet certain of Alaska's energy needs with imported products than with instate refineries, Alaska Statutes Section 38.05.183 might allow the State to seek buyers for its royalty oil who are willing to pay more than Alaskan refiners and ship petroleum products back to Alaska at competitive prices. The intent of the law does not seem to be actual Alaska self-sufficiency in petroleum and gas products; rather, it seems to be aimed at adequate overall supplies. It may permit intrastate uses to be met from a variety of sources as long as they are identified and discussed. Thus, it might be acceptable to say that consumption can be met with imported product, even while exports are taking place, so long as it benefits Alaskans. This is the position taken in this report.

The only problems occur if the cost of imported product were significantly above the cost of products which could be refined in Alaska, or if Alaska users were suffering an absolute shortfall in petroleum products which could be made up by product shipped from out of state. In such a circumstance, the State might not be able to continue exporting.

OIL AND GAS CONSUMPTION 2.0

METHODOLOGY 2.1

The data sources used in this chapter are those used in last year's edition of this report. Tables presented here are similar to those included in the January 1983 edition, though detailed data on power generation have been deleted.

Oil Consumption

The procedure for tabulating motor fuel consumption has been changed somewhat from the method used in the past. Alaska oil consumption information is taken from Alaska Department of Revenue (ADOR) reports. During 1982, ADOR revised its form for reporting fuel sales. That revision affects this report in two ways.

1) Two alternative tables showing historic fuel consumption are presented.

   ADOR revised some fuel categories in October, 1982. The Executive Summary of this report explains that the Consumption Forecast, Section 3, was compiled in late 1982. The background data for this projection were phrased in the old classification, and the text and tables refer to several fuel class names that are now obsolete. As a result, a transition table is required which accommodates both the old and the new schemes. To avoid confusion, two tables of fuel consumption are included in this section. One table (Table 2.1) shows fuel consumption from 1977 through 1982 (1982 total is estimated) using only the old fuel class names. The second table (Table 2.2) shows fuel consumption from 1977 through 1983 (1983 total is estimated) using the new classification scheme as major classes and the old scheme as sub-classes.

2) The procedure for allocating fuel to regions is somewhat imprecise.

   ADOR reported fuel sales by Judicial Districts (JD) through June, 1982. These data were formerly reallocated to this report's three regions by computing:

   Railbelt = population share X (JD III + JD IV)
   Rest of State = JD II + JD III + JD IV - Railbelt
   Southeast = JD I
   where "population share" of Railbelt was calculated, from 1980 census data, to be 85% of the combined populations of JD III and JD IV.

   Since July, 1982, ADOR has reported fuel sales only as state totals. In order to allocate 1983 state totals to the three regions, 1982 regional allocation percentages had to be applied to each 1983 fuel category. The sum effect of this is that 1983 regional values reflect 1980 population distributions and 1982 fuel consumption patterns. Though this is admittedly a weak procedure for estimating absolute volumes of fuel used by each region, relative fuel use is probably valid. Accordingly, Table 2.2 presents estimated regional consumption in two ways, as volumes and as percentages of 1983 state volumes.

Natural Gas Consumption

Historical and estimated 1983 gas disposition figures were derived from several sources. Primary categories were compiled from Alaska Oil and Gas Conservation Commission (AOGCC) reports. The AOGCC categories are Injected, Vented, Used (on Leases), Shrinkage, Other and Sales. AOGCC's "Other" category applies only to North Cook Inlet field and Prudhoe Bay field, and has a different meaning for each field. North Cook Inlet "Other" is ignored in this report because its volume is included in "Sold." Prudhoe Bay "Other" is included in this report; it represents gas consumed by field facilities.

Gas "Sales" is subdivided by major purchasers. Data for these subdivisions came from consumers themselves and from DMEM royalty receipts.

OIL (FUEL) CONSUMPTION 2.2

Fuel category data may not be strictly comparable from year to year. This is due partly to changes in the fuel classification systems and partly to the shifting of some end-uses from one category to another.

The volume percentages in the text below refer to 1983 fuel consumption estimated from ADOR reports of January through September, 1983.

State Consumption

Aviation Jet was the state's largest fuel use at 49% of the total consumption, followed by Other Diesel at 41%, Other Gas at 19% and Marine Diesel at 17%.

Regional Consumption

Each region has a distinctive fuel use pattern. The Railbelt relies on a mix of petroleum, natural gas and hydroelectricity for its energy needs. The Rest of State region relies primarily on petroleum fuels, though Barrow and Prudhoe Bay needs are supplemented by local natural gas supplies. The Southeast region's energy requirements are almost totally supplied by petroleum (by tanker and barge) and hydroelectricity.

The Railbelt consumed 72% of the petroleum fuels sold in Alaska, whereas Rest of State used 20% and Southeast used 8%.

- Railbelt. Aviation Jet fuel was by far the region's largest fuel use at 45%. Other Diesel was next largest at 24%. Other Gas and Marine Diesel uses accounted for 15% and 13% respectively. Much of the Marine Diesel was consumed at Valdez by tankers which transport Prudhoe Bay and Kuparuk River oil.

- Rest of State. Other Diesel, at 49% was the dominant regional fuel use, followed by Aviation Jet at 29%. Data from 1982 indicate that much of the Other Diesel was consumed by pipeline companies for electric generation and by construction companies for trucks hauling heavy equipment.

- Southeast. Other Diesel accounted for 53% of the regional fuel consumption. Marine Diesel was the second largest use at 26%. Marine Diesel use is proportionally higher than in the other regions and use of Aviation fuel is proportionally much lower than the other regions.

HISTORICAL MOTOR FUEL SALES: STATE [1] TABLE 2.1
(Alaska Department of Revenue, old classification)
(Million gallons)

	1977	1978	1979	1980	1981	1982 [2]
Aviation	347.514	379.437	432.089	433.096	418.931	442.790
Jet	330.744	363.607	415.164	416.184	400.177	429.292
Taxable	103.163	113.006	126.190	130.074	152.558	338.262
Exempt	190.392	220.789	220.988	190.881	152.614	84.468
Bonded	37.189	29.812	67.986	95.229	95.005	6.562
Gas	16.770	15.830	16.925	16.912	18.754	13.498
Taxable	15.249	15.145	16.373	16.354	18.180	12.926
Exempt	1.521	0.685	0.552	0.558	0.574	0.572
Highway	350.374	343.007	368.965	382.976	418.634	430.894
Gas	186.213	187.359	181.329	177.353	186.446	192.884
Taxable	181.119	179.069	173.802	169.191	177.362	184.952
Exempt	5.094	8.290	7.527	8.162	9.084	7.932
Diesel	164.161	155.648	96.074	88.726	176.391	238.008
Taxable	118.999	101.598	56.597	64.791	153.567	218.534
Exempt	45.162	54.050	39.477	23.935	22.824	19.474
Other	*	*	91.562	116.897	55.797	0.002
Off-Highway Diesel	*	*	81.483	97.004	94.250	141.914
Marine	51.970	88.927	68.046	75.329	79.886	64.584
Gas	6.443	7.714	8.296	7.598	7.602	5.258
Taxable	6.059	7.160	8.004	7.573	7.517	5.248
Exempt	0.384	0.554	0.292	0.025	0.085	0.010
Diesel	38.613	51.985	59.492	67.711	72.282	59.326
Taxable	32.217	41.869	53.167	62.341	67.129	56.896
Exempt	6.396	10.116	6.325	5.370	5.153	2.430
Other	1.591	29.228	0.258	0.020	0.002	0.000
Taxable	0.593	29.228	0.258	0.020	0.002	0.000
Exempt	0.998	*	*	*	*	*
Non-Propulsion	5.323	*	*	*	*	*
TOTAL SALES	749.858	811.371	950.583	988.405	1,011.701	1,080.182

* Data not reported.
** Data not reported by Judicial District.
[1] Alaska Department of Revenue, "Report of Motor Fuel Sold or Distributed in Alaska."
[2] Estimated from part-yearly reports.

HISTORICAL MOTOR FUEL SALES: RAILBELT [1] TABLE 2.1 (cont.)
(Alaska Department of Revenue, old classification)
(Million gallons)

	1977	1978	1979	1980	1981	1982 [2]
Aviation	131.157	102.153	372.148	377.021	346.284	367.438
Jet	120.744	91.783	360.356	365.434	333.608	358.244
Taxable	83.555	91.783	102.585	106.451	123.660	281.258
Exempt	**	**	189.785	163.754	129.194	71.408
Bonded	37.189	*	67.986	95.229	80.754	5.578
Gas	10.413	10.370	11.792	11.587	12.676	9.194
Taxable	10.413	10.370	11.339	11.242	12.335	8.844
Exempt	**	**	0.453	0.345	0.341	0.350
Highway	88.765	218.239	268.366	263.398	268.619	269.580
Gas	14.023	140.250	139.053	134.466	140.082	144.482
Taxable	14.023	140.250	133.261	128.190	133.050	138.532
Exempt	**	**	5.792	6.276	7.032	5.950
Diesel	74.742	77.989	50.572	28.404	81.112	125.088
Taxable	74.742	77.989	26.556	17.666	69.606	118.792
Exempt	**	**	24.016	10.738	11.506	6.296
Other	*	*	78.741	100.528	47.425	0.010
Off-Highway Diesel	*	*	46.690	51.505	47.438	83.714
Marine	28.830	57.179	46.722	52.928	55.746	44.818
Gas	3.826	3.887	4.749	4.490	4.579	3.184
Taxable	3.826	3.887	4.614	4.459	4.553	3.180
Exempt	**	**	0.135	0.031	0.026	0.004
Diesel	20.826	28.291	41.910	48.388	51.167	41.634
Taxable	20.826	28.291	36.913	43.871	47.018	39.904
Exempt	**	**	4.997	4.517	4.149	1.730
Other	0.355	25.001	0.063	0.050	0.000	0.000
Taxable	0.355	25.001	0.063	0.050	0.000	0.000
Exempt	**	*	*	*	*	*
Non-Propulsion	3.823	*	*	*	*	*
TOTAL SALES	248.752	377.571	733.926	744.852	718.087	765.550

* Data not reported.
** Data not reported by Judicial District.
[1] Alaska Department of Revenue, "Report of Motor Fuel Sold or Distributed in Alaska."
[2] Estimated from part-yearly reports.

HISTORICAL MOTOR FUEL SALES: REST OF STATE [1] TABLE 2.1 (cont.)
(Alaska Department of Revenue, old classification)
(Million gallons)

	1977	1978	1979	1980	1981	1982 [2]
Aviation	17.828	19.289	53.020	50.112	65.361	68.934
Jet	14.844	16.057	49.668	46.613	61.310	66.112
Taxable	14.844	16.057	18.691	19.863	24.142	52.358
Exempt	**	**	30.977	26.750	22.917	12.770
Bonded	*	*	*	*	14.251	0.984
Gas	2.984	3.232	3.352	3.499	4.051	2.822
Taxable	2.984	3.232	3.277	3.400	3.929	2.662
Exempt	*	*	0.075	0.099	0.122	0.160
Highway	59.506	42.566	73.903	90.957	118.271	128.782
Gas	25.994	24.688	27.821	27.705	30.712	32.456
Taxable	25.994	24.688	26.675	26.389	29.294	31.158
Exempt	**	**	1.146	1.316	1.418	1.298
Diesel	33.512	17.878	33.263	46.886	79.189	96.320
Taxable	33.512	17.878	23.462	39.833	74.455	91.322
Exempt	**	**	9.801	7.053	4.734	4.998
Other	*	*	12.819	16.366	8.370	0.006
Off-Highway Diesel	*	*	14.635	19.307	16.102	20.736
Marine	5.364	10.037	8.626	10.039	11.287	8.048
Gas	0.690	1.144	1.369	1.380	1.324	0.640
Taxable	0.690	1.144	1.316	1.375	1.318	0.638
Exempt	**	**	0.053	0.005	0.006	0.002
Diesel	3.684	4.804	7.196	8.644	9.963	7.408
Taxable	3.684	4.804	6.366	7.902	9.230	7.100
Exempt	**	**	0.830	0.742	0.733	0.308
Other	0.107	4.089	0.061	0.015	0.000	0.000
Taxable	0.107	4.089	0.061	0.015	0.000	0.000
Exempt	**	*	*	*	*	*
Non-Propulsion	0.883	*	*	*	*	*
TOTAL SALES	82.698	71.892	150.184	170.415	211.021	226.500

* Data not reported.
** Data not reported by Judicial District.
[1] Alaska Department of Revenue, "Report of Motor Fuel Sold or Distributed in Alaska."
[2] Estimated from part-yearly reports.

HISTORICAL MOTOR FUEL SALES: SOUTHEAST [1] TABLE 2.1 (cont.)
(Alaska Department of Revenue, old classification)
(Million gallons)

	1977	1978	1979	1980	1981	1982 [2]
Aviation	6.617	6.710	6.920	5.964	7.236	6.418
Jet	4.765	5.167	5.140	4.137	5.259	4.936
Taxable	4.765	5.167	4.914	3.760	4.756	4.644
Exempt	**	**	0.226	0.377	0.503	0.292
Bonded	*	*	*	*	0.000	0.000
Gas	1.852	1.543	1.780	1.827	1.977	1.482
Taxable	1.852	1.543	1.757	1.712	1.866	1.420
Exempt	*	*	0.023	0.115	0.111	0.062
Highway	24.848	19.862	26.697	28.622	31.744	32.548
Gas	14.102	14.131	14.457	15.182	15.652	15.946
Taxable	14.102	14.131	13.867	14.612	15.018	15.262
Exempt	**	**	0.590	0.570	0.634	0.684
Diesel	10.746	5.731	12.238	13.437	16.090	16.600
Taxable	10.746	5.731	6.578	7.293	9.506	8.420
Exempt	**	**	5.660	6.144	6.584	8.180
Other	*	*	0.002	0.003	0.002	0.002
Off-Highway Diesel	*	*	20.157	26.192	30.710	37.464
Marine	10.640	11.040	12.698	12.453	12.853	11.718
Gas	2.135	2.128	2.178	1.728	1.699	1.434
Taxable	2.135	2.128	2.075	1.739	1.646	1.430
Exempt	**	**	0.103	(0.011)	0.053	0.004
Diesel	7.707	8.773	10.386	10.680	11.152	10.284
Taxable	7.707	8.773	9.888	10.569	10.881	9.892
Exempt	**	**	0.498	0.111	0.271	0.392
Other	0.131	0.139	0.134	0.045	0.002	0.000
Taxable	0.131	0.139	0.134	0.045	0.002	0.000
Exempt	**	*	*	*	*	*
Non-Propulsion	0.667	*	*	*	*	*
TOTAL SALES	42.105	37.612	66.472	73.231	82.543	88.148

* Data not reported.
** Data not reported by Judicial District.
[1] Alaska Department of Revenue, "Report of Motor Fuel Sold or Distributed in Alaska."
[2] Estimated from part-yearly reports.

HISTORICAL MOTOR FUEL SALES: STATE [1] (Million gallons)
(Alaska Department of Revenue, new classification)

TABLE 2.

	1977	1978	1979	1980	1981	1982	1983 [2]									
							STATE	% OF STATE	RAILBELT	% OF RLBLT	% OF STATE	REST OF STATE	% OF ROS	% OF STATE	SOUTH-EAST	% OF SE	% OF STATE
AVIATION GAS																	
Exempt	1.521	0.685	0.552	0.558	0.574	0.589	0.576	.0%	0.352	.0%	.0%	0.161	0.1%	.0%	0.062	.0%	.0%
Taxable	15.249	15.145	16.373	16.354	18.180	16.007	18.122	1.6%	12.399	1.1%	0.8%	3.723	1.2%	0.3%	0.991	0.8%	0.1%
TOTAL Aviation Gas	16.770	15.830	16.925	16.912	18.754	16.596	18.698	1.6%	12.751	1.2%	0.8%	3.884	1.3%	0.4%	1.053	0.8%	0.1%
AVIATION JET																	
Exempt (inc. Bonded)	227.581	250.601	288.974	286.110	247.619	99.957	277.750	23.9%	243.899	22.5%	16.2%	42.088	13.8%	3.9%	0.891	0.7%	0.1%
Taxable	103.163	113.006	126.190	130.074	152.558	332.409	296.903	25.5%	246.869	22.8%	16.4%	45.956	15.1%	4.2%	4.076	3.2%	0.4%
TOTAL Aviation Jet	330.744	363.607	415.164	416.184	400.177	432.366	574.653	49.4%	490.768	45.3%	32.5%	88.044	28.9%	8.1%	4.967	3.8%	0.5%
MARINE GAS																	
Exempt	0.384	0.554	0.292	0.025	0.085	0.032	0.072	.0%	0.029	.0%	.0%	0.014	.0%	.0%	0.029	.0%	.0%
Taxable	6.059	7.160	8.004	7.573	7.517	7.846	11.709	1.0%	7.095	0.7%	0.5%	1.423	0.5%	0.1%	3.191	2.5%	0.3%
MARINE NON-PROPULSION	5.323	*	*	*	*												
TOTAL Marine Gas	11.766	7.714	8.296	7.598	7.602	7.878	11.781	1.0%	7.124	0.7%	0.5%	1.437	0.5%	0.1%	3.220	2.5%	0.3%
MARINE DIESEL																	
Exempt	6.396	10.116	6.325	5.370	5.153	30.443	110.878	9.5%	78.938	7.3%	5.2%	14.054	4.6%	1.3%	17.886	13.8%	1.7%
Taxable	32.217	41.869	53.167	62.341	67.129	69.000	88.845	7.6%	62.311	5.8%	4.1%	11.087	3.6%	1.0%	15.447	11.9%	1.4%
MARINE OTHER																	
Exempt	0.998	*	*	*	*												
Taxable	0.593	29.228	0.258	0.020	0.002												
TOTAL Marine Diesel	40.204	81.213	59.750	67.731	72.284	99.443	199.723	17.2%	141.249	13.0%	9.4%	25.141	8.3%	2.3%	33.333	25.8%	3.1%
OTHER GAS																	
Exempt						12.809	12.699	1.1%	9.513	0.9%	0.6%	2.078	0.7%	0.2%	1.095	0.8%	0.1%
Taxable						182.206	209.863	18.1%	157.191	14.5%	10.4%	35.424	11.6%	3.3%	17.318	13.4%	1.6%
HIGHWAY GAS																	
Exempt	5.094	8.290	7.527	8.162	9.084												
Taxable	181.119	179.069	173.802	169.191	177.362												
TOTAL Other Gas	186.213	187.359	181.329	177.353	186.446	195.015	222.562	19.1%	166.704	15.4%	11.1%	37.502	12.3%	3.5%	18.413	14.2%	1.7%
OTHER DIESEL																	
Exempt						187.856	204.173	17.6%	113.872	10.5%	7.5%	32.556	10.7%	3.0%	57.745	44.6%	5.3%
Taxable						223.269	276.676	23.8%	150.400	13.9%	10.0%	115.615	38.0%	10.7%	10.662	8.2%	1.0%
HIGHWAY DIESEL																	
Exempt	45.162	54.050	39.477	23.935	22.824												
Taxable	118.999	101.598	56.597	64.791	153.567												
HIGHWAY OTHER	*	*	91.562	116.897	55.797												
OFF-HIGHWAY DIESEL	*	*	81.483	97.004	94.250												
TOTAL Other Diesel	164.161	155.648	269.119	302.627	326.438	411.125	480.849	41.4%	264.272	24.4%	17.5%	148.171	48.7%	13.7%	68.407	52.9%	6.3%
TOTAL ALL FUEL	749.858	811.371	950.583	988.405	1,011.701	1,162.423	1,508.266		1,082.868			304.179			129.393		

* Data not reported.
[1] Alaska Department of Revenue, "Report of Motor Fuel Sold or Distributed in Alaska."
[2] Estimated from reports for January through September, 1983.

Natural gas disposition and consumption figures are shown in Table 2.3.

In the following text, all percentages refer to 1983 gas consumption, estimated from ADOR reports of January through September, 1983.

State Disposition and Consumption

Of the gross gas extracted in 1983, 76% was injected, 17% was sold and 7% was consumed in field operations.

Regional Disposition and Consumption

All of Alaska's gas is extracted in the Railbelt (in and around Cook Inlet) and in Rest of State (at Barrow, Prudhoe Bay and Kuparuk River fields). The ratio of extraction to consumption of the two region are quite different. Most of the state's gas is extracted in the Rest of State region, but a great proportion of that gas is injected and little is consumed. Railbelt, in contrast, extracts less total volume of gas, but most of this gas is consumed.

- Railbelt. Of the gross gas production in this region in 1983, 68% was consumed, and the remaining 32% was injected.

Of net production, 9% was used in field operations. Gas sales went largely to LNG production, 32%, and for use in the production of Ammonia-Urea, 24%.

-Rest of State. Virtually all of this region's gas is taken from Prudhoe Bay and Kuparuk River fields. The Barrow fields are locally important but produce only 2% of the region's gas.

By far the largest part of the extracted gas, 92%, was reinjected. Field operations and sales consumed the remaining 8%.

Of the gas that was consumed, 80% was used in field operations. Most of the 20% that was sold was bought by TAPS or used by Prudhoe Bay and Kuparuk River producers for fuel for pipeline and production equipment.

HISTORICAL GAS DISPOSITION AND SALES: STATE (Million MCF)

TABLE 2.3

	1971**	1972**	1973**	1974**	1975	1976	1977	1978	1979	1980	1981	1982	1983 [2]
GROSS PRODUCTION [1]	227.93	222.80	223.10	228.44	256.398	271.162	375.831	602.686	738.485	898.155	948.554	1,090.655	1,162.936
Injection [1]	73.88	76.13	87.78	86.81	83.007	97.077	171.188	375.405	503.003	661.947	694.196	817.863	885.610
NET Production	154.05	146.67	135.32	141.63	173.391	174.085	204.643	227.281	235.482	236.208	254.358	272.792	277.326
FIELD OPERATIONS [1]													
Vented and flared	33.18	20.98	6.93	7.05	10.566	6.674	15.729	6.183	4.550	4.845	5.660	6.983	4.991
Used on Leases	10.96	14.86	12.42	14.31	17.962	18.423	29.966	35.054	38.122	43.575	45.911	52.724	57.225
Shrinkage	1.11	0.72	1.55	2.53	3.118	3.223	3.144	3.425	2.846	2.437	2.433	2.602	3.188
Other	0.00	0.00	0.00	0.00	0.000	0.000	0.000	8.092	8.364	8.929	9.480	10.567	10.635
TOTAL Field Operations	45.25	36.56	20.90	23.89	31.646	28.320	48.839	52.754	53.882	59.786	63.484	72.876	76.039
SOLD													
LNG [3]	63.24	59.87	60.99	61.87	64.777	63.509	66.912	60.874	64.111	54.844	68.823	52.434	66.921
Amonia-Urea [4]	19.49	20.58	20.64	22.10	23.888	24.257	28.620	48.879	51.657	47.632	53.707	49.220	49.623
Power generation [5]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Public	8.142	8.906	10.631	11.764	19.619	22.189	23.590	24.592	28.155	28.757	29.386	31.392	30.967
Military	6.549	6.473	6.069	5.684	5.842	5.424	5.000	5.126	4.986	4.763	4.561	4.830	4.509
Gas Utilities [5]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Residential	5.440	6.027	6.519	6.717	5.548	5.916	6.010	6.536	6.911	7.773	8.385	10.520	9.646
Commercial/Industrial	4.798	7.072	8.238	8.411	6.544	6.635	6.673	6.918	7.134	7.748	7.828	9.044	8.487
Producers [6]	*	*	*	*	*	*	6.703	10.760	7.242	5.516	6.009	11.383	14.221
Refiners[6]	*	*	*	*	*	*	0.199	0.312	0.282	0.372	0.414	0.486	0.464
TAPS [6]	*	*	*	*	*	*	1.754	6.949	8.648	10.686	11.106	11.952	12.470
Other Sales [7]	14.058	14.789	17.850	13.772	15.535	17.833	10.323	1.155	(1.509)	6.117	0.654	18.653	3.977
TOTAL Sold [1]	121.717	123.717	130.937	130.318	141.753	145.763	155.784	172.101	177.617	174.208	190.873	199.914	201.285

* Not readily available.
** Railbelt data only; does not include North Slope.
N/A Not applicable.
[1] Alaska Oil and Gas Conservation Commission, "Report of Gas Disposition," monthly reports.
[2] Estimated from part-yearly reports of cited sources.
[3] 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."
1980-83: Royalty reports of producers to Division of Minerals and Energy Management.
[4] 1971-74: Stanford Research Institute, "Natural Gas Demand and Supply to the Year 2000 in the Cook Inlet Basin of South Central Alaska," Nov. 1977.
1975-79: Sum of 1) sales from Kenai and Beaver Creek gas fields to Collier Chemical in: Alaska Oil and Gas Conservation Commission, "Kenai Gas Sales," and 2) sales from McArthur River gas field in: Alaska Oil and Gas Conservation Commission, "Monthly Report of Gas Disposition."
1980-83: Royalty reports of producers to Division of Minerals and Energy Management.
[5] Annual reports from Alaska Pipeline Co., ENSTAR and Kenai Utility Service Co. to Alaska Public Utilities Commission and Barrow Utilities and Electric Cooperative Inc., personal communication.
[6] Royalty reports of producers to Division of Minerals and Energy Development.
[7] Calculated difference between "TOTAL Sold" and sum of listed "SOLD" items.

HISTORICAL GAS DISPOSITION AND SALES: RAILBELT (Million MCF)

TABLE 2.3 (cont.)

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983 [2]
GROSS PRODUCTION [1]	227.93	222.80	223.10	228.44	252.553	265.254	279.960	293.799	305.075	299.941	299.049	329.119	303.803
Injection [1]	73.88	76.13	87.78	86.81	83.007	97.077	103.108	103.551	112.867	115.438	99.090	102.248	97.496
NET Production	154.05	146.67	135.32	141.63	169.546	168.177	176.852	190.248	192.208	184.503	199.959	226.871	206.307
FIELD OPERATIONS [1]													
Vented and flared	33.18	20.98	6.93	7.05	9.505	5.421	4.848	3.870	2.710	3.045	3.174	3.494	2.556
Used on Leases	10.96	14.86	12.42	14.31	16.215	15.822	16.404	16.228	14.563	14.608	16.249	14.860	13.704
Shrinkage	1.11	0.72	1.55	2.53	3.118	3.223	3.144	3.425	2.846	2.437	2.433	2.602	2.748
Other	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL Field Operations	45.25	36.56	20.90	23.89	28.838	24.466	24.396	23.523	20.119	20.090	21.856	20.956	19.008
SOLD													
LNG [3]	63.24	59.87	60.99	61.87	64.777	63.509	66.912	60.874	64.111	54.844	68.823	52.434	66.921
Amonia-Urea [4]	19.49	20.58	20.64	22.10	23.888	24.257	28.620	48.879	51.657	47.632	53.707	49.220	49.623
Power generation [5]													
Public	8.142	8.906	10.631	11.764	19.619	22.189	23.590	24.592	28.155	28.757	29.071	30.988	30.967
Military	6.549	6.473	6.069	5.684	5.842	5.424	5.000	5.126	4.986	4.763	4.561	4.830	4.509
Gas Utilities [5]													
Residential	5.440	6.027	6.519	6.717	5.548	5.916	6.010	6.536	6.911	7.773	7.950	9.981	9.646
Commercial/Industrial	4.798	7.072	8.238	8.411	6.544	6.635	6.673	6.918	7.134	7.748	7.828	9.044	8.487
Producers [6]	*	*	*	*	*	*	6.703	10.760	7.242	5.516	6.009	11.383	14.221
Refiners[6]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TAPS [6]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Other Sales [7]	14.058	14.789	17.850	13.772	14.499	15.780	8.929	0.615	(2.090)	5.168	0.133	18.033	2.924
TOTAL Sold [1]	121.717	123.717	130.937	130.318	140.717	143.710	152.437	164.300	168.106	162.201	178.082	185.913	187.298

* Not readily available.
N/A Not applicable
[1] Alaska Oil and Gas Conservation Commission, "Report of Gas Disposition," monthly reports.
[2] Estimated from part-yearly reports of cited sources.
[3] 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."
1980-83: Royalty reports of producers to Division of Minerals and Energy Management.
[4] 1971-74: Stanford Research Institute, "Natural Gas Demand and Supply to the Year 2000 in the Cook Inlet Basin of South Central Alaska," Nov. 1977.
1975-79: Sum of 1) sales from Kenai and Beaver Creek gas fields to Collier Chemical in: Alaska Oil and Gas Conservation Commission, "Kenai Gas Sales," and 2) sales from McArthur River gas field in: Alaska Oil and Gas Conservation Commission, "Monthly Report of Gas Disposition."
1980-83: Royalty reports of producers to Division of Minerals and Energy Management.
[5] Annual reports from Alaska Pipeline Co., ENSTAR and Kenai Utility Service Co. to Alaska Public Utilities Commission.
[6] Royalty reports of producers to Division of Minerals and Energy Development.
[7] Calculated difference between "TOTAL Sold" and sum of listed "SOLD" items.

HISTORICAL GAS DISPOSITION AND SALES: REST OF STATE (Million MCF)

TABLE 2.3 (cont.)

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983 [2]
GROSS PRODUCTION [1]	*	*	*	*	3.845	5.908	95.871	308.887	433.410	598.214	649.505	761.536	859.133
Injection [1]	*	*	*	*	0.000	0.000	68.080	271.854	390.136	546.509	595.106	715.615	788.114
NET Production	*	*	*	*	3.845	5.908	27.791	37.033	43.274	51.705	54.399	45.921	71.019
FIELD OPERATIONS [1]													
Vented	*	*	*	*	1.061	1.253	10.881	2.313	1.840	1.800	2.486	3.489	2.435
Used on Leases	*	*	*	*	1.747	2.601	13.562	18.826	23.559	28.967	29.662	37.864	43.521
Shrinkage	*	*	*	*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.440
Other	*	*	*	*	0.000	0.000	0.000	8.092	8.364	8.929	9.480	10.567	10.635
TOTAL Field Operations	*	*	*	*	2.808	3.854	24.443	29.231	33.763	39.696	41.628	51.920	57.031
SOLD													
LNG	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Amonia-Urea	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Power generation [3]													
Public	*	*	*	*	*	*	*	*	*	*	0.315	0.404 [2]	*
Military	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gas Utilities [3]													
Residential	*	*	*	*	*	*	*	*	*	*	0.435	0.539 [2]	*
Commercial/Industrial	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Producers	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Refiners [4]	*	*	*	*	*	*	0.199	0.312	0.282	0.372	0.414	0.486	0.464
TAPS [4]	*	*	*	*	*	*	1.754	6.949	8.648	10.686	11.106	11.952	12.470
Other Sales [5]	*	*	*	*	1.036	2.053	1.394	0.540	0.581	0.949	0.521	0.620	1.053
TOTAL Sold [1]	*	*	*	*	1.036	2.053	3.347	7.801	9.511	12.007	12.791	14.001	13.987

* Not readily available.
N/A Not applicable.
[1] Alaska Oil and Gas Conservation Commission, "Report of Gas Disposition", monthly reports.
[2] Estimated from part-yearly reports of cited sources.
[3] Barrow Utilities and Electric Cooperative Inc., personal communication.
[4] Royalty reports of producers to Division of Minerals and Energy Development.
[5] Calculated difference between "TOTAL Sold" and sum of listed "SOLD" items.

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

Consumption of natural gas will grow from 211 billion cubic feet (Bcf) in 1983 to 243 Bcf in 1987 (annual growth of 2.9 percent), 286 Bcf in 1992 (3.1 percent annual growth), and 309 Bcf in 1997 (2.6 percent annual growth). 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 and electricity generation will outstrip growth in industrial use. Over the next 15 years, use of gas for space heating will more than double, from 18.9 Bcf in 1983 to 37.4 Bcf in 1997 (4.7 percent annual growth). Use of gas for electricity generation will grow from 32.9 Bcf in 1983 to 62.4 Bcf in 1997 (4.4 percent annual growth).

Consumption of liquid petroleum will increase from 1,251 million gallons in 1983 (about 30 million barrels of crude oil equivalent) to 1,713 million gallons in 1997 (41 million barrels). This represents a 2.1 percent annual growth rate. The five- and ten-year growth rates are both 2.0 percent annually. Space heating use of petroleum will grow most rapidly, at 2.5 percent annually, due to size increases in the building stock outside the railbelt. Vehicle transportation use will increase 2.0 percent annually, a modest rate of increase due to increases in motor vehicle fuel use efficiencies. Electric utility use of fuel oil will decrease in the mid-1980s as several hydroelectric facilities replace high cost fuel oil generation, but total consumption will subsequently increase and the 15-year growth rate will be 2.2 percent annually. Industrial use of petroleum liquids will remain constant.

1/ See Appendix B for assumptions.

Projected Consumption of Oil and Gas
(Liquids - Million Gallons)
(Natural Gas - BCF)

TABLE 3.1

	1982			1983		
	Total State	Rail-Belt	Non-Railbelt	Total State	Rail-Belt	Non-Railbelt
Vehicle Transportation						
Liquids	938	682	256	977	704	273
Natural gas	0	0	0	0	0	0
Space Heat						
Liquids	169	64	105	174	66	108
Natural gas	18.2	17.7	.5	18.9	18.4	.5
Utility Electricity Generation						
Liquids	35.1	10	25.1	37.7	10	27.7
Natural gas	30.9	30.5	.4	32.9	32.5	.4
Industry						
Liquids	94.8	-	-	94.8	-	-
Natural gas	154.4	91.7	62.7	158.8	91.8	67
Total						
Liquids	1236.9	-	-	-	-	-
Natural gas	203.5	139.9	63.6	210.6	142.7	67.9

For detail, see following tables.

Projected Consumption of Oil and Gas
(Liquids - Million Gallons)
(Natural Gas - BCF)

TABLE 3.1 (cont.)

	1984			1985		
	Total State	Rail-Belt	Non-Railbelt	Total State	Rail-Belt	Non-Railbelt
Vehicle Transportation						
Liquids	996	720	277	1,017	736	280
Natural gas	0	0	0	0	0	0
Space Heat						
Liquids	179	68	111	185	70	115
Natural gas	20	19.4	.6	20.8	20.2	.6
Utility Electricity Generation						
Liquids	38.6	10	28.6	31.8	10	21.8
Natural gas	35.1	34.6	.5	37	36.5	.5
Industry						
Liquids	94.8	-	-	94.8	-	-
Natural gas	163.6	91.8	71.8	168.6	91.8	76.8
Total						
Liquids	1308.4	-	-	1328.6	-	-
Natural gas	218.7	145.8	72.9	226.4	148.5	77.9

For detail, see following tables.

Projected Consumption of Oil and Gas
(Liquids - Million Gallons)
(Natural Gas - BCF)

TABLE 3.1 (cont.)

	1986			1987		
	Total State	Rail-Belt	Non-Railbelt	Total State	Rail-Belt	Non-Railbelt
Vehicle Transportation						
Liquids	1,037	754	283	1,056	770	286
Natural gas	0	0	0	0	0	0
Space Heat						
7 Liquids	190	72	118	195	74	121
Natural gas	22	21.4	.6	23.4	22.8	.6
Utility Electricity Generation						
Liquids	32.7	10	22.7	33.5	10	23.5
Natural gas	38.4	37.9	.5	39.9	39.4	.5
Industry						
Liquids	94.8	-	-	94.8	-	-
Natural gas	174	91.8	82.2	179.7	91.8	87.9
Total						
Liquids	1354.5	-	-	1379.3	-	-
Natural gas	234.4	151.1	83.3	243	154	89.0

For detail, see following tables.

Projected Consumption of Oil and Gas
(Liquids - Million Gallons)
(Natural Gas - BCF)

TABLE 3.1 (cont.)

	1992			1997		
	Total State	Rail-Belt	Non-Railbelt	Total State	Rail-Belt	Non-Railbelt
Vehicle Transportation						
Liquids	1,174	869	306	1,313	987	328
Natural gas	0	0	0	0	0	0
Space Heat						
Liquids	221	82	139	253	92	161
Natural gas	30.3	29.7	.6	37.4	36.8	.6
Utility Electricity Generation						
Liquids	40.6	10	30.6	51.9	10	41.9
Natural gas	45.8	45.2	.6	62.4	61.6	.8
Industry						
Liquids	94.8	-	-	94.8	-	-
Natural gas	209.6	91.8	117.8	209.6	91.8	117.8
Total						
Liquids	1530.4	-	-	1712.7	-	-
Natural gas	285.7	166.7	119	309.4	190.2	119.2

For detail, see following tables.

Projected Consumption of Oil and Gas
(Liquids - Million Gallons)
(Natural Gas - BCF)

TABLE 3.1 (cont.)

	1983-1997 Total		
	Total State	Rail Belt	Non-Railbelt
Vehicle Transportation			
Liquids	16,882	12,418	4,464
Natural gas	0	0	0
Space Heat			
Liquids	3,147	1,174	1,973
Natural gas	408.6	399.7	8.9
Utility Electricity Generation			
Liquids	590.8	150	440.8
Natural gas	668.1	659.4	8.7
Industry			
Liquids	1,423	-	-
Natural gas	2,866	1,377	1,489
Total			
Liquids	22,042.8	-	-
Natural gas	3,942.7	2,436.1	1,506.6

For detail, see following tables.

TRANSPORTATION LIQUID FUELS 3.1

Transportation related fuel consumption will grow moderately with population growth in future years, increasing from 938 million gallons in 1982 to 1,313 million gallons in 1997 (Table 3.2). Growth will be relatively evenly divided among the three types of fuels--jet fuel, diesel, and gasoline.

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. In aviation, marine, and diesel highway uses, economic growth will result in a continued increase in per capita consumption levels.

Total consumption projected over the 15-year period from 1983 to 1997 is 16,882 million gallons. This is approximately equivalent to 402 million barrels of crude oil.

Projected Consumption of Vehicle Transport Fuels[1/]
(Million Gallons)

TABLE 3.2

	1982			1983		
	State Total	Railbelt	Non-Railbelt	State Total	Railbelt	Non-Railbelt
Gasoline						
Total	212	157	55	236	170	66
Highway	193	144	48	206	148	58
Marine	5	3	2	39	6	2
Aviation	13	9	4	21	15	6
Diesel						
Total	297	167	131	303	219	85
Highway	238	125	113	243	175	68
Marine	59	42	18	60	44	17
Jet Fuel						
Total	429	358	71	438	315	122
Civilian Domestic	338	281	57	159	114	44
Military & International	91	77	14	279	201	78
Grand Total	938	682	256	977	704	273

Numbers may not sum to total due to rounding.

[1/] Includes industrial, military, and government use. Excludes space heating, utility generation and pipeline fuel.

Projected Consumption of Vehicle Transport Fuels[1/]
(Million Gallons)

TABLE 3.2 (cont.)

	1984			1985		
	State Total	Railbelt	Non-Railbelt	State Total	Railbelt	Non-Railbelt
Gasoline						
Total	238	172	66	241	175	65
Highway	208	150	58	210	153	58
Marine	9	6	2	9	6	2
Aviation	22	16	6	22	16	6
Diesel						
Total	309	224	86	316	229	86
Highway	248	179	69	253	183	69
Marine	62	45	17	63	46	17
Jet Fuel						
Total	449	324	125	460	332	128
Civilian Domestic	167	121	46	175	127	48
Military & International	282	203	79	285	205	80
Grand Total	996	720	277	1,017	736	280

Numbers may not sum to total due to rounding.

(a) Includes industrial, military, and government use. Excludes space heating, utility generation and pipeline fuel.

Projected Consumption of Vehicle Transport Fuels[1/]
(Million Gallons)

TABLE 3.2 (cont.)

	1986			1987		
	State Total	Railbelt	Non-Railbelt	State Total	Railbelt	Non-Railbelt
Gasoline						
Total	244	178	66	245	179	66
Highway	212	155	58	214	157	57
Marine	9	7	3	9	7	3
Aviation	22	16	6	23	17	6
Diesel						
Total	322	235	87	328	240	88
Highway	258	188	70	263	192	71
Marine	64	47	17	66	48	18
Jet Fuel						
Total	471	341	130	483	351	132
Civilian Domestic	184	134	50	193	141	52
Military & International	287	207	80	290	209	81
Grand Total	1,037	754	283	1,056	770	286

Numbers may not sum to total due to rounding.

1/ Includes industrial, military, and government use. Excludes space heating, utility generation and pipeline fuel.

Projected Consumption of Vehicle Transport Fuels[1/]
(Million Gallons)

TABLE 3.2 (cont.)

	1992			1997		
	State Total	Railbelt	Non-Railbelt	State Total	Railbelt	Non-Railbelt
Gasoline						
Total	260	194	66	275	210	66
Highway	225	168	57	236	180	56
Marine	10	8	3	11	9	3
Aviation	25	19	6	28	21	7
Diesel						
Total	362	270	92	400	305	96
Highway	290	217	74	320	244	77
Marine	72	54	18	80	61	19
Jet Fuel						
Total	552	405	148	638	472	166
Civilian Domestic	248	185	63	317	241	76
Military & International	305	220	85	321	231	90
Grand Total	1,174	869	306	1,313	987	328

Numbers may not sum to total due to rounding.

1/ Includes industrial, military, and government use. Excludes space heating, utility generation and pipeline fuel.

Projected Consumption of Vehicle Transport Fuels[1/]
(Million Gallons)

TABLE 3.2 (cont.)

	1983 - 1997 Total		
	State Total	Railbelt	Non-Railbelt
Gasoline			
Total	3,806	2,816	990
Highway			
Marine			
Aviation			
Diesel			
Total	5,211	3,860	1,351
Highway			
Marine			
Jet Fuel			
Total	7,865	5,742	2,123
Civilian Domestic			
Military & International			
Grand Total	16,882	12,418	4,464

Numbers may not sum to total due to rounding.

1/ Includes industrial, military, and government use. Excludes space heating, utility generation and pipeline fuel.

SPACE HEATING 3.2

Space heating related 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, from 18.2 billion cubic feet in 1982 to 37.4 billion cubic feet in 1997 (Table 3.3).

The relatively more rapid growth of natural gas is attributable both to the more rapid growth of population in the railbelt as well as 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 eight percent in the 1990's. Barrow, on the North Slope, is the only location outside of the railbelt presently served by natural gas.

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 170 million gallons in 1982 to 253 million gallons in 1997.

Projected Consumption of Oil and Gas for Space Heat TABLE 3.3

	1982	1983	1984	1985	1986	1987
Natural Gas (BCF)						
Total	18.21	18.9	20.0	20.8	22.0	23.4
Railbelt	17.67	18.4	19.4	20.2	21.4	22.8
Current Market	17.67	18.4	19.4	20.2	21.0	22.0
Matanuska Valley	0	0	0	0	.4	.6
Non-Railbelt	.54	.5	.6	.6	.6	.6
Fuel Oil (Million Gallons)						
Total	169.9	174.3	179.2	184.7	189.5	194.4
Railbelt	65	66.4	68	70	71.6	73
Non-Railbelt	104.9	107.9	111.2	114.7	117.9	121.4

	1992	1997	1983-1997 Total
Natural Gas (BCF)			
Total	30.3	37.4	408.6
Railbelt	29.7	36.8	399.7
Current Market	27.4	33.9	
Matanuska Valley	2.3	2.9	
Non-Railbelt	.6	.6	8.9
Fuel Oil (Million Gallons)			
Total	221.5	253.2	3147.9
Railbelt	82.4	92.4	1174.6
Non-Railbelt	139.1	160.8	1,973.1

UTILITY ELECTRICITY GENERATION 3.3

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 nearly doubles from 32.9 bcf in 1983 to 62.4 bcf in 1997 (Table 3.4). The percentage of electricity in the railbelt provided by natural gas reaches a high of 81 percent by 1997 after temporarily falling below its current level of 77 percent when the Bradley Lake hydroelectric facility comes on line.2/

Fuel oil use for utility electricity generation will grow at an average annual rate of only 2.6 percent. This is due to the expected completion of several hydroelectric plants in locations currently dependent entirely upon fuel oil for generation. Because of this, fuel oil use will actually fall in the mid-1980s, but continued growth in electricity demand will cause fuel oil use to resume its upward trend shortly thereafter.

2/ Susitna hydro is considered in Chapter 5.

Projected Consumption of Oil and Gas for
Utility Electricity Generation TABLE 3.4

	1982			
	State Total	Railbelt	Southeast	Rest of State
Electricity Production (Thousand MWH)	3,625	2,971	415	239
Percent Natural Gas	-	76	0	7
Percent Fuel Oil	-	3	23	93
Natural Gas (BCF)	30.9	30.5	0	.4
Fuel Oil (Million Gallons)	35.1	10	7.8	17.3

	1983			
	State Total	Railbelt	Southeast	Rest of State
Electricity Production (Thousand MWH)	3,786	3,102	431	253
Percent Natural Gas	-	77	0	7
Percent Fuel Oil	-	3	26	93
Natural Gas (BCF)	32.9	32.5	0	.4
Fuel Oil (Million Gallons)	37.7	10	9.2	18.5

Projected Consumption of Oil and Gas for
Utility Electricity Generation

TABLE 3.4 (cont.)

	1984			
	State Total	Railbelt	Southeast	Rest of State
Electricity Production (Thousand MWH)	3,962	3,244	448	270
Percent Natural Gas	-	78	0	7
Percent Fuel Oil	-	2	24	93
Natural Gas (BCF)	35.1	34.6	0	.5
Fuel Oil (Million Gallons)	38.6	10	8.8	19.8

	1985			
	State Total	Railbelt	Southeast	Rest of State
Electricity Production (Thousand MWH)	4,122	3,375	463	284
Percent Natural Gas	-	79	0	7
Percent Fuel Oil	-	2	18	68
Natural Gas (BCF)	37	36.5	0	.5
Fuel Oil (Million Gallons)	31.8	10	6.6	15.2

Projected Consumption of Oil and Gas for
Utility Electricity Generation TABLE 3.4 (cont.)

	1986			
	State Total	Railbelt	Southeast	Rest of State
Electricity Production (Thousand MWH)	4,237	3,472	472	293
Percent Natural Gas	-	79	0	7
Percent Fuel Oil	-	2	18	68
Natural Gas (BCF)	38.4	37.9	0	.5
Fuel Oil (Million Gallons)	32.7	10	7.0	15.7

	1987			
	State Total	Railbelt	Southeast	Rest of State
Electricity Production (Thousand MWH)	4,352	3,569	481	302
Percent Natural Gas	-	80	0	7
Percent Fuel Oil	-	2	19	68
Natural Gas (BCF)	39.9	39.4	0	.5
Fuel Oil (Million Gallons)	33.5	10	7.4	16.1

Projected Consumption of Oil and Gas for
Utility Electricity Generation

TABLE 3.4 (cont.)

	1992			
	State Total	Railbelt	Southeast	Rest of State
Electricity Production (Thousand MWH)	5,190	4,265	550	375
Percent Natural Gas	-	75	0	7
Percent Fuel Oil	-	2	24	68
Natural Gas (BCF)	45.8	45.2	0	.6
Fuel Oil (Million Gallons)	40.6	10	10.6	20.0

	1997			
	State Total	Railbelt	Southeast	Rest of State
Electricity Production (Thousand MWH)	6,518	5,370	651	497
Percent Natural Gas	-	81	0	7
Percent Fuel Oil	-	1	29	68
Natural Gas (BCF)	62.4	61.6	0	.8
Fuel Oil (Million Gallons)	51.9	10	15.3	26.6

Projected Consumption of Oil and Gas for
Utility Electricity Generation

TABLE 3.4 (cont.)

	1983-1997 Total			
	State Total	Railbelt	Southeast	Rest of State
Electricity Production (Thousand MWH)	-	-	-	-
Percent Natural Gas	-	-	-	-
Percent Fuel Oil	-	-	-	-
Natural Gas (BCF)	668.1	659.4	0	8.7
Fuel Oil (Million Gallons)	590.8	150	148.8	292

INDUSTRIAL FUEL USE 3.4

Increased use of natural gas in future years will be related to petroleum production. This will be concentrated on the North Slope where expanded petroleum activity will be concentrated. The other large industrial use of natural gas, the production of Ammonia-Urea on the Kenai peninsula, will continue requiring relatively constant amounts of natural gas.

The major industrial use of fuel oil (not including transportation) is also 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 relatively constant levels.

Projected Consumption of Oil and Gas for Industry TABLE 3.5

	1982	1983	1984	1985	1986	1987
Natural Gas (BCF)						
Total Consumption	154.4	158.8	163.6	168.6	174	179.7
Petroleum Production Related	94.5	98.8	103.6	108.6	114.0	119.7
Pipeline Fuel	12.9	13.7	14.6	15.6	16.6	17.7
Railbelt	1.0	1.0	1.0	1.0	1.0	1.0
Rest of State	11.9	12.7	13.6	14.6	15.6	16.7
Other 1/	81.6	85.1	89.0	93.0	97.4	102.0
North Slope	50.8	54.3	58.2	62.2	66.6	71.2
Cook Inlet	30.8	30.8	30.8	30.8	30.8	30.8
Ammonia Urea	55.3	55.3	55.3	55.3	55.3	55.3
Military	4.7	4.7	4.7	4.7	4.7	4.7
Item: Injection	774.1	-	-	-	-	-
North Slope	671.0	-	-	-	-	-
Cook Inlet	103.1	-	-	-	-	-
Oil (Million Barrels)						
Total	2.258	2.258	2.258	2.258	2.258	2.258
Pipeline Fuel	2.000	2.000	2.000	2.000	2.000	2.000
Electrical Generation	.258	.258	.258	.258	.258	.258

1/ Includes natural gas in field operations, sales to producers and refiners, and miscellaneous sales.

Projected Consumption of Oil and Gas for Industry TABLE 3.5 (cont.)

	1992	1997	1983-1997 Total
Natural Gas (BCF)			
Total Consumption	209.6	209.6	2840.8
Petroleum Production Related	149.6	149.6	1966
Pipeline Fuel	18.9	18.9	264.2
Railbelt	1.0	1.0	15.0
Rest of State	17.9	17.9	249.2
Other1/	130.7	130.7	1701.8
North Slope	99.9	99.9	1239.8
Cook Inlet	30.8	30.8	462.0
Ammonia Urea	55.3	55.3	70.5
Military	4.7	4.7	829.5
Item: Injection	-	-	-
North Slope	-	-	-
Cook Inlet	-	-	-
Oil (Million Barrels)			
Total	2.258	2.258	33.870
Pipeline Fuel	2.000	2.000	30.000
Electrical Generation	.258	.258	3.870

1/ Includes natural gas in field operations, sales to producers and refiners, and miscellaneous sales.

RESERVE ESTIMATES AND ROYALTY SHARE 4.0

This section develops estimates of oil and gas reserves in the state and the royalty share of these reserves. The reserve estimates are developed for low, mid and high cases. The low and mid cases are based upon proven and probable reserves. The high cases also includes estimates of undiscovered reserves. The terms of the individual oil and gas lease contracts were used to determine the state's royalty share of the respective reserves.

RESERVE ESTIMATES 4.1

The estimated reserves for oil and gas are shown in Tables 4.1 and 4.2, respectively. The estimates are 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

Much information is available about the oil and gas reserves in the Cook Inlet area, and major new discoveries are not considered likely at this time. The reserves are assumed to remain constant for low, mid and high estimates. In addition, Cook Inlet reserves account for about 1.5% and 8% of the state's low and mid estimates of total proven and probable oil and gas reserves, respectively. The high estimate of reserves further reduces the Cook Inlet share of total oil and gas reserves to 0.6% and 5% respectively.

North Slope

Oil and gas reserve estimates for the North Slope are taken from a report to the Governor.(1) These estimates provide the low, mid and high proven and probable oil reserves on currently leased state lands. These estimates were compiled from public information available to the author.

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. The other oil and gas fields and areas listed in the report are combined together because production is not expected to begin until the mid to late 1980s.

(1) Van Dyke, W., Proven and Probable Oil and Gas Reserves, North Slope, Alaska, Division of Minerals and Energy Management, September 25, 1980, and personal communications 11/10/82 and 12/83.

No gas is currently exported from the North Slope. The Alaska Natural Gas Transportation System for carrying gas to the Lower 48 is currently targeted for completion in the late 1980's at the earliest, but commencement of construction of the line is very uncertain at this time. The proposed pipeline capacity will permit exports in the range of 2.0 to 2.4 Bcf per day, with an expected level of 2.0 Bcf per day. Alternative marketing of North Slope natural gas is being considered.

Undiscovered Resources

Undiscovered oil and gas resources are taken as the simple average of the low estimates recently developed by the U.S. Geological Survey (USGS) and the National Petroleum Council (NPC) for lands in Alaska. The USGS estimates the quantities of conventionally producible reserves based upon information available to USGS. At the 95% confidence level, the low USGS estimates of undiscovered oil and gas resources are 2.5 billion barrels (Bbbl) and 19.8 Tcf respectively . The NPC resources estimates were conditioned and yields on investment of greater than 10% for oil and gas and 15% for oil alone. These estimates are 17.8 Bbbl of oil and 10.1 Tcf. The averaged low estimate of undiscovered resources is added to the high estimate in this report in order to take a conservative approach on potential resource estimating, but the estimate should still be treated as a highly speculative number.

ESTIMATED RECOVERABLE RESERVES: OIL TABLE 4.1
(Million Bbl)

	LOW	MID	HIGH
COOK INLET [1]			
Beaver Creek	1	1	1
Granite Point	27	27	27
McArthur River	74	74	74
Middle Ground Shoal	19	19	19
Swanson River	19	19	19
Trading Bay	4	4	4
SUBTOTAL	144	144	144
NORTH SLOPE [2]			
Prudhoe Bay Unit			
Sadlerochit reservoir	5,563	6,343	6,733
Sag River reservoir (as of 9/1/83)	100	130	200
Lisburne reservoir and Sag Delta Area and Duck Island Area (as of 9/1/83)	430	575	850
Point Thomson Area and Flaxman Island Area	400	600	900
North Prudhoe Bay - West Dock Area	50	75	100
Milne Point Area (as of 9/1/83)	60	60	95
Gwydyr Bay Area (as of 9/1/83)	0	30	60
Shallow Cretaceous Sands (as of 9/1/83)	0	750	2,750
Kuparuk River Unit (as of 9/1/83)	615	1,040	1,240
SUBTOTAL	7,218	9,603	12,928
UNDISCOVERED [3]	N/A	N/A	10,150
TOTAL	7,362	9,747	23,222

ESTIMATED RECOVERABLE RESERVES: GAS TABLE 4.2
(Million MCF)

	LOW	MID	HIGH
COOK INLET [1]			
Beaver Creek	240	240	240
Beluga River	796	796	796
Birch Hill	11	11	11
Falls Creek	13	13	13
Granite Point	26	26	26
Ivan River	26	26	26
Kenai	929	929	929
Lewis River	22	22	22
McArthur River	89	89	89
Middle Ground Shoal	11	11	11
Nicolai Creek	3	3	3
North Cook Inlet	907	907	907
North Fork	12	12	12
Sterling	23	23	23
Swanson River	259	259	259
Trading Bay	33	33	33
West Foreland	20	20	20
West Fork	6	6	6
SUBTOTAL	3,426	3,426	3,426
NORTH SLOPE [2]			
Prudhoe Bay Unit			
Sadlerochit reservoir	29,000	29,000	29,000
Lisburne reservoir, Sag Delta Area and Duck Island Area (as of 9/1/83)	2,000	2,950	4,100
Point Thomson Area and Flaxman Island Area	3,200	4,500	6,000
Kuparuk River Unit (as of 9/1/83)	135	220	260
SUBTOTAL	34,335	36,670	39,360
UNDISCOVERED [3]	N/A	N/A	15,000
TOTAL	37,761	40,096	57,786

[1] Alaska Oil and Gas Conservation Commission, "1982 Statistical Report."
[2] Van Dyke, W., "Proven and Probable Oil and Gas Reserves, North Slope, Alaska," September 25, 1980, and personal communication, December 24, 1983.
[3] "NPC Seed Big U.S. Arctic Resources," Oil and Gas Journal, November 23, 1981, and "Estimates of Undiscovered Recoverable Resources of Conventionally Producible Oil and Gas in the United States, a Summary," U.S. Geological Survey, OFR 81-192, 1981.

The royalty share assigned to each field varies according to land ownership and the terms of the leases. The share used for the Cook Inlet fields and the Prudhoe Bay Sadlerochit Reservoir are taken from "Disposition of the States Royalty Share of Its Oil and Gas," prepared by the Division of Minerals and Energy Management. The share for the other existing North Slope fields is set at 12.5%, and at 0% for the undiscovered resources, due to the fact that not enough information is available to estimate what portion of undiscovered North Slope resources, if any, may be on state lands.

The royalty share of oil and gas reserves based upon these shares are presented in Tables 4.3 and 4.4, respectively. In the mid estimate case, the royalty oil available from Cook Inlet Fields is less than 2% of the State total reserves and about 5% for gas reserves.

ESTIMATED ROYALTY SHARE: OIL
(Million Bbl)

TABLE 4.3

	LOW	MID	HIGH
COOK INLET			
Beaver Creek			
Granite Point	4	4	4
McArthur River	11	11	11
Middle Ground Shoal	3	3	3
Swanson River			
Trading Bay	1	1	1
SUBTOTAL	19	19	19
NORTH SLOPE			
Prudhoe Bay			
Sadlerochit reservoir	771	869	918
Kuparuk	75	125	188
Other North Slope	136	198	297
SUBTOTAL	982	1,192	1,403
UNDISCOVERED	N/A	N/A	0
TOTAL	1,001	1,211	1,422

ESTIMATED ROYALTY SHARE: GAS
(Million MCF)

TABLE 4.4

	LOW	MID	HIGH
COOK INLET			
Beaver Creek			
Beluga River	56	56	56
Birch Hill			
Falls Creek			
Granite Point	3	3	3
Ivan River			
Kenai	23	23	23
Lewis River			
McArthur River	11	11	11
Middle Ground Shoal	2	2	2
Nicolai Creek	2	2	2
North Cook Inlet	119	119	119
North Fork			
Sterling	0	0	0
Swanson River			
Trading Bay	2	2	2
West Foreland			
SUBTOTAL	218	218	218
NORTH SLOPE			
Prudhoe Bay Unit			
Sadlerochit reservoir	3,625	3,625	3,625
Other North Slope	563	800	1,100
SUBTOTAL	4,188	4,425	4,725
UNDISCOVERED	N/A	N/A	0
TOTAL	4,406	4,643	4,943

ANALYSIS OF SURPLUS 5.0

Under reasonable assumptions about recoverable reserves and Alaskan consumption, the current inventory of both oil and gas is more than sufficient to meet the presently identifiable needs of Alaskans for the next 15 years. The state royalty share is also sufficient given an adequate transportation system for natural gas is developed for natural gas.

LIQUID PETROLEUM 5.1

Table 5.1 shows that the cumulative 15-year Alaskan demand for liquid petroleum is projected to be approximately 525 million barrels of crude oil equivalent. This is equal to approximately half the reserves of royalty oil and is 5 percent of total reserves. No attempt has been made to compare petroleum products produced at Alaskan refineries with petroleum products consumed in the state. Currently the total 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. 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.

Surplus Oil Calculation (Million Barrels) TABLE 5.1

	Liquid Petroleum					
	Statewide		North Slope		Cook Inlet	
	Total	State Royalty	Total	State Royalty	Total	State Royalty
Recoverable Reserves 1/	9,705	1,211	9,530	1,192	175	19
Estimated Production for remainder of 1982 2/	117	15	92	12	25	3
Estimated Remaining Recoverable Reserves as of Jan. 1, 1983	9,588	1,192	9,438	1,180	150	16
Item: Estimated Alaskan Consumption during 1982 3/	29	-	-	-	-	-
Estimated Cumulative Alaskan Consumption from 1983 to 1997 (15 years)	525	-	-	-	-	-
Net Surplus (Deficit)	9,063	667	-	-	-	-

Note: This Table has not been updated from the 1983 report.

1/ From Chapter 4. North Slope is as of 11/1/82. Cook Inlet is as of 1/1/82.

2/ Author's estimates. State royalty share is proportion of state royalty oil in total.

3/ From Chapter 3.

NATURAL GAS 5.2

Table 5.2 shows that the cumulative 15-year Alaskan demand for natural gas is projected to be approximately 3.943 trillion cubic feet of gas. This is approximately 85 percent of the state royalty share of gas in the current inventory at Cook Inlet and on the North Slope combined.

Since the transportation of natural gas normally requires a pipeline, particular consideration to the location of in-state demand centers for gas which are linked by pipeline to gas supplies is relevant for the determination of excess supply. Table 5.2 shows that there is a projected net surplus in both the Cook Inlet and North Slope markets. The Alaskan royalty share of Cook Inlet gas alone, however, is insufficient to meet the projected Cook Inlet gas requirements over the next 15 years.

PROJECTIONS BEYOND CURRENT INVENTORY 5.3

We assume recoverable reserves represent a 15-year inventory of petroleum in the ground based upon historical reserve to production ratios. The idea of a fixed inventory of reserves is based on the notion that because a very sizable investment is required to develop a petroleum reservoir into recoverable reserves, such developments will only occur at a pace consistent with the growth in demand. 'Excessive' reserves, like excessive inventories, result in excessive carrying costs to the oil companies.

Consequently, a 15 year time horizon for demand is also used in the analyses. As time passes, any growth in demand will stimulate the search for reserves to replace those produced, and markets will work to keep supply and demand in balance.

Surplus Gas Calculation (BCF) TABLE 5.2

	Natural Gas					
	Statewide		North Slope		Cook Inlet	
	Total	State Royalty	Total	State Royalty	Total	State Royalty
Recoverable Reserves 1/	39,994	4,643	35,400	4,425	3,594	218
Estimated Production for remainder of 1982 2/	213	13	11	1	202	12
Estimated Remaining Recoverable Reserves as of Jan. 1, 1983	38,781	4,630	35,389	4,424	3,392	206
Item: Estimated Alaskan Consumption during 1982 3/	203	-	64	-	139	-
Estimated Cumulative Alaskan Consumption from 1983 to 1997 (15 years)	3,943	-	1,507	-	2,436	-
Net Surplus (Deficit)	34,838	687	33,882	2,917	956	(2,230)

1/ From Chapter 4. North Slope is as of 11/1/82. Cook Inlet is as of 1/1/82.

2/ Total gas disposition net of reinjection, from Chapter 2. State royalty share is proportion of state royalty gas in total.

3/ From Chapter 3.

The conclusions of this chapter are sensitive to several assumptions made in the analysis. As with any projection or estimate of future events some uncertainty exists. The assumptions are discussed below and the effects of varying the assumptions are shown in Table 5.3.

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 more than natural gas because a larger portion of natural gas is used by large industrial users. 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. Use of natural gas would expand by a smaller proportion.

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 945 billion cubic feet. If the Pacific Alaska LNG facility were built to currently proposed specifications, it would annually export 160 billion cubic feet. With an assumed first year of operation of 1990, cumulative exports to California through 1997 would be 1,280 billion cubic feet. Combined exports to Japan and California would be 2,225 billion cubic feet, reducing reserves for instate use, and the net surplus, to 30,713 billion cubic feet. The net surplus in Cook Inlet alone under these assumptions becomes a net deficit.

Susitna Hydro

If Susitna hydro is built according to the current schedule, it would begin to replace generation by natural gas and fuel oil in 1994. If natural gas use were cut back 75 percent beginning in that year, cumulative gas consumption would decline 182 billion cubic feet. Accompanying fuel oil use could be eliminated at a savings of 40 million gallons (about one million barrels).

Sensitivity Analysis of Net Surplus TABLE 5.3

	Net Surplus	
	Liquid Petroleum (Million barrels)	Natural Gas (BCF)
Base case	9,063	34,838
Low reserve estimates	7,393	32,938
50% increase in growth of population-related consumption	8,997	34,538
Export of LNG	N/C	30,713
Susitna hydro	9,062	35,020
Natural gas available in Fairbanks	9,243	34,779

N/C = no change

Natural Gas Availability in Fairbanks

If, by some means, natural gas became available in Fairbanks, all or most electricity generation and space heating might convert to gas. This could increase annual gas consumption for electricity generation by 6.3 billion cubic feet as coal and fuel oil use are backed out. Fuel oil use would fall by 10 million gallons annually.

Natural gas consumption for space heating would gradually replace fuel oil and coal and could easily 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 20.7 billion cubic feet and fuel oil consumption fall by 120 million gallons. The statewide net surplus of gas would fall very marginally because of this.

FIELD	BELUGA RIVER
LOCATION	Cook Inlet, onshore, west side
BEGAN PRODUCTION	1/68
OWNER	AGEA, ARCO, Chevron, Shell
OPERATOR	Chevron

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	Bbl	MCF	1,485,618 MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	Bbl	MCF	155,246,395 MCF
ESTIMATED RESERVES AS OF 8/83	Bbl	MCF	784,115,056 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	%	%	17 %

ROYALTY 12.5%, Effective rate: 7.555%

PURCHASER Chugach Electric /Bbl /MCF RIV: $ 0.20 /MCF

LEASES State ADL: 17592, 17599, 17658, 21126, 21127, 21128, 21129
Federal AO: 29656, 29657

COMMENTS

Chugach Electric is 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 is building 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%. Royalty ownership was reallocated by changing the ownership determination from surface acreage to reservoir percentage.

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	Bbl	MCF	MCF
AS OF			
CUMULATIVE NET PRODUCTION	Bbl	MCF	MCF
AS OF			
ESTIMATED RESERVES	Bbl	MCF	MCF
AS OF			
ESTIMATED PERCENT OF FIELD DEPLETED			
AS OF	%	%	%
ROYALTY			
PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS
Initial hydrocarbon equity ownership calculations underway.

FIELD	DUCK ISLAND / SAG DELTA (ENDICOTT RESERVOIR)
LOCATION	North Slope, onshore/offshore
BEGAN PRODUCTION	Facilities design underway, production expected to begin in 1988.
OWNER	
OPERATOR	EXXON, SOHIO

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION	Bbl	MCF	MCF
AS OF			
CUMULATIVE NET PRODUCTION	Bbl	MCF	MCF
AS OF			
ESTIMATED RESERVES	Bbl*	MCF*	MCF
AS OF			
ESTIMATED PERCENT OF FIELD DEPLETED			
AS OF	%	%	%

* See Tables 4.1 and 4.2.

ROYALTY

PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

Initial calculation of hydrocarbon ownership underway.

Unit area expansion proposed for 1984.

FIELD	EPPERSON KNOB UNIT AREA
LOCATION	Cook Inlet, onshore, east side
BEGAN PRODUCTION	Exploration to begin in 1984
OWNER	
OPERATOR	Grand Banks

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION	Bbl	MCF	MCF
AS OF			
CUMULATIVE NET PRODUCTION	Bbl	MCF	MCF
AS OF			
ESTIMATED RESERVES	Bbl	MCF	MCF
AS OF			
ESTIMATED PERCENT OF FIELD DEPLETED			
AS OF	%	%	%
ROYALTY			
PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

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

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	Bbl	MCF	0 MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	Bbl	MCF	18,983 MCF
ESTIMATED RESERVES AS OF 8/83	Bbl	MCF	13,000,000 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	%	%	0 %
ROYALTY			
PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

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

	OIL	GAS Casinghead	GAS Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	302,068 Bbl	218,394 MCF	MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	93,349,971 Bbl	82,090,730 MCF	MCF
ESTIMATED RESERVES AS OF 8/83	24,583,459 Bbl	24,252,846 MCF	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	79 %	77 %	%

ROYALTY 12.5 %

PURCHASER	Tesoro	RIK: $28.66 /Bbl	/MCF	/MCF
	ARCO*		RIV: $ 0.118	
	AMOCO Platform*		RIV: $ 0.10	
	Union*		RIV: $ 0.10	

* Small amount of casinghead gas sold to AMOCO for use on platform.

LEASES State ADL: 17586, 17587, 17597, 18742, 18761, 18776, 35431

COMMENTS

All royalty oil from this field is taken in kind and sold to Tesoro.

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

	OIL		GAS	
			Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION		Bbl	MCF	MCF
AS OF				
CUMULATIVE NET PRODUCTION		Bbl	MCF	MCF
AS OF				
ESTIMATED RESERVES	30,000,000	Bbl*	MCF	MCF
AS OF 9/1/83				
ESTIMATED PERCENT OF FIELD DEPLETED				
AS OF		%	%	%

* William Van Dyke, personal communication, 12/23/83

ROYALTY

PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

Further exploration activities planned for 1984-85.

FIELD	Unnamed - HEMI SPRINGS
LOCATION	North Slope, onshore
BEGAN PRODUCTION	Exploration to begin in 1984
OWNER	
OPERATOR	ARCO

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION	Bbl	MCF	MCF
AS OF			
CUMULATIVE NET PRODUCTION	Bbl	MCF	MCF
AS OF			
ESTIMATED RESERVES	Bbl	MCF	MCF
AS OF			
ESTIMATED PERCENT OF FIELD DEPLETED			
AS OF	%	%	%
ROYALTY			
PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS
Unit agreement submitted for state approval in December, 1983.

FIELD	IVAN RIVER
LOCATION	Cook Inlet, onshore, west side
BEGAN PRODUCTION	Shut-in 1966, suspended
OWNER	
OPERATOR	Chevron

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	Bbl	MCF	MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	Bbl	MCF	0 MCF
ESTIMATED RESERVES AS OF 8/83	Bbl	MCF	26,000,000 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	%	%	0 %
ROYALTY			
PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

FIELD	KATALLA
LOCATION	Gulf of Alaska, onshore
BEGAN PRODUCTION	Abandoned 1934
OWNER	
OPERATOR	

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	0 Bbl	MCF	MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	154,000 Bbl	MCF	MCF
ESTIMATED RESERVES AS OF 8/83	Not reported Bbl	MCF	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	N/A %	%	%
ROYALTY			
PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

FIELD	KAVIK
LOCATION	North Slope, onshore
BEGAN PRODUCTION	Shut-in, suspended
OWNER	
OPERATOR	ARCO

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION	Bbl	MCF	MCF
AS OF			
CUMULATIVE NET PRODUCTION	Bbl	MCF	MCF
AS OF			
ESTIMATED RESERVES	Bbl	MCF	MCF
AS OF			
ESTIMATED PERCENT OF FIELD DEPLETED			
AS OF	%	%	%
ROYALTY			
PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

FIELD	KENAI
LOCATION	Cook Inlet, onshore, east side
BEGAN PRODUCTION	1/62
OWNER	ARCO, Chevron, Marathon, Union
OPERATOR	Union

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	0 Bbl	MCF	9,106,404 MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	11,877 Bbl*	MCF	1,388,518,403 MCF
ESTIMATED RESERVES AS OF 8/83	Not reported Bbl	MCF	856,148,771 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	N/A %	%	62 %

* Natural gas liquids

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

PURCHASER	Alaska Pipeline	/Bbl	/MCF	RIV: $ 0.605 /MCF
	Chevron			RIV: $ 0.605
	City of Kenai			RIV: $ 0.29
	Marathon LNG			RIV: $ 2.02
	Rental gas (Swanson River oil field)			RIV: $ 0.18
	Union			RIV: $ 0.53
	Union-Chevron exchange			RIV: $ 0.605
			Weighted average:	$ 0.526

LEASES State ADL: 00593, 00594, 00588, 02411, 02497, 308223, 324598
Federal AD: 28047, 28055, 28056, 28103, 28140, 28142, 28143

COMMENTS

The Kenai Unit provides most of the gas sales in the Cook Inlet area. Estimated Alaska state royalty gas sales were approximately 195,000 MCF as of 1982.

The state does not receive the full 12.5% royalty share because of the predominance of Federal leases in the unit and the recent conveyance of land to Cook Inlet Region Inc. The price the state receved from its royalty share results from prices paid under existing contracts between the lessees and their purchasers.

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

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	3,202,844 Bbl	518,410 MCF	MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	59,126,206 Bbl	9,930,467 MCF	MCF
ESTIMATED RESERVES AS OF 9/1/83	1,040,000,000 Bbl*	220,000,000 MCF*	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	4 %	4 %	%

* William Van Dyke, personal communication, 12/23/83.

ROYALTY 12.5 %

PURCHASER None RIV: $17.015 /Bbl RIV: $2.71 /MCF

LEASES State ADL: 25512, 25513, 25519, 25520, 25521, 25522, 25523, 25531, 25547, 25548 25569, 25570, 25571, 25585, 25586, 25587, 25588, 25589, 25590, 25603 25604, 25605, 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

COMMENTS

Unit Area expansion proposed for 1984.

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

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF	Bbl	MCF	MCF
CUMULATIVE NET PRODUCTION AS OF	Bbl	MCF	MCF
ESTIMATED RESERVES AS OF	Bbl	MCF	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF	%	%	%
ROYALTY			
PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

FIELD	LISBURNE RESERVOIR
LOCATION	North Slope, onshore/offshore
BEGAN PRODUCTION	Field delineation and facilities design underway, production expected to
OWNER	begin in the late 1980's.
OPERATOR	ARCO

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	Bbl	MCF	MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	Bbl	MCF	MCF
ESTIMATED RESERVES AS OF 8/83	Bbl*	MCF*	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	%	%	%

* See Tables 4.1 and 4.2

ROYALTY

PURCHASER /Bbl /MCF /MCF

LEASES State ADL:

COMMENTS

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

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	1,184,646 Bbl	463,449 MCF	654,762 MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	490,615,650 Bbl*	153,376,414 MCF	95,959,957 MCF
ESTIMATED RESERVES AS OF 8/83	64,522,836 Bbl	22,292,412 MCF	57,761,908 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	88 %	87 %	62 %

* includes 7,770,430 Bbl NGL

ROYALTY 12.5 %

PURCHASER Tesoro RIK: $28.04 /Bbl /MCF /MCF

LEASES State ADL: 17519, 17594, 17602, 18716, 18729, 18730, 18758, 18772, 18777, 21068

COMMENTS

All royalty oil from this field is taken in kind and sold to Tesoro.

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	MIDDLE GROUND SHOAL
LOCATION	Cook Inlet, offshore, east side
BEGAN PRODUCTION	9/67
OWNER	AMOCO, ARCO, Chevron, Getty, Phillips, Shell
OPERATOR	AMOCO, Shell

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	283,761 Bbl	193,424 MCF	17,532 MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	139,599,334 Bbl	69,154,732 MCF	237,070 MCF
ESTIMATED RESERVES AS OF 8/83	16,729,909 Bbl	9,452,607 MCF	Not reported MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	89 %	88 %	N/A %
ROYALTY	12.5 %		
PURCHASER Tesoro	RIK: $28.17 /Bbl	/MCF	/MCF
LEASES	State ADL: 17595, 18744, 18746, 18754, 18756		

COMMENTS

All royalty oil produced from this field is taken in kind and sold to Tesoro.

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	MILNE POINT
LOCATION	North Slope, onshore
BEGAN PRODUCTION	Field delineation and facilities design underway, production expected to.
OWNER	begin in the late 1980's.
OPERATOR	Conoco

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF	Bbl	MCF	MCF
CUMULATIVE NET PRODUCTION AS OF	Bbl	MCF	MCF
ESTIMATED RESERVES AS OF	60,000,000 Bbl*	MCF	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF	%	%	%

* William Van Dyke, personal communication, 12/23/83.

ROYALTY

PURCHASER /Bbl /MCF /MCF

LEASES State ADL:

COMMENTS

Unit area expansion approved during 1983.

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

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	Bbl	MCF	0 MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	Bbl	MCF	1,062,055 MCF
ESTIMATED RESERVES AS OF 8/83	Bbl	MCF	3,000,000 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	%	%	26 %

ROYALTY 12.5 %

PURCHASER AMOCO /Bbl /MCF RIV: $ 0.15 /MCF

LEASES State ADL: 17585, 17598, 63279
Federal AD: 34161

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

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	Bbl	MCF	3,879,939 MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	Bbl	MCF	623,932,700 MCF
ESTIMATED RESERVES AS OF 8/83	Bbl	MCF	875,960,490 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	%	%	42 %

ROYALTY 12.5 %

PURCHASER Alaska Pipeline /Bbl /MCF RIK: $3.033 /MCF
Phillips RIV: $0.4165725/MCF

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. However, in 1977 the state entered into agreements with Phillips and Alaska Pipeline Company to sell the royalty share to Alaska Pipeline Company for delivery to the Alaska market. Royalty gas not purchased by Alaska Pipeline Company is taken by Phillips. This agreement expires during 1984.

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

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	Bbl	MCF	0 MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	Bbl	MCF	104,595 MCF
ESTIMATED RESERVES AS OF 8/83	Bbl	MCF	12,000,000 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	%	%	1 %
ROYALTY			
PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

FIELD NORTH MIDDLE GROUND SHOAL
LOCATION Cook Inlet, offshore, mid-channel
BEGAN PRODUCTION No production, abandoned 1975
OWNER
OPERATOR

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION	Bbl	MCF	MCF
AS OF			
CUMULATIVE NET PRODUCTION	Bbl	MCF	MCF
AS OF			
ESTIMATED RESERVES	Bbl	MCF	MCF
AS OF			
ESTIMATED PERCENT OF FIELD DEPLETED			
AS OF	%	%	%

ROYALTY

PURCHASER /Bbl /MCF /MCF

LEASES State ADL:

COMMENTS

FIELD	POINT THOMSON UNIT AREA
LOCATION	North Slope, onshore/offshore
BEGAN PRODUCTION	Shut-in
OWNER	
OPERATOR	EXXON

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION	Bbl	MCF	MCF
AS OF			
CUMULATIVE NET PRODUCTION	Bbl	MCF	MCF
AS OF			
ESTIMATED RESERVES	Bbl*	MCF*	MCF
AS OF			
ESTIMATED PERCENT OF FIELD DEPLETED			
AS OF	%	%	%

* See Tables 4.1 and 4.2.

ROYALTY

PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

Unit Area expansion proposed for 1984. Market analysis underway to determine development potential.

FIELD	PRUDHOE BAY - SADLEROCHIT RESERVOIR		
LOCATION	North Slope, onshore		
BEGAN PRODUCTION	10/69		
OWNER	Amerada-Hess, ARCO, BP, Chevron, Exxon, Getty, LL&E, Marathon, Mobil, Petro-Lewis, Phillips, SOHIO		
OPERATOR	ARCO, Sohio		
	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	46,585,684 Bbl	5,289,584 MCF	MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	3,024,749,050 Bbl	323,990,471 MCF	MCF
ESTIMATED RESERVES AS OF 9/1/83	6,343,000,000 Bbl*	29,000,000,000 MCF	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	32 %	1 %	%

* William Van Dyke, personal communication, 12/24/83

ROYALTY 12.5 %

PURCHASER Tesoro RIK: $28.04 /Bbl /MCF /MCF

LEASES State ADL: 28238, 28239, 28240, 28241, 28244, 28245, 28246, 28257, 28258, 28260
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, 28344, 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 operator of the Trans-Alaska Pipeline. The state is receiving royalty in value with the gas price being set by the owners of the gas. There presently is no other market. The state's royalty share of gas sales is 12.5%.

Unit Area expansion is proposed for 1984, with additional development work continuing.

FIELD PRUDHOE BAY - SAG RIVER RESERVOIR
LOCATION
BEGAN PRODUCTION
OWNER
OPERATOR

	OIL		GAS	
			Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83		Bbl	ERR MCF	ERR MCF
CUMULATIVE NET PRODUCTION AS OF 8/83		Bbl	0 MCF	0 MCF
ESTIMATED RESERVES AS OF 9/1/83	130,000,000	Bbl*	0 MCF	0 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83		%	ERR %	ERR %

* William Van Dyke, personal communication, 12/23/83

ROYALTY

PURCHASER /Bbl /MCF /MCF

LEASES State ADL:

COMMENTS

FIELD	REDOUBT SHOAL
LOCATION	Cook Inlet, offshore, mid-channel
BEGAN PRODUCTION	Abandoned
OWNER	
OPERATOR	

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	0 Bbl	0 MCF	MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	1,596 Bbl	456 MCF	MCF
ESTIMATED RESERVES As OF 8/83	Not reported Bbl	Not reported MCF	MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	N/A %	N/A %	%
ROYALTY			
PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

FIELD	SOUTH MCARTHUR RIVER UNIT AREA
LOCATION	Cook Inlet, offshore
BEGAN PRODUCTION	Further exploration pending
OWNER	
OPERATOR	Mobil

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION	Bbl	MCF	MCF
AS OF			
CUMULATIVE NET PRODUCTION	Bbl	MCF	MCF
AS OF			
ESTIMATED RESERVES	Bbl	MCF	MCF
AS OF			
ESTIMATED PERCENT OF FIELD DEPLETED			
AS OF	%	%	%
ROYALTY			
PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

FIELD	STERLING
LOCATION	Cook Inlet, onshore, east side
BEGAN PRODUCTION	5/62
OWNER	Marathon, Union
OPERATOR	Union

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	Bbl	MCF	1,581 MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	Bbl	MCF	2,047,252 MCF
ESTIMATED RESERVES AS OF 8/83	Bbl	MCF	22,987,349 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	%	%	8 %

ROYALTY 12.5%, Effective rate, 1.55461%

PURCHASER Sport Lake Greenhouse /Bbl /MCF $ 0.40 /MCF

LEASES State ADL: 02497, 320912, 324599

COMMENTS

Since Federal and Cook Inlet Region Inc. leases are involved, 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	STUMP LAKE UNIT AREA
LOCATION	Cook Inlet, onshore, west side
BEGAN PRODUCTION	Shut-in
OWNER	
OPERATOR	Chevron

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION	Bbl	MCF	MCF
AS OF			
CUMULATIVE NET PRODUCTION	Bbl	MCF	MCF
AS OF			
ESTIMATED RESERVES	Bbl	MCF	MCF
AS OF			
ESTIMATED PERCENT OF FIELD DEPLETED			
AS OF	%	%	%
ROYALTY			
PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

FIELD	THEODORE RIVER (PRETTY CREEK UNIT AREA)
LOCATION	Cook Inlet, onshore, west side
BEGAN PRODUCTION	Shut-in
OWNER	
OPERATOR	Chevron

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION	Bbl	MCF	MCF
AS OF			
CUMULATIVE NET PRODUCTION	Bbl	MCF	MCF
AS OF			
ESTIMATED RESERVES	Bbl	MCF	MCF
AS OF			
ESTIMATED PERCENT OF FIELD DEPLETED			
AS OF	%	%	%
ROYALTY			
PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

FIELD	TRADING BAY
LOCATION	Cook Inlet, offshore, west side
BEGAN PRODUCTION	12/67
OWNER	Marathon, Union
OPERATOR	Union

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION AS OF 1-8/83	105,367 Bbl	80,940 MCF	46,559 MCF
CUMULATIVE NET PRODUCTION AS OF 8/83	84,993,129 Bbl*	55,060,693 MCF	1,078,993 MCF
ESTIMATED RESERVES AS OF 8/83	3,157,062 Bbl	2,352,484 MCF	29,627,531 MCF
ESTIMATED PERCENT OF FIELD DEPLETED AS OF 8/83	96 %	96 %	4 %

* includes 346,543 Bbl NGL

ROYALTY 12.5 %

PURCHASER Tesoro RIK: $26.43 /Bbl** /MCF /MCF

** Weighted average

LEASES State ADL: 18731

COMMENTS

All royalty oil from this field is taken in kind and sold to Tesoro.

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

FIELD	WEST FORELAND
LOCATION	Cook Inlet, onshore, west side
BEGAN PRODUCTION	Shut-in 1962
OWNER	
OPERATOR	

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION	Bbl	MCF	MCF
AS OF			
CUMULATIVE NET PRODUCTION	Bbl	MCF	MCF
AS OF			
ESTIMATED RESERVES	Bbl	MCF	MCF
AS OF			
ESTIMATED PERCENT OF FIELD DEPLETED			
AS OF	%	%	%
ROYALTY			
PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

FIELD	WEST FORK
LOCATION	Cook Inlet, onshore, east side
BEGAN PRODUCTION	
OWNER	
OPERATOR	

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION	Bbl	MCF	6,318 MCF
AS OF			
CUMULATIVE NET PRODUCTION	Bbl	MCF	1,465,679 MCF
AS OF			
ESTIMATED RESERVES	Bbl	MCF	5,949,455 MCF
AS OF			
ESTIMATED PERCENT OF FIELD DEPLETED			
AS OF	%	%	20 %
ROYALTY			
PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

FIELD	WEST MIKKELSEN UNIT AREA
LOCATION	North Slope, onshore/offshore
BEGAN PRODUCTION	Further exploration pending
OWNER	
OPERATOR	ARCO, Shell

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION	Bbl	MCF	MCF
AS OF			
CUMULATIVE NET PRODUCTION	Bbl	MCF	MCF
AS OF			
ESTIMATED RESERVES	Bbl	MCF	MCF
AS OF			
ESTIMATED PERCENT OF FIELD DEPLETED			
AS OF	%	%	%
ROYALTY			
PURCHASER	/Bbl	/MCF	/MCF

LEASES State ADL:

COMMENTS

FIELD	WEST SAK RESERVOIR
LOCATION	North Slope, onshore
BEGAN PRODUCTION	Pilot production underway
OWNER	
OPERATOR	ARCO, Conoco

	OIL	GAS	
		Casinghead	Gas Well
AVERAGE MONTHLY PRODUCTION	Bbl	MCF	MCF
AS OF			
CUMULATIVE NET PRODUCTION	Bbl	MCF	MCF
AS OF			
ESTIMATED RESERVES	Bbl*	MCF	MCF
AS OF			
ESTIMATED PERCENT OF FIELD DEPLETED			
AS OF	%	%	%

* See Tables 4.1 and 4.2.

ROYALTY

PURCHASER /Bbl /MCF /MCF

LEASES State ADL:

COMMENTS

Reservoir delineation and engineering/geological studies continuing.

DEMAND PROJECTION METHODOLOGY APPENDIX B

Demand for oil and gas is best calculated if divided into use categories because of similarity in the factors affecting the level and growth rate of demand by use. In addition, oil and gas often compete with one another in a market for a particular use, such as space heating or electricity generation. The use categories in this study are transportation, electricity, space heat, and industrial.

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

TRANSPORTATION USE OF LIQUID PETROLEUM B.1

Consumption per capita coefficients is the method of projecting transportation fuel use.

Gasoline

a. Highway use (taxable & 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. Demand is projected using a per capita coefficient which declines one percent annually from the previous year. 1981 consumption was 444 gallons per capita.

b. Aviation gasoline (taxable and exempt) use has, in the past decade, been roughly 10 percent as large as highway gasoline use. The sharp decline in 1982 is probably a reporting error. We assume that a strong income elasticity of demand for general aviation will result in a maintenance of the current per capita use coefficient in future years. 1981 consumption was 44.7 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. 1981 consumption was 18 gallons per capita.

Jet Fuel

Jet fuel consumption consists of domestic commercial operations, international commercial operations, and military operations. Domestic commercial operations is a function of the Alaskan population and economy and as such has 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 later categories, accounting for about 2/3 of jet fuel consumption, cannot be separately identified in the historical data, but their combined total has shown relatively modest, although cyclical, growth since the early 1970s.

Using 1981 as a base (since that is the last year for which domestic commercial jet fuel consumption can be separately identified in the data), we project domestic commercial consumption separately from international commercial and military. The coefficient relating consumption to population for domestic commercial aviation has increased from 161 to 316 gallons per capita since 1971.

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

Variation in international commercial and military consumption is difficult to project. Growth during the preceding decade approximated one percent per annum. We use this figure to project future growth.

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. The difficulties are that "exempt highway fuel" includes some nontransport fuel use and "off highway fuel" includes an unknown portion of electrical utility fuel use and space heating use (see Table B.1).

State Consumption of
Motor Vehicle Diesel Fuel 1/ (Million Gallons) TABLE B.1

Year	Total	Highway		Off Highway	Other Taxable
		Taxable	Exempt	Exempt	Highway
1971	107	35	72	-	-
1972	84	29	55	-	-
1973	114	25	89	-	-
1974	166	66	100	-	-
1975	204	133	71	-	-
1976	205	140	65	-	-
1977	144	99	45	-	-
1978	156	102	54	-	-
1979	269	57	69	81	92
1980	302	65	24	97	117
1981	336	36	22	103	75
1982	380	19	19	142	0

1/ Department of Revenue, Tax Records

We assume 1982 highway sales (taxable and exempt) represent all highway transport use of diesel and no nontransport use. Future growth in consumption is projected at the current per capita use rate of 512.9 gallons. "Off highway fuel" use and "other taxable highway" as reported by the Department of Revenue are components of utility and space heat fuel use. Projections of these uses of diesel fuel are separately calculated (see below).

Marine diesel use is roughly one quarter that of highway diesel. Its use displayed very rapid growth in the mid 1970s and now appears to be stabilizing. We assume a constant per capita level of consumption of 127.8 gallons.

Regional Allocation

Regional allocations of transportation fuels are made on the same basis as the allocations of historical consumption in Chapter 2.

ELECTRIC UTILITY USE OF LIQUID FUELS AND NATURAL GAS B.2

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

a. Consumption

The space heating and nonspace heating components of electricity consumption per capita in the railbelt are based upon the Railbelt Electricity Demand Model (Table B.2) updated to estimated 1982 electricity consumption levels.

Rail Belt Consumption of Electricity
Net of Space Heating

TABLE B.2

	Consumption 1/ (MWH)	Population	Consumption per Capita (KWH)
1980	1498	284,392	5265
1985	2059	341,169	6035
1990	2355	370,445	6350
1995	3091	421,983	7325
2000	3866	472,551	8180

1/ Total consumption in medium case minus twice the residential space heating consumption, Electric Power Consumption for the Railbelt; Goldsmith and Huskey, ISER 1980.

Non-space heating railbelt electricity consumption per capita is projected to grow according to the growth in Table B.2.

Electricity consumption for space heating depends upon population growth but also upon two other factors:)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 utilizing natural gas rather than 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.

We assume the gas utility will extend their market into the Matanuska Valley and aggressively market their gas for space heating. Market penetration begins in 1985, and during the next five years the electric space heating market in the Matanuska Valley falls to half its current share. Subsequent to that, it resumes the growth rate of per capita space heating consumption.

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

b. Mode Split

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 exceptions modify these rules:

1. Coal-fired generation in Fairbanks remains constant at 354 thousand MWH annually.

2. Bradley Lake comes on line in 1988 and produces 300 thousand MWH annually. This backs out 4.5 billion cubic feet of natural gas annually.

3. Solomon Gulch comes on line in 1982 with a firm annual energy of 55 thousand MWH. This backs out 3 million gallons of fuel oil 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. 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 hydroelectric projects, now in the planning stage or under construction, 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 schedule of hydroelectric projects assumed is as shown in Table B.3.

Scheduled Southeast Alaska Hydroelectric Projects TABLE B.3

Name	Location	Scheduled Completion	Capacity (MW)	Annual Energy (MWH)
Swan Lake	Ketchikan	1984	22	103
Tyee Lake	Wrangell/Petersburg	1985	20	133

Rest-of-State

The rest of the state, with the exception of Barrow, currently relies on fuel oil for electricity generation. This dependence is projected to continue into the future with the exception of Kodiak, which will have some hydropower available in 1985 when the Terror Lake project is completed. This will provide 132 thousand MWH of firm annual energy.

Growth in per capita electricity demand is assumed to occur at twice the rate projected for the railbelt.

In the Anchorage area, natural gas is the most economical fuel for space heating. Elsewhere fuel oil is least expensive except where electricity generated by natural gas is available. In projecting future demands, we use different procedures for gas and fuel oil. Natural gas 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. This 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 retrofiting and expansion of the commmercial sector. This trend will moderate in the future, and growth is projected to exceed population by two percent annually.

In addition, a new market will open in the Matanuska Valley in 1985. We estimate that by 1990, one-half of the building stock in the Matanuska Valley will utilize natural gas for space heating. The resulting demand level is estimated on a per capita basis. Currently total natural gas consumption (residential plus commercial) per capita for the gas using population is 113 mcf. 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.

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 consumption grows at one percent in excess of the rate of population increase. The base, from which this growth is projected, is the per capita gas consumption figure converted to fuel oil on the basis of BTU equivalency. The proportion of railbelt population dependent upon fuel oil for space heating is estimated to be 12 percent.

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

Nonrailbelt

Outside the railbelt, space heating is almost entirely provided by fuel oil, with the exception of Barrow. Growth in consumption is assumed to occur two percent faster than population due to a continuation in the decline of average household size and upgrading of the average size and number of structures relative to population. The same growth rate is applied to gas use in Barrow.

The base from which growth is projected is the same per capita coefficient of fuel oil use for space heating used for the railbelt population. This estimate is consistent with surveys and small region 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.

INDUSTRIAL USE OF LIQUID FUELS AND NATURAL GAS B.4

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 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 seven percent annually for ten 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. Transportation-Oil

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.

e. 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.

f. 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.

PROCESSING PLANTS

REFINERY	PLANT CAPACITY	DATE PLANT IN OPERATION	DATE EXPANSION	PLANT PRODUCT	DESTINATION
NIKISKI					
Chevron Refinery	18,000 BPD, North Slope Crude	1962		JP4, Furnace Oil, Diesels, Fuel Oil, Asphalt, Unfinished Gasoline.	JP4, JA50, Furnace Oil, Diesels, and Asphalt for Alaska; Unfinished Gasoline, High Sulfur Fuels to Lower-48 states.
Tesoro Refinery	45,500 BPD	1969 (17,500 BPD)	1974,1975,1977 1980(7500 BPD Hydrocracker Unit.)	Propane, Unleaded, Regular, and Premium Gasoline, Jet A, Diesel Fuel, No. 2 Diesel, JP 4 and No. 6 Fuel Oil.	Alaska except No. 6 Fuel Oil to Lower-48 states.
Union Chemical Division	Ammonia 1,100,000 tons/yr Urea 1,000,000 tons/yr	1969	1977	Anhydrous Ammonia, Urea Prills and Granules.	West Coast and export by tanker and bulk freighter.
INTERIOR ALASKA					
North Pole Refinery	46,600 BPD	1977	Fall 1980	Military Jet Fuel (JP4), 3000-4000 BPD; Commercial Jet Fuel, 5000-6500 BPD; Diesel/Heating Fuel No. 1, 1000-1500 BPD; Diesel/Heating Fuel No. 2, 1800-2500 BPD, Diesel Fuel Type No. 4, 600-1800 BPD.	Fairbanks area, Nenana and river villages, Eilson AFB.

TRASPORTATION FACILITIES

Phillips-Marathon LNG	230,000 MCF/Day	1969		Liquified Natural Gas.	Japan, by tanker, 2 tankers capacity 71,500 cubic meters each, avg. one ship every 10 days.
Pacific Alaska LNG	200,000 MCF/Day initial 400,000 MCF/Day (2nd yr)	Planned 1986		Liquified Natural Gas.	Southern California one ship every 13 days.

Trans-Alaska Pipeline Statistics [1/]

1982	Pump Sta. 1 Throughput	Closing Valdez Storage	# Ships	Ship Cargo	Ship Liftings
January	50,385,826	6,130,687	61	811,669	49,511,820
February	45,548,631	5,242,503	53	852,308	45,172,305
March	50,379,849	2,919,529	65	800,744	52,048,334
April	48,431,614	1,721,105	64	765,986	49,023,096
May	50,583,201	4,519,692	56	840,479	47,066,819
June	47,693,327	3,679,775	56	855,928	47,931,968
July	50,739,029	3,499,471	60	836,602	50,196,146
August	50,191,592	3,365,599	58	854,876	49,582,797
Sept.	48,998,195	6,790,667	52	863,280	44,890,561
October	50,404,233	5,832,173	61	829,994	50,629,644
November	48,082,928	4,061,822	61	806,667	49,206,687
December	49,703,120	4,785,900	59	804,102	47,441,992
TOTAL	591,141,545		706		583,370,439
Average Month	49,261,795		59	826,886	48,614,203

[1/] Personal communication with Alyeska Pipeline Service.

Note. Data for 1983 not available at time of printing.

Economic projections for estimating future petroleum demands are particularly difficult to develop this year because of the unsettled nature of both the world oil market and the national 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 affects the short and medium term level of economic activity in the state as the recession in the Lower 48 states makes the in-migration of people and money to Alaska more attractive.

This phenomenon during the last two years, amplified by the dramatic growth in state spending fueled by the increase in oil prices, has generated an increase in population from 400 thousand in 1980 to 464 thousand in 1982 (Alaska Department of Labor). This two-year increase in population matches the magnitude of the growth which occurred between 1974 and 1976 during the peak construction years for the oil pipeline (approximately 67 thousand), and was unanticipated by all forecasts. This annual growth rate of 7.7 percent during the past two years contrasts sharply with an average annual growth rate of 2.9 percent in population between 1960 and 1980. The fact that population change can display such a wide variation in growth in only two years 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 assumes a population growth rate of 2 percent annually with an employment growth rate of 1.8 percent. These growth rates are down from those observed over the first two decades of statehood, but are considerably above projections of growth of the national economy. 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 (Survey of Current Business, November 1980).

These rates of growth are obviously consistent with many possible sets of assumptions about future basic sector activity and public sector spending. For future basic sector activity the particular "scenario" employed to generate the population numbers for this projection was similar to that used in the moderate case scenario presented in last year's study (Historical and Projected Oil and Gas Consumptions, Division of Minerals and Energy Management, January 1982), with the following exceptions:

1. Pacific Alaska LNG - deleted

2. Petroleum Refinery - deleted

3. U.S. Borax Molybdenum - added

4. Alaska Natural Gas Pipeline - two-year delay

Public sector spending is constrained by the flow of petroleum revenues. This projection of employment is consistent with a growth in state spending consistent with the current spending limit until 1988 at which time the revenue constraint supersedes the expenditure limit ceiling. Non-essential programs are eliminated (transfers and subsidies), taxes are reinstituted and tax schedules raised, and the growth in the capital and operating budgets stops. State government employment remains constant after 1987.

The regional distribution of economic activity, employment, and population continues to shift in favor of the railbelt as the economic center of the state.

The population projections and distribution used in the demand calculations are shown in Table D.1.

Population Projections TABLE D.1

Year	State Total	Railbelt 1/	Southeast Alaska	Rest-of-State
1982	464,047	333,009	59,201	71,837
1983	473,328	341,001	59,812	72,515
1984	482,795	349,185	60,392	73,218
1985	492,450	357,566	60,968	73,916
1986	502,299	366,147	61,541	74,611
1987	512,345	374,935	62,109	75,301
1992	565,670	422,139	64,876	78,655
1997	624,546	475,286	67,466	81,794

1/ Railbelt includes the following Census Divisions: Anchorage, Kenai Peninsula, Matanuska-Susitna, Fairbanks, Southeast Fairbanks, and Valdez Cordova net of the Cordova census subarea.

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

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